Multimedia and Its Implications for the News Message

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Abstract

Multimedia and Its Implications for the News Message is about meanings in multimedia, and how the interaction of multiple media affects those meanings and the messages they create. In other words, the structure of the multimedia and the intermedia perturbations generated by that structure create the message. It is not about communication or the communication of communication. While meaning does involve interpretation and different people interpret meanings differently, meanings here are based on the social norms of a target audience. An important focus is the effects of intermedia perturbations that are generated by the relationships between the media. These intermedia perturbations are critical in determining the news message and understanding the way changes in meanings result from intermedial relationships and, in addition, whether or not these changes are overt or covert as occurs when using subliminal or liminal techniques. This understanding is a prerequisite to creating multimedia that communicates the intended message.

The project includes a survey undertaken to better understand current use of multimedia in online news. In addition, it looks at how the construction of meaning in multimedia can be understood drawing on a number of different theories and models from various fields. These theories and models include autopoietic theory, systems theory, complexity science, emergence theory, added value, the generalized theoretical framework for the analysis of multimedia with its three models of multimedia, and the model of film music perception. A proposed model of multimedia that incorporates aspects of these various theories and models is constructed to enable analysis of an existing multimedia text or creation of a new multimedia text with the message determined for a target audience.

Statement of Candidate

I certify that the work in this thesis entitled "Multimedia and Its Implications for the News Message" has not previously been submitted for a degree nor has it been submitted as part of the requirements for a degree to any other university or institution other than Macquarie University.

I also certify that the thesis is an original piece of research and it has been written by me. Any help and assistance that I have received in my research work and preparation of the thesis itself has been appropriately acknowledged.

In addition, I certify that all information, sources and literature used are indicated in the thesis.

Meghan Stevens (40504336)

Meghan Stevens

12th February 2015

Acknowledgements

Abbreviations

ABC: Australian Broadcasting Corporation, except in Chapter 14 where it refers specifically to Australian Broadcasting Corporation online news.

ACMA: Australian Communications and Media Authority

ACO: Australian Chamber Orchestra

AHPRA: Australian Health Practitioner Regulation Agency

AJ: Al Jazeera online news in English

BBC: British Broadcasting Corporation online news

CAA: Chiropractors Association of Australia

CNN: Cable News Network online news

DW: Deutsche Wella online news in English

F24:   France 24 online news in English

FOSIM: Friends of Science in Medicine

NPPA: American National Press Photographers Association

OAIC: Office of the Australian Information Commissioner

SSO: Sydney Symphony Orchestra

Web: World Wide Web

An Outline of Chapters

Part I Introduction

Chapter 1 *Background* describes and defines multimedia and outlines the background to multimedia journalism. In addition, it states the objectives, the problems that can result from the use of multimedia in news, and the significance of the thesis.

Chapter 2 *Trust, Ethics and Sensationalism* discusses the falling rates of trust in the media, and the audience response to sensationalism. It discusses how the use of sensationalist techniques can make news more entertaining but can undermine the ability of a news organization to present unbiased and ethical news. It concludes with a description of a television health and science report that uses sensationalist techniques in a way that is biased and unethical.

Chapter 3 *Communication Theory versus an Alternative Theory* reviews and clarifies the misinterpretations regarding Shannon's "A Mathematical Theory of Communication" (1948) created by Weaver's interpretation of Shannon's theory in the pamphlet book "The Mathematical Theory of Communication" (1949). It shows that the thesis moves beyond traditional communication theory and explains that the theory proposed in this thesis does not reference communication theory as it is commonly understood, and which is based on Shannon's theory. The proposed theory draws on a number of audio-visual, multimedia and media theories and it focuses on the relationships between the media that compose the multimedia.

Chapter 4 *Theories of Multimedia & Audio-visual Technology* describes a number of theories, models and research that are incorporated into and referenced by the proposed theory of multimedia and which are not described in their own chapters elsewhere. Included in this chapter are Chion's added value and synchresis, Cook's generalized theoretical framework for the analysis of multimedia, and Lipscomb and Kendall's model of film music perception. However, autopoietic theory, systems theory, complexity science, and emergence theory are

described in their own chapters (5, 6, 7 and 8 respectively). In addition, this chapter describes audio-visual cognitive psychology research which is drawn on throughout the thesis. It also explores research on intermedia conflict and information overload.

Part II Systems Theories & Their Application to Multimedia

Chapter 5 *Autopoiesis in Multimedia News Messages* is a slightly revised version of the article published in the journal *Multimodal Research* Volume 2(1) 2013, published by the Multimodal Research Centre, Auckland University of Technology, New Zealand. The article has been reformatted in the style of the thesis for consistency and so it can be included in the table of contents and table of figures. This chapter describes the autopoietic theory of Humberto Maturana and how it can be applied to a multimedia news story to assist in understanding the topology of multimedia, and how the meaning of the multimedia message is created from the relationships between the media. The concepts of structure-specific systems and perturbations are particularly relevant given that the relationships between the media, and the intermedia perturbations they generate, play an important role in determining the message of the news story.

Chapter 6 *Systems Theory & Multimedia* describes the link from Maturana's autopoietic theory to Luhmann's systems theory, discusses various criticisms of Luhmann's application of Maturana's autopoiesis to social systems, and builds on a number of Maturana's autopoietic concepts. It describes a number of concepts from Luhmann's systems theory, including his notions of function systems, communication events and systems differentiation, and their application to a multimedia text.

Chapter 7 *Multimedia as a Complex System* argues that a multimedia text, where the multimedia is used to communicate information such as a news story, under certain conditions, can be categorised as a complex system. In addition, that complexity science, as interpreted by Scott Page, sheds light on a number of the problems that can occur in multimedia such as the emergence of unexpected changes in meaning. It describes the

prerequisites for a complex system and shows how a multimedia text can meet these requirements. In addition, by meeting these requirements it is possible to create a multimedia text which is entertaining, as well as one that maintains the intended meaning.

Chapter 8 *Multimedia, Causality and Emergence* describes emergence in multimedia from the perspective that multimedia can be seen as a complex system where emergence can occur. A complex system can also be an autopoietic system where self-production occurs, and as an autopoietic system, a type of causal relationship occurs which can be understood using Fleischaker's consequential theory. In addition, it expands the discussion of emergence theory and its application to multimedia which was briefly discussed in the previous chapter. It is claimed that the scenes in multimedia texts can fall into three categories, those that have an enriched meaning but this is not emergence, those which have a simple form of emergence which is readily understood, and those which have a more complex form of emergence. The emergence in multimedia can be understood using Bedau's definitions and hallmarks of emergence and his process of crawling the micro-causal web.

Part III Message, Meaning and Modelling

Chapter 9 *Mediation in Multimedia* describes McLuhan's concept of "the medium is the message" and the mediation this involves. In addition, it describes the mediation of the individual media on the meanings of those media, and the mediation of the multimedia as a whole on the news story message.

Chapter 10 *Association, Accents & Meaning* explains the structure of a multimedia text. In addition, it explains that the expressive meaning is formed from associations and accents of each of the media. The associations are created by meanings from culture, education and experience while the accent structures are created by salient points in time in a multimedia text. The association and accent relationships between the media can be in three different states which can be explained using Cook's multimedia models (conformance, complementation and contest) plus the addition of compatible. All have the potential to create

intermedia perturbations that can influence the meaning of the other media and mediate the meaning of multimedia new story message. In addition, the contest relationships are the most likely to create ambiguity or multiple interpretations because it is from conflict that a new and unexpected meaning can emerge.

Chapter 11 *Influence of Differentiation on Meaning* extends the discussion of Luhmann's concept of systems differentiation and its application to a multimedia text. This includes explanations of how the type of differentiation conditions applicable at a particular time in a multimedia text are determined, and in addition, how differentiation plays its part of the process that creates the multimedia news message.

Chapter 12 *The Proposed Model of Multimedia* draws on various concepts and theories, including those from autopoietic theory, social systems theory, complexity science, emergence theory, added value, synchresis, the generalized theoretical framework for the analysis of multimedia and the model of film music perception. These are brought together to produce a model that can be used to both create and evaluate a multimedia text so it communicates its intended message. Each stage of the model is explained as well as its overall functioning.

Chapter 13 *Application of the Model to Multimedia* analyses two television science reports to apply the proposed model. These analyses show how the proposed theory of multimedia is used to determine whether the meaning of the news story message is likely to be distorted by intermedia perturbations generated by subsystems.

Part IV Interactive Multimedia & Theory

Chapter 14 *Survey of Online News* discusses research undertaken as part of this project to determine the extent, type and effectiveness of multimedia on selected news websites. This included an examination of audio files, video, slideshows, search facilities and menus, and the level of interactivity of story content, which was generally quite low.

Chapter 15 *Interactivity and News* discusses the relationship between interactivity and multimedia and that the message of the Internet/Web is interactivity. It describes how to apply the proposed theory of multimedia to create new forms of interactive news – news summaries, gamification, and more personal news (social media) – that make the news more entertaining, and how various techniques can be used with online news without changing the meaning of the news story message.

Part V: Conclusion and Back Matter

Chapter 16 *Conclusion: the Reality of Multimedia* discusses Luhmann's concepts of news as mass media and applies them to today's new reality, created by social media, to show how the theory of multimedia described in this thesis fits into this new reality.

Part I Introduction

Chapter 1   Background

Introduction

The aims of this chapter are twofold. Firstly, it provides a brief history of multimedia, it defines several multimedia terms, and it describes the background to multimedia journalism. Clear definitions are necessary because without understanding the nature of multimedia, what is to follow will not make a great deal of sense. Secondly, this chapter gives an overview of the thesis including its objectives, the problems that can result from multimedia, and the significance of the thesis.

About multimedia

Origins of multimedia

Multimedia has its origins in the arts, both live performance and cinema. The first multimedia performance – even though the term was not in use at the time – was probably the surrealist ballet *Relâche* in 1924 at the Champs-Elysées theatre. *Relâche*, meaning, "no performance today" was created by the French painter and poet, Francis Picabia. It has two acts that are separated by the film *Entr'acte,* directed by René Clair, in which the composer Eric Satie played a cameo role. Satie wrote the ballet music as well as the film score. The score was written to underline the action and was probably the first score for cinema ever written with music-to-film synchronization; Paris had seen nothing like it before (Ford 1997: 55-6).

The first act of *Relâche* started with a series of projected images on a movie screen with the last image being a gun fired at the audience. Then everything went black and the curtain rose to a woman dancing without music. This was followed by a male dancer entering in a motorized wheelchair, discarded when he joined the dance performance, with powerful spotlights sweeping the audience (Gillmor 1988: 250-1). The second act ended with Satie and Picabia driving a motor car onto the stage (Ford 1997: 56). For many people, this multimedia performance would seem almost as radical today as it was at the time.

Multimedia is just as appropriate for use with the high arts as it is with the popular arts (Cook 1998: viii) and this can be seen with multimedia used with ballet and classical music. Multimedia has become mainstream with the Australian Chamber Orchestra (ACO), the Australian Ballet and capital city symphony orchestras staging multimedia performances regularly. For instance, the Australian Chamber Orchestra presented *Luminous* in 2005 which was classical music and singing accompanied by the artworks of the internationally acclaimed but controversial photographer, Bill Henson. In 2012, the ACO presented an even more unusual performance for a chamber orchestra, *The Reef*, which featured surfing film footage accompanied by classical music.

The Sydney Symphony Orchestra (SSO) season normally includes a *Kaleidoscope* series, which combines the traditional with the modern. In 2007 this series included *Gold Rush* and *Antarctic Symphony*. *Gold Rush* consisted of the Charlie Chaplin movie of the same name with the SSO playing the music score he created for it. *Antarctic Symphony* included the music by Ralph Vaughan Williams, *Sinfonie Antartica,* accompanied by photographs from the Scott Expedition with actor John Bell reading extracts from Scott's journals. Such performances are increasingly common and most seasons now include a multimedia performance.

The Australian Ballet often includes multimedia in ballet performances. This is normally achieved with rear projection of images replacing or complementing stage sets. One such ballet, premiered in April 2003, was Meryl Tankard's *Wild Swans* with commissioned score for orchestra by the internationally acclaimed composer Elena Kats-Chernin. This ballet was a mix of dance, photographic and video illuminations, and soprano voice. Such performances with added media have become increasingly popular.

Film theory, much of which is based around notions of editing, provides many concepts for multimedia theory. The first filmmaker to use and develop editing techniques was Edwin S. Porter. Taking Porter's techniques further, Russian filmmakers, particularly Sergei

Eisenstein, developed montage theory (Thompson & Bordwell 2003: 30-1,129-130). Montage theory is based on the concept that "montage is an idea that arises from the collision of independent shots" where "each sequential element is perceived not next to the other, but on top of the other" (Eisenstein 1949: 49). In other words, montage is a technique that uses different shots of apparently unrelated footage. It includes cuts and visual effects, which allow media to be combined in ways that are not normally possible, or at least not practical, in a purely live performance. Eisenstein took montage theory further by adding the concept of vertical montage that combines incongruent media such as music and images that would not normally accompany each other.

Montage theory concepts assist in defining multimedia. As commonly used and understood, the term multimedia does not refer to multiple separate media occurring at the same time such as in a live opera performance. However, most people do consider that the Internet[1] is multimedia. Between live performance and the Internet is a shadowy area as far as defining multimedia is concerned. Whether movies and television are categorised as multimedia depends on the content and who evaluates them with what criteria. Based on montage theory, a television show could be categorised as multimedia if the show is a construct of disparate parts.

Types of multimedia

Multimedia can refer to hardware such as a DVD or content such as a movie, a physical assembly such as an art installation or content on the World Wide Web (the Web). Lightshows are referred to as multimedia even though they might contain only one type of media, the laser.

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[1] There is sometimes confusion about the difference between the Internet (Net) and the World Wide Web (Web). The Internet is the infrastructure while the Web holds the content. The Web is composed of websites, around 60 trillion individual webpages (Google 2014), containing the information that is stored more or less permanently, whereas emails are moved around the Internet but are not stored on the Web unless the person uses a Web email facility such as G-mail. So when browsing, we use Internet facilities and services to find information on the Web. However, both terms are often used loosely and particularly the Internet is often used as referring to and including the Web.

Figure 1-1shows the different types of unrelated items that can be referred to as multimedia.
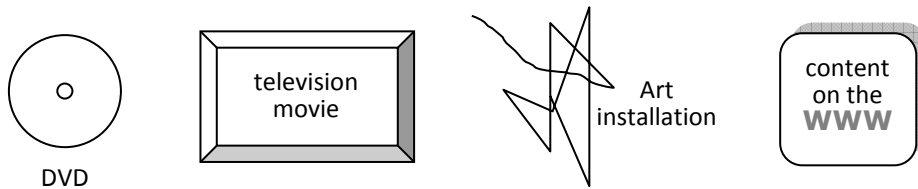
Figure 1-1 Different forms of multimedia

More commonly, multimedia is thought of as some type of combination of various media as occurs on the Internet and which includes visual and audio media that are connected or synchronized in some way. At the moment, multimedia does not normally include smell or sophisticated forms of touch, although touch may be offered as part of art installations, and kinaesthetic sense is available with computer keyboard, mouse, touchpad and joystick. Multimedia will frequently include hypermedia, the use of hyperlinks attached to language or images, which when clicked, create some type of change such as jumping to another page or activating a process.

Figure 1-2 shows that normally multimedia is limited to four different types of media and these are visual, audio, hypermedia and kinaesthetic media.
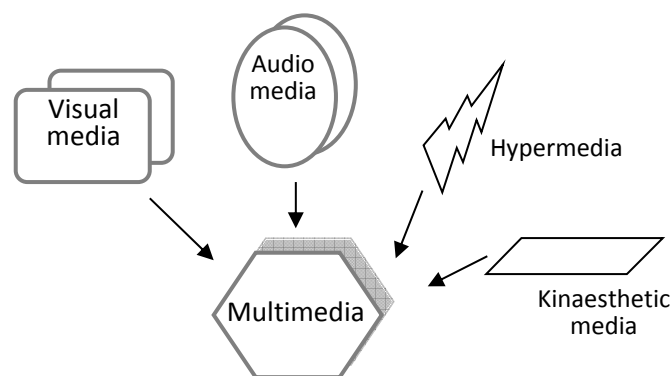
Figure 1-2 Media composing multimedia

Note that various symbols have been designated to represent different media. These symbols include the hexagon to designate multimedia because it indicates the many components of multimedia, a rounded square in the shape of a screen to indicate visuals, an

oval to indicate sound, and a horizontal parallelogram to indicate a keypad. In later discussions, when language is discussed as separate from other visual and audio media it is represented by a vertical parallelogram.

Multimedia is used for education, entertainment, advertising and news. If the content can be manipulated by the user with the use of hyperlinks, such as a computer game, then it is interactive, non-linear multimedia. If content cannot be manipulated, such as a movie in a traditional format, then it is non-interactive, linear multimedia. The ability to only stop and start a movie on a DVD is not normally considered as interactive but most movies on DVDs have facilities for the user to select and watch specific parts. The facility for this manipulation is normally available through menus and/or images with hyperlinks to different sections of the movie, and with these facilities the movie becomes interactive and non-linear. Music recordings, with their facility for choosing specific tracks have long been interactive and non-linear but these facilities have been provided by hardware rather than software.

Definition of multimedia

Multimedia is more than only capturing something live using technology, such as using a video camera to capture news footage. It includes added technology such as special effects or it uses technology to construct the multimedia in a way that does not mimic the original media. For instance, a conventional opera is not multimedia but if an opera included an animated visual rear projection as a backdrop it would be multimedia. Another example is a video of a singer performing. A videoed performance is not classified as multimedia. However, if special effects were added, as is done with most music videos, the video would become multimedia. In many movies, the sound, including voices, is dubbed afterwards to create a higher quality sound but this does not necessarily make it multimedia. However, the amount of editing and special effects that are used in most movies normally puts them in the category of multimedia.

The term "multimedia" is defined here as an audio-visual construct of disparate parts where the multiple media are formed into an aggregated whole where some type of technology is involved. Therefore, multimedia has four properties. The first property, that the multimedia is a construct of disparate parts into an aggregated whole, draws on montage theory in that editing of scenes brings disparate media together. An unedited video of a person or event is not multimedia because even though it might include both audio and visual, it is not constructed from disparate parts that have been edited together.

The second property is that multimedia has media that cannot be in a printed book or newspaper. In other words, multimedia has media which are additional to the written language and still images. The third property is that multimedia should include multiple types of media and the different types of media should relate to the different senses. There are currently three senses that can occur with multimedia and these are aural, visual and proprioception. The sense of proprioception (discussed further in Chapter 15) is also referred to as the kinaesthetic sense and is the sense of self in relation to the world and the objects in it. An example is a person's hand using a mouse or joystick. Here, the tool, such as the mouse, provides an extension of the self. The fourth property is that the multimedia must contain some element of technology or a feature created by technology and it cannot be only a recording of a live performance.

Definition of multimedia text

The word "text" is used as in literary theory where a text is a set of information that sends a message. A multimedia text is defined here as multimedia having a specific message that the multimedia is intended to communicate, such as news or educational material. The message is created by a complex process that includes mediation, aggregation and messaging. Mediation occurs with the influence of the medium; McLuhan's medium-is-the-message. Aggregation of media occurs within the multimedia when the meanings of the media are combined and negotiated depending on the relationships between them. Messaging occurs

with the message developing over time. Additionally, the message process includes influences by the broadcast medium that carries it, such as the Internet, as well as the audience that interprets it. Mass media targets mass audiences so the issue is not how an individual interprets the message but how the targeted majority interprets the message. Communication of news is not as complex as other forms of communication because the media use special techniques such as framing, which includes media templates, story branding and story placing, as well as the use of empathy, stock images and stereotypes (Kitzinger 2004) to ensure consistency of interpretation. Therefore, the interpretation of information is less of an issue in journalism than it is in many other areas of information dissemination.

The term "multimedia text" is used in this thesis to refer to multimedia which is inseparable and which communicates information but is not necessarily interactive. A computer game that is used solely for entertainment is not classed as a multimedia text. Multimedia news or multimedia educational material would be classified as texts because their primary purpose is the communication of information.

A multimedia text is different to a multimedia group. In a multimedia group the multiple media are not an aggregated whole but remain separate media that are associated in some way. For instance, if a news story has a number of components on or accessible from a single webpage including, text, hyperlinks to other pages about the story, photographs, and a video, these components are be referred to here as a multimedia group.

Definition of multimedia message and media meaning

In a multimedia text, the different types of audio and visual media are brought together to create some type of multimedia message. If experienced alone, each medium creates its own meaning, but in multimedia, these meanings combine and interact to create an aggregated meaning, which is the multimedia message. Therefore, the media are said to have meanings while the multimedia is said to have a message. In multimedia there is a conceptual aspect and a physical aspect to multimedia. The meanings and the message are conceptual,

and the media and the multimedia are said to be physical in that they can be seen and heard. The multimedia message may vary in importance, as in an art installation where the message might not be significant, but in a news story or educational material the multimedia message is normally the primary purpose. In a news story, the multimedia message is the news message and is not to be confused with McLuhan's medium-is-the-message discussed in Chapter 9.

Multimedia journalism

The term multimedia is ambiguous and is used many different ways in journalism to define many different products. Therefore, it can be claimed that it is too ambiguous to use in an analysis of contemporary journalism and that "multimodality" is a more appropriate term (Opgenhaffen 2008). While this may be correct, multimedia is the term commonly used when referring to online journalism. A definition of multimedia is "the use of more than one type of media in a single product" (Kawamoto 2003: 4) and although this is accurate in theory, the term is generally used in journalism with a broader meaning. For instance, multimedia has been defined as video files, audio files, photos, and slideshows (Sturgill, Pierce & Wang 2010: 11).

Multimedia in journalism can be divided into two categories: divergent and convergent; but, as Appelgren states these terms mean different things to different people (Appelgren 2004). For instance, the term media convergence can refer to the trend of media companies to produce content for multiple platforms (Huang et al. 2006: 83-4) with an example being when traditional news media is repackaged as online content (Carvajal & Avilés 2008: 225). Opgenhaffen states that divergent multimedia includes the use of, and hyperlink to, various facilities, which can be found on a website such as e-mail and user comments, while convergent multimedia involves multiple media modes used together such as written language, photo(s) and video (Opgenhaffen 2009: 71). However, there are other more intuitive terms for these forms.

A closely related term is interactivity. Interactivity has many and varied definitions and a useful definition of interactivity is "the extent to which users can participate in modifying the form and content of a mediated environment in real time" (Steuer 1992: 84). In other words, the level of interactivity is commensurate with how much users can modify data, and modify the way that data is accessed, at the time the data is accessed. However, another concept normally associated with interactivity is two-way activity, where each side responds to and acts upon the other in a more or less continuous fashion. In addition, interactivity occurs along a continuum (Rafaeli 1988: 111) and it can be difficult to define whether an activity is interactive or not. For instance, as previously stated, the ability to stop and start media would not normally be considered as an interactive feature but being able to select a specific starting point would normally be thought of as interactive.

Interactivity can be defined as interpersonal and as content. Interpersonal interactivity occurs with facilities such as e-mail and discussion forums while content interactivity occurs with multiple choices and the unrestrained navigation that occurs with hyperlinks (Zeng & Li 2006:141-3). The terms "medium", "human-medium" and "human" are also used to describe interactivity (Chung & Yoo 2008:378). However, these terms are not intuitive and can be confusing. There are also variations in this set and it sometimes includes "medium-human" and "human-medium" (Larsson 2012). Another set is "human-to-human", "human-to-computer" and "human-to-content" (McMillan 2005:1). All are described in the glossary. Due to the confusion that can occur with these sets of terms, they are avoided here.

The terms "interpersonal" and "content" are clearer, have narrower meanings and have fewer variations than those mentioned above, so are used here. As well as using these terms for interactivity, in this thesis they are used to classify multimedia. Interpersonal multimedia is stated as being media that is external to a news story such as email and user comments. User comments are about the story, but are not part of the story, so user comments are always

interpersonal multimedia. Content multimedia refers to the story itself created by the journalist or news team.

In sum, interpersonal interactivity is the actions involved in creating the emails or comments and interpersonal multimedia are the actual emails or comments. Content interactivity is the user's ability to interact with the story and content multimedia is the story itself.

Content multimedia is further clarified by adding the word "story" when the content refers to only a news story. Both story content multimedia and interpersonal multimedia can contain navigational multimedia, that is, hyperlinks. Hyperlinks can also be referred to as hypermedia.

Content multimedia can be further categorised into a multimedia text or a multimedia group. A multimedia text is where the media are aggregated into a whole and are inseparable as previously defined. A constructed video is a multimedia text in that the visual and audio are inseparable but a video is not normally interactive other than the ability to stop and start it. A video might be a combination of various types of images and sounds. The images could include video scenes, photographs and graphics such as maps. The sound can include both diegetic and non-diegetic elements. In news, diegetic elements would be the sound that normally accompanies the images such as language in a video interview, while examples of non-diegetic elements are mood music or a voice-over.

Figure 1-3 shows a multimedia text, which is composed of video scenes and audio. These subsystems cannot be accessed separately, nor can the audio and visual be separated other than one or the other being turned off.
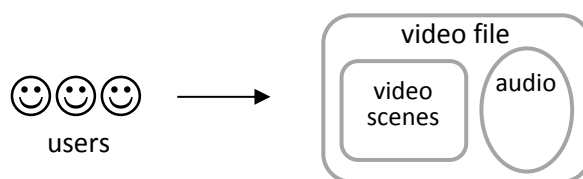
Figure 1-3 Video is a multimedia text with aggregated and inseparable media

Figure 1-4 shows a multimedia group consisting of a video file, photos, audio file, written text with hyperlinks. The multiple media are all part of the same story but are accessed separately.
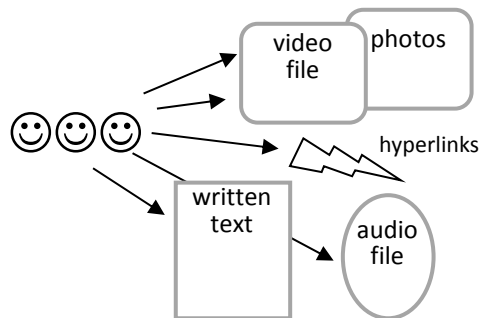
Figure 1-4 A multimedia group has separate multiple files

Figure 1-5 shows an interactive multimedia text where the media are inseparable from the user perspective and accessed through an interface such as a menu. An interface is a normal part of interactivity and occurs with games but most news stories have not yet progressed to this stage.
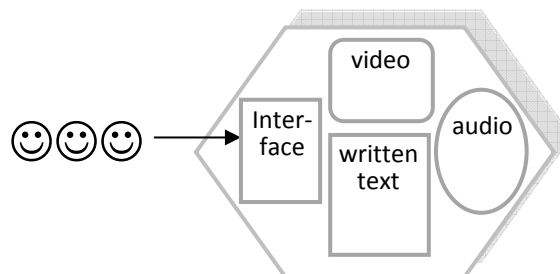
Figure 1-5 Interactive inseparable multimedia with user interface

Multimedia journalism is defined as the use of multiple media including written text, photographs, videos, graphics and audio files, to produce a single news story. In multimedia, each of the media can influence the meaning of the others. Music can change the meaning of images and language, images can change the meaning of music and language, and language can change the meaning of music and images. These changes of meaning can lead to misinterpretation of the multimedia message as well as creating confusion. These effects are

not an issue with multimedia intended only for entertainment but they are a problem for

information produced for news and education.

A change of meaning can be avoided by closely matching media but this is not the

solution in journalism. When information matches too closely, such as words and image,

where neither adds different information, little interest is created; however, a combination of

the expected and the unexpected will add richness and grab attention (Boltz, Schulkind &

Kantra 1991: 601; Dunsby 2007). Therefore, added media that are not a close match normally

make the news story more interesting even though the potential for misinterpretation and

confusion exists. However, the additional work involved to avoid misunderstanding and

confusion, does not normally outweigh the benefits of increased entertainment value, given

news is expected to be entertaining.

Multimedia news message

A multimedia news text normally has a story with an angle. An angle is the journalistic

term for the way the story is presented. The story and angle have an overall meaning or theme

and this is the essential meaning or the essence of the story. Each scene in the multimedia text

has its own meaning and each scene's meaning builds on the last to create the overall or final

meaning. Both the meaning of the scenes and the overall meaning are created by the

meanings of the media which compose the multimedia, and the relationships between those

media. Additionally, as previously stated, the overall meaning is influenced by the broadcast

medium that carries it such as the Web, as well as the audience that interprets it; however,

mass media targets mass audiences so the issue is not about how an individual interprets the

media, but as stated previously, it is about the meaning as it would be interpreted by the target

audience. In sum, the term "news message" refers to the essence of a news story from the

angle taken by the journalist and may refer to the news message in a particular scene or the

final news message of the multimedia as a whole.

News as entertainment

Entertainment is normally thought of as something amusing, pleasing or diverting. One view is that enjoyment and pleasure are central to entertainment but given that popular movies can evoke fear and sadness, the concepts of enjoyment and pleasure are an inadequate definition (David, Horton & German 2006:10). Here, entertainment is the dictionary meaning, which is "agreeable occupation for the mind; diversion, or amusement" (Macquarie Dictionary 2013). The feeling of being entertained involves the feeling that comes from being absorbed in a situation, which has been described as "flow" by Csikszentmihalyi (2014), and this concept of flow is similar to immersion, which is closely related to hyperreality and to the inability to distinguish between a simulation of reality and reality itself (Cirucci 2013: 47,54). This concept is discussed in Chapter 15. In addition, entertainment involves a substantial level of passivity. For instance, playing football is entertaining for the audience but is not normally considered as entertainment for the players, rather it is described as sport or recreation. While playing board games and computer games are considered entertainment, they involve much less physical activity than sport. Watching television is almost completely passive.

While it may be challenging to make news entertaining, it does not necessarily mean that factual information cannot be entertaining. Nor is it to suggest that entertainment is the only reason that the meaning of a story might be manipulated. The angle that the story is presented from will change the meaning and this is part of journalism. However, changes of meaning from influences other than the relationships between the media and the construction of multimedia are not the issues being addressed in this thesis.

Entertainment techniques can be used in advertising without corrupting the intended meaning but this does not necessarily mean they can be used in journalism. Advertising is very different from journalism. Advertising is intended to be entertaining but, unlike news, advertising has a single, simple intention. In addition, the meaning presented in the advertisement may already be a distortion and of a dubious nature given that a form of

corruption of the message is normally the intention of advertisers and this occurs with the use of young, beautiful, scantily clad women and sculpted men to promote products. Further, advertisers spend vast amounts of money to produce advertisements that are entertaining and effective even though they are not interactive. Such a level of funding is not available for most news stories with costs of maintaining news organisations increasing but profits decreasing. Therefore, techniques suitable for entertainment and advertising are not necessarily suitable for news. These issues are discussed below and in the following chapter.

Extensive research shows that recall and understanding of news stories are poor (Opgenhaffen & d'Haenens 2011: 8; Katz, Adoni & Parness 1977: 239) except when items are presented frequently. This is because repeated exposure improves recall (Booth 1970: 609-10) as in the case with advertisements, which are normally remembered for a number of reasons including that they are presented multiple times.

There are many reasons why entertainment techniques can be used in advertising with positive results (for the advertisers) but may create problems for news organisations. Even though sound and image project their own individual meanings when experienced separately, a new meaning can occur when they are combined in multimedia as is shown in cognitive psychology research (Cohen 1993; 2000: 369; Shao & Weng 2011: 316-7; Graf & Schacter 1989: 938-9; Marshall & Cohen 1988; McGurk & MacDonald 1976). Advertisers use this emergence of meaning to the product's advantage as in an advertisement for a Citroen where the car takes on the liveliness and precision of Mozart's overture for the opera, *Marriage of Figaro* (Cook 1998: 6-8). Therefore, the problems involved in using entertainment techniques in multimedia news stories cannot be compared to other areas such as advertisements.

As Thussu states, this more recent attempt to make news pleasurable is driven by increased competition, the increasing costs of collecting news globally, and the need for news to be commercially viable, which entails covering its costs with advertising revenue. The result is that to attract audiences, news is portrayed in an entertaining way, even when

covering wars. Whether a news item is broadcast depends increasingly on how much it will attract audiences, with this commercialisation trend extending to public-service broadcasters (Thussu 2007: 2-3,7-11,30-31,38-9,69).

Criticism of journalism that has a primary aim of entertainment is ongoing. In a luncheon address to business leaders in 1972, McLuhan stated that old journalism aimed to be objective while modern journalism is subjective; with the current journalistic practice of immersing the audience in the situation being a "sort of fiction" (McLuhan 2005: 188-9). In his book *The Reality of the Mass Media*, first published in German in 1995, Luhmann criticised journalism as being a class of entertainment rather than the provider of factual information. He argued that news is not based on truth because facts are selected and mixed with opinion, and many items are often reported for their entertainment rather than news value. Luhmann believed that news appears factual only when compared to advertising and entertainment (Luhmann 2000: 1,23-41,63-4). More recent criticism is discussed in the following chapter.

In 1986, Neil Postman predicted that news would become predominantly entertainment and entertainment would dominate the mass media. He stated that with the invention of the telegraph and photography, news had become irrelevant because it contained facts from afar. From these facts, readers learn nothing that they can incorporate into their daily lives. News is about events that its readers cannot influence so it is suitable only as entertainment. In addition, he stated that television "has made entertainment itself the natural format for the representation of all experience" (Postman 1986: 7-9,87).

Even though the use of entertainment techniques appears to be essential for the viability of news, the response to sensationalism by many within the news industry has been to react against the use of such techniques, given they can change the meaning of the news or raise the audience emotional level. The reaction against the use of entertainment techniques can be seen in the American National Press Photographers Association's code of ethics which states:

"Do not manipulate images or add or alter sound in any way that can mislead viewers or misrepresent subjects" (NPPA 2014). While this applies to manipulation for political or unethical reasons, it also applies where manipulation increases the sensationalist aspects of a story. In addition, the code states that the "primary goal is the faithful and comprehensive depiction of the subject at hand".

This reaction to entertainment techniques in informational genres is well founded given that the use of multimedia is increasing and there are more and greater problems with sensationalism in multimedia than in newsprint. The use of multimedia for informational genres has highlighted a number of issues, including emergence of something new in the news message. Emergence is not considered a problem for the entertainment industry but is a problem for news. The emergence of a new and unexpected meaning when media are combined in film was recognised in the first half of the twentieth century by Eisenstein, who found that the combination of music and image often created unpredictable results (Cook 1998: 84; Eisenstein 1947: 159).

These unpredictable results described by Eisenstein occur because we do not hear the same thing when looking and we do not see the same thing when listening (Chion 1994: xxvi,5). Multimedia "constructs" meaning through the reciprocal transfer of attributes and this is not a reproduction, but a dynamic process of cross-media interaction that creates something new (Cook 1998: 97). This new meaning is created by the relationships between the media that compose the multimedia text.

The process of creating meaning in multimedia is complex and includes a number of McLuhan's media concepts. His medium-is-the-message and the mediation it creates is an important part of the process and is discussed in Chapter 9. Many of his other concepts are also helpful in that they highlight areas that need to be considered. McLuhan realised that media, for instance radio, television and cinema, interacted continually with each other and he likened this interaction to the struggle in nature around adaptation and survival (Logan 2013:

89). However, this approach defines media at a higher level and does not discuss the interaction of the media within multimedia so the issue is somewhat different in that the struggle that this thesis focuses on is not between media such as television and cinema, but on the struggle between the components of multimedia, such as the struggle between music and image to dominate the meaning in a movie scene.

Another aspect of McLuhan's media theory is the primacy of one medium giving way to another such as when sound in an oral culture gives way to vision in written language cultures (Potts 2008). While this can be applied from the perspective of the primacy of one mass medium over another, such as the primacy of the Internet over television, it does not apply to the primacy of a particular form of perception over another. There is no overall dominant media in multimedia and no dominant form of perception for the Internet unless it is interactivity, which is not itself a sensory mode even though it uses a number of sensory modes.

The issues of meaning from the interaction of the media within multimedia are becoming increasingly important due to the competition between television and multimedia on the Web. Television must now be more entertaining to retain its audience because it "cannot compete with the interactivity and richness of digital media and their two-way flow of information. Television has become a one-way dead end medium – without interactivity and hence boring" (Logan 2013: 100). Some television shows have introduced texting, where a viewer comment appears as a subtitle on the screen, but this is a very limited form of interactivity. The competition between television and the Web increases the risk of television news being created primarily for entertainment, with more attention given to how added media makes the news entertaining than to whether it changes the intended message. Given this competition between television and the Web, the use of sensationalist techniques is more likely to increase rather than decrease.

There are many criticisms of specific sensationalist techniques used in news, especially music. Even though music is not used extensively in news, it can be the most problematic of all media. For instance, emotional music can be overpowering, become cliché and detract from the real emotion in a story (Ingram 2009). Fiona Anderson of the BBC states that music changes what is being represented while Rich Beckman of Miami University states that using music in a documentary story may cast doubt on the credibility of the reporting (McCombs 2011). One suggestion for resolving the problem of added music is that the music "should be used sparingly unless that's what the story is about" (Ingram 2009). This may be especially important given that research indicates that music is the most common offending noise and canned music (also referred to as piped music and muzak) is the third most hated thing about modern life; canned music is musical pollution and is like an "alien force [that] moves relentlessly forward regardless of any human responses" (Frith 2002: 35-9).

Music is often used in the background in longer news reporting and documentaries and is referred to as background music, but background music, if it was true to its original aims and composed as it was originally envisaged, would not create a problem. Background music was originally created by Erik Satie and referred to as "furniture" music. Satie's furniture music was composed for use in specific situations and was integral to and supported its environment, as does a conversation, a chair or an artwork (Myers 1968: 60). Therefore, if faithful to its original aims, background music would not change the meaning of the media it accompanied. But the background music added to news reports and most documentaries is very different.

Background music can be used to increase the entertainment level while not affecting the emotional level or meaning but it must be specifically composed for each occasion and this is not practical for news. Music used to accompany news reports is normally from a stock library because specially composed music would be costly and would be difficult to obtain within the required timeframes. For already composed music, other than from stock music

libraries, copyright issues must be resolved. However, good music cannot be created from stock library music because it will sound "cheesy" and stale; custom scoring is necessary to ensure that music matches the emotion which already exists but does not heighten that emotion (O'Leary 2009). The use of music, more than any other medium, is problematic in news because music can covertly change the meaning of other media even if the music is not consciously heard (Cohen 1993: 173: 2000: 363,366-8,373-4; Bolivar, Cohen, & Fentress 1994: 48; Marks 1996: 112).

While music can be a problem, silence can also be a problem. Silence, as opposed to quietness, can be disconcerting. Those places normally considered peaceful, such as a beach or forest, are not silent. Silence in nature can indicate danger such as the observation that animals and birds become silent before earthquakes (Anderson 2011; Kakkilaya 2008). Neither is silence congruent with most images. Art movies, such as those by French-Swiss film director Jean-Luc Godard, use effects including silence in unusual ways and silence can be used to create a special effect. However, in most movies, the auditory flow cannot be interrupted by silence because the audience would think there was a technical problem and attention would be drawn to the silence; in movies, silence is replaced with ambient silence, the sounds that are normally heard in a natural environment (Chion 1994: 57). The same issues apply to a news story with video. If there is no sound it is likely to be interpreted as a technical problem, and, in addition, moving images without sound create a sensory gap on television or the Internet. Multimedia offers solutions but it also creates problems.

Multimedia news on the Internet has not been particularly successful (Ahlers 2006: 29,48) and research shows that the use of video on news websites has not been well received. For instance, young adults complain of lack of control with videos, that they take too long to load, that they contain too little information for the time spent watching them, and that they are normally less informative than written articles (Sturgill, Pierce & Wang 2010: 11-2).

While it could be claimed that providing more information and more detailed information would increase the entertainment value of news, there is evidence that news is already too fast. Research shows that recall and understanding of television news items are poor (Mundorf, Drew, Zillmann & Weaver 1990: 601) and this poor recall and understanding is at least in part attributed to the rapid presentation of news items. Both recall and understanding improve with more time allocated to items (Katz, Adoni & Parness 1977: 239). In addition, it will be argued in Chapter 15 that, particularly for online users, "less is more" for a number of reasons including research that shows users prefer to read printed versions of long documents and important information (Hooper & Herath 2014: 53,57-9).

The techniques of tabloid journalism, including sensationalism, which blend trivia, facts and fiction, are increasingly used in multimedia news stories to raise the entertainment level of news. While the use of similar techniques and the outcomes that result from intermedial relationships have been examined in various contexts, including advertisements and music videos, they have not been examined in news. This is surprising because tabloid journalism is not new and news used as entertainment has a long tradition from the sung narrative of the broadside ballad through to the tabloid press, cinema newsreels and television news (Thussu 2007: 3,15,27-9; Vettehen, Nuijten & Beentjes 2005: 282,292-3). While there are many ways to manipulate meaning in news stories, intentionally and unintentionally, this thesis focuses on the relationship between the media in multimedia and how this relationship, especially when entertainment techniques are used, has the potential to change meanings and the message in a multimedia text.

Sensationalism in television science news reporting

Sensationalism has spread further than the traditional newspaper story and today one of the prime media for tabloid journalism is television (Örnebring & Jönsson 2004: 283). While news has been a component of television programming since broadcasting began, the high level of sensationalism is a more recent phenomenon. Tabloid journalism and the use of

sensationalist techniques in news reporting can be seen in many of the episodes of the

Australian Broadcasting Corporation (ABC) science and health news program, *Catalyst.*

   Catalyst episodes can be classified as multimedia news because they use added media

and audio-visual special effects to increase the entertainment level. Specific techniques used

by *Catalyst* include: added background and foreground music, subliminal images, visual

effects, sound effects, increased number of camera shots and cuts, interviews with lay

persons, young attractive female hosts, a fabrication of both sides of the story, emotive

delivery, dramatisation (the re-enactment of dramatic scenes by professional actors), eye-

witness camera, the use of zoom-in camera shots, conversational modes, and a blending of

trivia, facts and fiction. These techniques when used in news can be problematic because they

frequently result in a change of the meaning or the emotional level. As discussed earlier,

added music particularly is recognised as a problem and Fiona Anderson of the BBC states

that when music is added it changes what is being represented and "if you're changing it, it

shouldn't be there. I think this whole issue of enhancement is really dodgy" (McCombs

2011).

   A blending of trivia, facts and fiction can be seen in the episode *Animal Action:*

Cleaning Station for Sharks and Rays (ABC 2010a), described in detail in Chapter 13, which

was entertaining as well as informative. The story message was that the environment provided

a place and process for sharks and rays to be cleaned. This message was not compromised by

the techniques used to make the episode entertaining. For example, in one scene the fish

appear to be dancing to the added music. It is generally known that fish do not dance to

music, so it was easy to discriminate fact from the fiction. The entertainment was not at the

expense of the information. Even if a person watching lacked the ability to discriminate fact

from fiction there would be no ethical issues involved in thinking fish could dance.

   A very different situation exists with episodes of *Catalyst* involving health professionals

making health and safety related statements. Examples are *Natural HRT – Magic Bullet or*

Clever Con (ABC 2007), *Heart of the Matter* (ABC 2013b) and *Chiropractors* (ABC 2013a) where the use of sensationalist techniques undermines the statements of speakers in a way that is claimed in this thesis to be unethical. In *Chiropractors,* the message was that chiropractic was dangerous but this message was created mainly from unsupported statements and sensationalist techniques rather than unbiased presentations of factual information. In *Chiropractors*, both subliminal and liminal effects were used throughout the episode. Subliminal refers to effects that are too fast or faint to be consciously perceived. Liminal refers to effects that are not normally consciously perceived until they are brought to the attention of the audience, such as background music which is not consciously heard. The use of subliminal effects in an ABC science show is surprising given that their use by non-government broadcasters is banned in Australia. The fact that the government owned ABC is exempt from these rules does not reduce the unethical nature of using these effects. The *Chiropractors* episode is examined in more detail in Chapter 2.

Problem and Significance

One of the characteristics of modern society is that systems are becoming more specialised and as specialisation and complexity increase, the potential for problems also increases; in addition, a complex system has more possibilities than can be actualised (Luhmann 1977: 39; 1995: 25). Multimedia news is an example of a new type of complex system which creates new types of problems. Here, the number of possibilities for a message grows exponentially with the number of media active at any one time. The number of possible problems and the difficulty in predicting those problems also grows exponentially. The issues involved in combining multiple media have long been recognised in film, in that film is understood as a sensory experience where sounds and images create sensations and the result is greater than the sum of the parts (Chion 2013b: 325).

This thesis focuses on the problems of multimedia when it is used for informational genres such as news. The proposed theory focuses on the process which results from the

deterministic nature of relationships between component parts. This can result in a type of emergence. This possibility of emergence adds to the possible problems.

There are a number of problems with multimedia news which can be set out as follows:

1: Economic pressure results in increased sensationalism which can change the message

The first problem is that the race to be commercially successful has resulted in news reporting borrowing and adapting techniques from entertainment genres (Thussu 2007: 3) as previously discussed. This approach, creating news as entertainment, can result in the news being portrayed inaccurately or with an increased emotional level. As Postman suggests, information and entertainment should not be mixed; but as he also states, our society has become based in entertainment (Postman 1986: 7-9,87,146-154) so audiences expect news to be entertaining.

2: The ways in which added media change the message are poorly understood

The second issue is that there is poor understanding of the reasons as to how and why changes from added media occur. These changes can occur unintentionally because few forms of media are as challenging as multimedia. Unintended changes of meaning in a multimedia text such as news can be overlooked by the creators because they are familiar with their creation and lack adequate tools to evaluate it. The creators may miss the numerous ways that sound, images and language can combine to create results that cannot be interpreted by most analytical tools (Zbikowski 2002: 252).

Comments along similar lines are made by Larsen when he discusses the fact that in media studies, the theoretical and analytical issues of multimedia are frequently neglected. He states that one area of analysis that has been used to a limited extent for multimedia analysis is semiotics. However, semiotics, because it is based on verbal text, does not provide a theoretical framework for multimedia. Semioticians acknowledged the need to study the diversity of media five decades ago but it was difficult with the tools and methods of the time.

The majority of media texts today are "montages, or heterogeneous constructions that are characterized by a constant displacement and circulation of meaning" and the specific problems created by being montages with constantly changing meanings are not recognised. As the use and complexity of multimedia increase, it becomes more likely that these changes to meanings will remain unnoticed (Larsen 2002: 134-5). In other words, the meaning in a multimedia text is fluid and can change as quickly as the media within the multimedia change, but this change is not readily noticeable because a multimedia text is normally a complex construction of multiple media.

Not only can added media change the meaning of the news but it can also change it in unintended and unexpected ways and "unintended meanings may arise both at production and, particularly at reception" (Toynbee 2008: 277). Eisenstein recognised that unexpected changes could occur with multiple media when he said that "two pieces of any kind, placed together, inevitably combine into a new concept, a new quality, arising out of that juxtaposition" (Eisenstein 1947: 4).

Sensationalist techniques make information more entertaining but they can change the meaning or emotional level; how and why this change occurs is poorly understood. Thus there is a clear need to be able to study and discuss the emergent interpretations of multimedia messages.

3: Audiences are not aware of changes to the meaning

The third problem with multimedia news is that this change of meaning or emotional level can occur without the audience being aware that a change has occurred.

Changes of meaning and emotional level, whether intentional or unintentional, especially when the audience is unaware of the changes, raise ethical issues. Ethical issues are not particularly relevant in films and concerts because even in biographical dramas it is generally accepted that directors use artistic licence. However, these changes done for artistic reasons are normally covered by a disclaimer in the credits. A different situation exists in

advertising where it has long been recognised that advertisements can meet advertising standards while at the same time implying misleading information.

News is very different to both advertising and mass media entertainment in that audiences are generally not aware of how these changes in news can surreptitiously manipulate audience views because as Chion states, the added value of added media means that the meaning appears to come "naturally" from the multimedia as if it is already contained in the media before they were combined (Chion 1994: 5). Cook says something similar about music when he states that music transfers its attributes to other media "silently", that is, the effect of music on an image is not noticeable to the audience, even though the music may completely change the meaning of the image (Cook 1998: 21-23).

This lack of awareness is not an issue with entertainment because audiences agree to suspend beliefs to be entertained. It is not such an issue with advertising because people generally understand that the purpose of an advertisement is to manipulate them into purchasing the product. However, with informational genres such as news, audiences expect the information to be accurately presented. While audiences are not generally aware of changes that occur from the combination of media, they do appear to be suspicious of sensationalism in news (Grabe 2000: 594-5; McCombs 2011; Cheng & Lo 2012: 131). Therefore, the use of sensationalism in news can undermine audience trust. This is discussed in more detail in Chapter 2.

4: Little innovation and interactivity in the multimedia news story

The fourth problem is that while there has been innovation in audience involvement in news, such as the facility for users to add comments at the end of a news item and the outsourcing of comments to Facebook and Twitter, there has been little innovation in the online news story itself other than the addition of hyperlinks. The Internet has dramatically changed the way news can be presented but news organizations continue to use methods that have been in place for decades and have not yet moved into the twenty-first century (Adair

2012). At least part of this lack of innovation and limited use of interactivity comes from inadequate knowledge and understanding of multimedia.

5: Irritation and information overload can result from multimedia

The fifth problem is that research has found that multimedia can be irritating even though it is more entertaining and informative, and it is speculated that this irritation is due to information overload (Xu, Oh & Teo 2009: 154,171).

6: Current theories and models do not address the problem

There are a number of theories and models that explain how multimedia functions and these include Chion's theory of added value and Cook's generalized theoretical framework for the analysis of multimedia. However, the application of these theories to multimedia news is limited given that the theories focus on the positive aspects of the emergence of a new and unexpected meaning. While emergence of a new meaning is positive for entertainment and advertising, it is a problem for news. In addition, the current theories and models are not unified in a single theory or model and even if they were unified, aspects of the intermedial relationship would remain unexplained.

Aims and objectives

The use of entertainment techniques in news cannot be avoided and an alternative solution to separating entertainment and news is to better understand multimedia so that news can be entertaining without altering the meaning or the emotional level. Media consciousness is essential in our media dominated society and "only through a deep and unfailing awareness of the structure and effects of information, through a demystification of media, is there any hope of our gaining some measure of control over television, or the computer, or any other medium" (Postman 1986: 161). Greater consciousness by journalists of how these techniques affect media information is important given the prominence of news on the Internet and the expectation that the Internet should provide multimedia.

The current multimedia/audio visual theories and models provide valuable information, and regardless of whether or not the goal is to create or minimize emergence, the same principles apply and a theory for one type of multimedia can be useful for another. Therefore, these theories and models are drawn on but the approach in this thesis is very different given that emergence of something new and unexpected in informational genres can be a problem. Even so, these existing theories and models form an important part of the proposed theory.

The aim of this thesis is to provide a theory of multimedia that explains the influences that arise within multimedia and provides a better understanding of a multimedia news text and the emergence that can occur so that the potential for misunderstanding can be minimized and the meaning is communicated as intended. This is not to suggest that the theory will determine the thoughts or reactions of an individual. However, it will allow the creators to determine how a target audience is likely to understand the multimedia.

The specific aims of the theory are as follows:

1. To differentiate between sensationalist techniques that change the meaning of the message or raise the emotional level, and techniques that make the news more entertaining while not changing the meaning or emotional level.

2. To explain how and why added media can change meaning and emotional levels.

3. To provide a tool for the analysis of multimedia to determine whether the meaning of the multimedia has been covertly manipulated in a way that would not be obvious to the target audience, and whether this covert manipulation appears to be intentional or unintentional.

4. To suggest more innovative forms of multimedia news.

5. To suggest how irritation arising from information overload in multimedia news can be avoided.

6. To draw on, to integrate and to expand on a number of exiting theories and models to formulate an approach that can be applied to multimedia news.

Chapter 2   Trust, Ethics & Sensationalism

Introduction

The aim of this chapter is to describe the issues of trust and ethics in journalism and how the use of sensationalist techniques to make news more entertaining can undermine the ability of a news organization to present unbiased and ethically sound news. The chapter concludes with a description of a television health and science report which uses sensationalist techniques in a way that is biased and unethical.

Power and legitimacy are intimately related. The capacity of an institution to influence is based on confidence in the institution's authority and its perceived legitimacy to exercise that authority; therefore, a loss of confidence in authority leads to a loss of power, and this loss occurs because power lies in the consent of the people to provide an institution with power (Parsons as interpreted by Hindess 1996: 34-35). This power relationship applies between the mass media and its audiences. People's willingness to watch or read media and to allow that media to influence them relies at least partially on their trust in that media to present accurate information. From this perspective, the power of the media over its audiences is balanced, to some extent, by the power of the audience over the media. If audiences choose to ignore news and follow other media, such as Twitter, Facebook and YouTube, news organisations lose their power.

A difficulty arises with the presentation of news when the audience expects news reports to be entertaining while maintaining their integrity. Even so, news organizations have a responsibility to present news transparently with any particular point of view being obvious. For instance, the views of a member of a political party will be expected to align with their party, so their affiliation should be stated. In such a situation, the views are being openly expressed and this type of expression is considered legitimate, whereas it is likely that covert influence, for instance where the meaning is influenced by background music, would be considered by most people as misleading.

Trust in news

The interest shown by young adults in news is declining (Mackay & Lowrey 2011: 39) and television news is not seen as being as important as it was in the past; it is no longer the must-watch program for young adults as it was for their parents (Csigó 2007). If anything important happens, young adults know the event will be vying for their attention as soon as they start up their online browser. For them, blocking – rather than finding out information – is the issue, and the prospect of information and news fatigue is ever present.

In addition, trust in news media has been steadily declining in the USA and this is shown in a Gallup survey from 2001 to 2012 (Beaujon 2012). This decline of trust can be attributed to the existence of multiple sources of news where the old gatekeepers are no longer in control, with the result that different sources show different information; these discrepancies lead people to think stories are inaccurate in that they favour one side, and that news reports are influenced by powerful institutions (Rosenstiel 2012). A low level of trust in traditional media can be seen in a study using university students as subjects that found a blog by a non-journalist was more credible than an online newspaper and a journalist's blog (Mackay & Lowrey 2011: 39).

At the same time as this decline of trust in news, the use of sensationalism in news has been increasing. A trend to use sensationalism became evident in the 1990s with a shift towards soft news topics such as celebrity, scandal, entertainment and lifestyle: in addition, there has been an increased use of sensationalist techniques such as re-enactments of crimes, animations and emotive delivery (Thussu 2007: 27-31). Sensationalism can be used to "lure the audience's attention" (Winegarner 2013). However, there are indications that audiences mistrust sensationalism. Viewers find standard news style more informative and believable than tabloid stories even though their emotional involvement level is higher for tabloid versions, and the conclusion that can be draw from this is that viewers recognise and distrust tabloid techniques (Grabe 2000: 594-5). This view is supported by Jonathan Menell,

documentary editor, who states that sensationalism takes a story outside the real world, even though it might add an emotional element and that it "tells the viewer you're going to handle them and control the emotion" (Menell in McCombs 2011). In other words, sensationalist techniques alert the viewer to the fact that the creators of the program are going to manipulate the emotions of the audience.

An example of sensationalism affecting credibility of news was shown with research on added sound effects. This research suggests that adding melodramatic animation to a news report did not reduce credibility, but when sound effects were added to these same melodramatic animations credibility was reduced (Cheng & Lo 2012: 131). The mistrust of sensationalism is well founded given that many sensationalist techniques change the meaning of the message. There is substantial research and theory dating from at least the mid 1970s which shows that one medium can change the meaning of another (McGurk & MacDonald 1976; Marks 1978; Marshall & Cohen 1988; Cohen 1993; Lipscomb & Kendall 1994: 91; Cook 1998; Penn 2000; Kassabian 2001: 53). This has significant and worrying implications for multimedia news stories where music is added.

In movies, facts are manipulated to improve the entertainment value of the movie and it is considered normal to mix fact and fiction, such as in the BBC production of *On Expenses* (2010). *On Expenses* is a television drama about an American journalist who in 2005 started probing the expenses of British MPs using the newly implemented Freedom of Information Act. Her work resulted in numerous political scandals. The opening credits state that the drama "is based on real characters and events. Some scenes have been imagined, some dates have been compressed". This television drama is referred to as being a true story even though it is not an accurate historical account.

It appears that producers and directors of television and cinema entertainment, having become used to manipulating the facts in historical and biographical dramas, have carried over this practice to news reporting, forgetting that news does not have disclaimers. For

instance, the science and health report discussed below edits out part of the statement by a guest, which reverses the meaning of the statement.

Another technique that has been carried over to news from the entertainment industry is intensified continuity. American film historian and theorist, David Bordwell, describes intensified continuity as the amping up of emphasis to a higher pitch. This technique is prevalent in films today, which are aimed at the American mass-audience. An example of intensified continuity is the decreasing shot length in feature films. From 1930 to 1960 the average shot length was approximately eight to eleven seconds and A-feature films often had extremely long takes, whereas from 1999 to 2000 a typical shot was three to six seconds. This trend to shorter shots continues (Bordwell 2002: 16-7,22-3).

Bordwell refers to intensified continuity as flamboyance that could be likened to the sacrifice of emotional depth in baroque music but at the same time he acknowledges that intensified continuity normally results in reduced detail in a shot (Bordwell 2002: 25). Given that baroque style involves a high level of detail and complexity, it can be argued that it is very different to intensified continuity. Intensified continuity is a sensationalist technique (Smith 2013: 347). The fast, almost incomprehensible scenes that are frequently created by increased cuts accompanied by potential changes in meaning might be acceptable in entertainment – even in biographical entertainment, provided disclaimers are used – but they are not acceptable in information presented as news reporting.

Sensationalism & "Infotainment"

Regardless of the problems with sensationalism, it appears that to be competitive, news must be entertaining, as discussed in Chapter 1. If it is essential that news be entertaining, but doing so distorts the facts, it can be argued that there is little point in watching news as opposed to entertainment. This creates a quandary for broadcasters: How far can news be pushed into an entertainment format while still maintaining the confidence of its audience?

The genre of news which is created to be entertaining is referred to as infotainment. Infotainment can be described as a hybrid of news, tabloid journalism, current affairs, documentary, media spectacle and entertainment (Thussu 2007: 7-8,69). Sensationalist techniques used in infotainment include emotive delivery, increased use of graphics, dramatisation (the re-enactment of dramatic scenes by professional actors), the inclusion of young attractive females, the choice of a dramatic or emotional subject, an increase in the number of camera shots and cuts, eye-witness camera, interviews with laypersons, the addition of music, the use of zoom-in camera shots, conversational modes, informality that emphasises storytelling skills, personalities, style and spectacle, tone of voice, short story durations, language intensifiers, unequal time allocation, simulation of both sides of a story, added music, and use of a presenter to support one side of an argument (Thussu 2007: 3,28; Vettehen, Nuijten & Peeters 2008: 320,332-4; Grabe: 2000: 582-3; Grabe, Zhou & Barnett 2001; Burgers & Graaf 2013; Iyengar & Kinder 1987: 33; Rusciano 2010; McCombs 2011; Moyer-Gusé & Nabi 2009: 45-48).

While infotainment is more entertaining, it detracts from the seriousness of a topic. It is a "dumbing-down" of the news through the use of tabloid techniques that blend trivia, facts and fiction; this is of increasing concern given that the average viewer may not be able to differentiate between actual news and propaganda (Thussu 2007: 3,13,162). At the same time there is limited understanding of the appeal of tabloid techniques (Vettehen, Nuijten & Peeters 2008: 319). Thussu states that whether or not a news item is broadcast depends increasingly on how much it will attract audiences and this trend to commercialisation has extended to public-service broadcasters including the Australian public broadcaster, the ABC. Making news more entertaining so that it attracts viewers remains a major concern for broadcasters (Thussu 2007: 2-3,7-11,30-31,38-9,67-9).

There are problems with sensationalist news but there are also advantages. For instance, emotionalism, sensation and simplification can be used for the public good in that tabloid

journalism is an "alternative arena for public discourse" that can recognise and represent groups not represented by the prestige press and thereby broaden the news audience (Örnebring & Jönsson 2004: 292-4).

Ethical journalism

Ethics in journalism is normally thought of as presenting content that is unbiased, verifiable and credible; while tabloid techniques, including sensationalism, are normally thought of as bad journalism (Rusciano 2010: 245-6). Accuracy, transparency and serving the audience are basic to ethical journalism; accuracy is not a simple process because judgement and different points of view are involved; transparency means that there is evidence to support the story and the motives of those who provide the evidence are clear; and the concept of serving the audience means that the news should be of public interest (McBride and Rosenstiel 2014: 218-9).

Biased reporting puts the reputation of the journalist and publisher at risk but this issue of reputation is somewhat different and less applicable to multimedia than the printed word. The printed word is much easier to analyse than a video clip. A video would normally require repeated watching to confirm exact details. In addition, multimedia is normally a group effort rather than the report of an individual journalist.

While there may be positive aspects to tabloid journalism, carrying over sensationalist techniques from cinema to journalism creates many ethical issues. News items do not include disclaimers and audiences do not expect facts to be manipulated or embellished. An analysis of television journalism using a number of sensationalist techniques follows.

Sensationalist techniques in health & science report

Catalyst is a health and science news report that can be classified as infotainment. Episodes are broadcast on the Australian Federal Government owned ABC1 television network and are available for download or viewing from the ABC website. *Catalyst* uses many of the sensationalist techniques referred to previously and this can be clearly seen in the

episode *Chiropractors* (ABC 2013a) broadcast on ABC television on 11th July 2013 and then available from the ABC website. The use of sensationalist techniques in *Chiropractors* is manipulative and unethical. These techniques include liminal background music, the use of conflict, dramatisation and re-enactment by professional actors, interviews with laypersons, emphasis and unequal time allocation to one side, editing and cuts to change meanings, simulation of both sides of the story, emotive delivery, the presenter supporting one side of an argument and – perhaps the most unethical technique of all – subliminal images.

The type of manipulation of meaning created by these techniques is well understood in the film and television industries. Techniques using lighting effects, sound effects and music all change the meaning of images and are used in movies to create and heighten emotions. In addition, sound is normally used to influence the meaning of images. Such techniques are taught as part of audio-visual film theory (Chion 1994; Bordwell & Thompson & 2008) and confirmed by cognitive psychology experiments (Marshall & Cohen 1988; Cohen 1993; McGurk & MacDonald 1976).

The episode starts with images of reproductions of ancient statues, some rotating, some with limbs missing. Over these rotating statues are flashed subliminal images of disembodied hands and arms from the statues. These images are accompanied by various special effects, music and a voice-over by presenter, Maryanne Demasi. This is followed by different people making statements about chiropractic procedures. The opening minute contains mostly anti-chiropractic statements. There is an apparently positive segment with children and babies being treated by chiropractors and mothers making positive statements about chiropractic, but these positive scenes are accompanied by a number of negative special effects including subliminal images as described below.

Subliminal images and special effects

There is substantial research that subliminal effects influence behaviour and attitudes (Hassin, Ferguson, Shidlovski & Gross 2007; Stewart & Shubert 2006; Légal, Chappé,

Coiffard & Villard-Forest 2012; Veltkamp, Custers & Aarts 2011; Monahan, Murphy & Zajonc 2000). Subliminal images are considered more than sensationalist, and the use of subliminal images in advertising and by any non-government broadcaster is banned in Australia. All of the friends and associates I spoke to about this episode (around a dozen) were surprised that subliminal images were used, and of the people who had watched the episode no one other than myself had noticed either the subliminal[2] or liminal techniques.

Subliminal images were used eleven times in the first 63 seconds and involved a total of eighteen subliminal frames. In the PAL system used in Australia, the frame rate is twenty-five frames per second, so for one frame the subliminal image occurs for 0.04 seconds, for the consecutive frames the subliminal image occurs for 0.08 seconds. Ten occurrences involving eighteen frames were overlaid on chiropractors or their patients and one was overlaid on a medical doctor. See Appendix A for a list of the subliminal images that are used in the first 1'03" of the episode.

At the same time as these subliminal images were used, they were accompanied by a special effect created by a flash of light and a shutter sound similar to a camera shutter when taking a photograph. This special effect created the impression of a flash photograph being taken, and the effect created was much the same as is used in television police and crime shows to represent the photographing of crimes and crime scenes.

The subliminal images were of disembodied arms and hands. Initially they were flashed over the statues with broken limbs and later over people. These subliminal images could have a number of interpretations. The earlier flashing of the subliminal images over the broken statues could suggest that the arm was broken. Alternatively, an arm and hand in this position with the palm facing outwards is commonly associated with danger and an order to stop.

This combination of the disembodied limbs, flash effect and shutter sound is likely to be interpreted by viewers as a dangerous crime scene that should be stopped. This effect was all

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[2] These subliminal images can be seen by stopping the video close to the appropriate frame then using the frame step facility. In the free download copy of VLC stepping frame by frame is done by pressing the E key.

the more pernicious because the images were subliminal so could not be consciously questioned or rejected.

There could be little argument that these subliminal and liminal effects are negative rather than positive. When they are used to accompany the medical doctor they support his negative statements about chiropractic treatment. The use of the other eighteen subliminal frames with special effects that were overlaid over chiropractic treatments of children and discussions with parents creates a very different effect. In these scenes, the comments and facial expressions of the parents would normally be interpreted as positive, but these positive meanings were undermined by the negative subliminal and liminal effects.

Figure 2-1 through Figure 2-4 show screen shots of four of the subliminal images. Figure 2-1 shows a mother speaking about the positive results of chiropractic treatment for asthma, but these positive statements are contradicted by an open palm over her face indicating danger/stop. The subliminal image in Figure 2-2 continues this theme of danger/stop with the open palm and arm stretching across the mothers face and the baby's body and head during a treatment. In Figure 2-3, the hand is placed across all four people, suggesting that the smiles of the mother and children are not appropriate. In Figure 2-4, the hand covers the mother, baby and chiropractor as he is treating the baby, again suggesting danger/stop. This opening segment has been precisely created with the timing and placement of these subliminal frames over treatments to ensure the greatest negative impact. The impact of these images was considerably greater than had they been placed in earlier or later frames when no treatments were being carried out.

Figure 2-1 Subliminal image over mother speaking about chiropractic.

Figure 2-2 Subliminal image over a mother and her baby being treated

Figure 2-3 Subliminal image over young girl being treated

Figure 2-4 Subliminal image over chiropractor treating baby

This influence of one medium changing the meaning of another, as happens with added media and special effects, occurs because each sense is limited in the information it can provide. The roles of the senses overlap when interpreting a specific situation, so that different senses assist each other to help us understand objects and events (Marks 1978: ix,185). In the *Chiropractors* episode, the subliminal images of body parts, shutter-like sound effects and flashing light effects that were added to scenes of chiropractic treatments will be used to interpret the meaning of those scenes, and the meaning of these special effects will normally be interpreted as negative. These effects created a meaning that was not in the original scenes of statues and people.

The most likely meaning that these special effects create is that chiropractors break bodies and perpetrate crimes and should be stopped. The special effects in this opening sequence have been designed to create fear that chiropractic treatment will result in injury. Fear is a powerful emotion, and the use of fear is traditional in journalism with its ability to grab the attention of the audience (Boyd & McBride 2014: 177). This fear was reinforced throughout the episode by the repetition of a shortened form of this special effects segment that included the subliminal image and the flash of light. The use of fear is unethical in health and science journalism.

In sum, over the entire episode, the overlaying of the subliminal images over people was almost entirely (all but one) over chiropractic treatments and parents talking positively about these treatments. While the exact interpretation might vary from person to person, the overall impression these special effects produce is unquestionably negative. At best this was a distraction from the positive statements made by the chiropractors and the parents of patients. At worst they created a tense atmosphere, suggestive of a crime scene that undermined the positive scenes and positive statements and created fear of chiropractic treatment. This is an effective use of subliminal images and special effects to undermine the pro-treatment scenes and statements of chiropractic. The subliminal images commenced early in the episode,

initially with statues and then with treatments; by occurring early, they set the tone and meaning of the episode and these were anti-chiropractic. This negative meaning is then reinforced throughout the episode whenever any of the effects are repeated. Subliminal effects have been described as "the ultimate invasion of a person's privacy" in that they invade a person's mind (Gratz 1984: 181). Their use in a science and health report is unethical, the more so given that subliminal effects used by commercial broadcasters are banned.

Complaints about the use of subliminal effects to the ABC Audience & Consumer Affairs, the ACMA (Australian Communications and Media Authority) and the Australian Commonwealth Ombudsman achieved nothing. The use of subliminal images is in contravention of the Broadcasting Services Act 1992 and the Commercial Television Industry Code of Practice - January 2010 (incorporating amendments to July 2013) which states: "1.9 A licensee may not broadcast a program, program promotion, station identification or community service announcement which is likely, in all the circumstances, to: [...] 1.9.4 use or involve any technique which attempts to convey information to the viewer by transmitting messages below or near the threshold of normal awareness" (Free TV 2015). Even though the use of subliminal images is in contravention of the Broadcasting Services Act 1992, the ABC, being owned by the Federal Government, is exempt from this Act and need only follow its own Code of Practice[3] and this code does not mention subliminal images. In addition, while the code does cover fair and honest dealing, it is written in such a way that its enforcement is based on opinion rather than clear, concise principles and standards. This means that Australian Government owned broadcasters do not need to follow the laws of the land as they apply to non-government broadcasters, and no special permission is needed from them to ignore these laws that others must follow.

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[3] The ABC Code of Practice 2011 is available from the ABC website at:
   http://about.abc.net.au/wp-content/uploads/2012/06/CodeOfPractice2011.pdf

Liminal background music

Added dissonant background music, often in a minor key, is used extensively in the episode, particularly in the opening sequence. Background music is an example of a liminal effect. Liminal effects occur when the effect is barely noticeable and not normally consciously noticed by the audience.

The addition of music will always result in some type of change to an image (Chion 1994, Anderson in McCombs 2011). There is considerable research over a long period showing that sound influences the meaning of the media it accompanies and the influence of music occurs even if it is not consciously heard (McGurk & MacDonald 1976; Cohen 1993: 173; 2000: 363,366-9,373-4; Marshall & Cohen 1988; Graf & Schacter 1989: 938-9; Bolivar, Cohen & Fentress 1994: 48; Marks 1996: 112; Shao & Weng 2011: 316-7). Music "can significantly influence viewers' interpretation of film content" and "music can influence viewers' interpretations of the visual content even when attention is directed away from the musical soundtrack" (Tan, Spackman & Bezdek 2007: 135,147).

Dissonant music is especially influential. Dissonant music has a long history of negative association dating back at least to the Medieval era when it was banned by the Catholic Church because it was believed to be evil and created by Lucifer (Levitin 2006: 13,7). Today, dissonance is considered to be harsh and unstable and is used to express pain, grief and conflict, as well as to create tension; this tension can be resolved by consonance but when the resolution is delayed it creates drama, suspense or surprise (Kamien 2000: 60). Dissonance is identified by a primitive part of the brain that responds before the intellect becomes involved (Levitin 2006: 72) so the reaction is automatic before a conscious decision is made. In addition, dissonance is often created in a minor key. Minor key music is associated with negative emotions and this occurs reliably even with young children (Kastner & Crowder 1990: 198). Therefore, the negative impact is heightened when dissonance is combined with minor key music.

The use of dissonance in film has been recognised for over 70 years. An article from the mid 1940s states that film composers use dissonance freely for dramatic situations that are tense or confused, and that complex, dissonant sustained chords produce continuing tension (Nelson 1946: 61). While dissonance is to some extent a subjective experience that depends on each individual and their listening experience (Johnson 1969: 5), there could be little argument that ambient dissonant music creates a negative emotional response in most Western audiences. For most Westerners, the impact is increased by a learned association created from the use of dissonant music in dramas, thriller and horror movies and negative or fear inducing events. This association is typically between dissonant music and evil or danger.

Research confirms that today's use of dissonant music is an effective means for creating and heightening emotion in movies. Cognitive psychology research shows that dissonance can create fear (Krumhansl 2002: 46-7; Nelson 1946: 61). Other characteristics that are associated with fear in subjects are rapid tempos and large variations of dynamics and pitch (Krumhansl 2002: 46-7). In addition, research shows that thriller music decreases the likeability of the characters it is associated with in movies (Hoeckner, Wyatt, Decety & Nusbaum 2011).These characteristics are used in the music accompanying the *Chiropractors* episode. The music is dissonant with an unresolving harmony, rapid background beat, and large pitch variations; the dynamics suddenly become loud at the end of the opening segment as the presenter poses a question asking if children are being put at risk.

Cognitive psychology experiments show that when incongruent media are used together both are normally judged inaccurately and the result is frequently a compromise (Cohen 2000: 360-2). Therefore, in this *Catalyst* episode, the positive statements made by the chiropractors and parents of patients when accompanied by dissonant music will be judged inaccurately. Dissonant music, being associated with fear and tension, will undermine the positive statements made by chiropractors and parents, making them appear to be less likeable, less convincing and even deceptive. However, if the meanings of music and image match, the

meaning is reinforced. Therefore, dissonant music used with criticisms of chiropractic results in the meaning being more negative than the words alone would have communicated.

Research indicates that the brain does not necessarily process audio-visual content in a linear and chronological order, and shows that music influences the meaning of images even when it occurs immediately before or after and not concurrently with the images. The presentation of music before or after images is referred to as forward and backward affective primes, respectively. While forward primes create a greater impact than backward primes, both significantly influence the meaning (Tan, Spackman & Bezdek 2007: 135-8,146-8). Therefore, the influence of dissonant music, by creating a negative effect, reduced the positive influence of the comments of chiropractors and parents, and increased the negative influence of the anti-chiropractic statements, even when the music occurred before or after the treatment.

Most people do not notice music when it accompanies a narrative unless it is actually part of the narrative itself, and so film music is not normally heard unless it is part of the plot (Marks 1996: 112). Even when the music is not consciously heard, it is used to interpret the meaning of the visuals (Cohen 1993: 173; 2000: 363-74; Bolivar, Cohen & Fentress 1994: 48; Marks 1996: 112). Therefore, the use of dissonant background music is all the more deceptive because it is not obvious and is normally processed unconsciously.

In addition, if the music is not consciously heard, the audience loses the ability to critically analyse its meaning. This is very different to listening to language where the meaning is consciously interpreted. In the *Chiropractors* episode, it is unlikely that this music was consciously heard and unlikely that the audience realised they were being manipulated by the music. The use of covert dissonant music in the context of a health report is unethical.

Dramatisation and re-enactment by professional actors

In this episode, comedy is used to mock chiropractic. The episode included a Charlie Chaplin style melodrama in a black and white, silent movie format with added old-movie

comic-drama style music. Professional actors wore fake, over-sized moustaches and supposedly re-enacted the first chiropractic treatment. The skit was referred to as providing a "history" of the beginnings of chiropractic treatment, and was accompanied by a serious and negative voice-over by the presenter, making clear its main purpose was derogatory rather than humorous.

"Performance is an exercise of power, a very curious one ... [which] presumes to compete with reality itself for control of the minds exposed to it", an illusion that "seems by the oddest chance in the world to be a reality" (Poirier 1992: 87). In other words, performances have the power to make us feel as if they are real. This skit is used to undermine the validity of chiropractic treatment, and to create a reality that it cannot be taken seriously. Presenting this so-called "history" as a comic melodrama, while accompanying it with a serious voice-over, is tabloid journalism.

Eyewitness news & interviews with laypersons

Interviews with laypersons play an important role in infotainment. The interview appears to have originated as a nineteenth century American invention that in Europe was considered tabloid and irresponsible journalism (Örnebring & Jönsson 2004: 291). More recently, personal testimony has consistently been shown to be the basis on which audiences form perceptions and judgments, even though these opinions and judgements are often incorrect, and this occurs regardless of more accurate information having been included (Aust & Zillmann 1996: 800). In addition, short interviews that are conducted with laypersons have been found to increase audience emotions (Vettehen, Nuijten & Peeters 2008: 320,332-4).

In the episode, interviews were conducted with mothers of child and infant patients. However, many of these interviews were accompanied by liminal dissonant music and special effects. These effects included subliminal images and the crime scene photographic effect created by a light flash and shutter sound. Given the negative nature of the liminal music and special effects, the positive nature of the interviews with mothers was undermined.

In addition, there was an interview with Lucie Snape who had a vertebrobasilar stroke that she attributed to chiropractic treatment. Snape's story was emotive, as were the supporting comments by the presenter. Vertebrobasilar stroke is a well-researched condition, and this research contradicts Snape's claims that there was nothing wrong with her before the chiropractic treatment (Terrett 1995; Debette & Leys 2009; Cassidy et al. 2008; Mitchell 2003). However, none of this research was presented and no experts on the condition were called upon to comment on Snape's claim. This segment was anecdotal evidence in the form of personal testimony from an interview with a layperson. Anecdotal evidence alone is not considered acceptable in science. An acceptable science reporting approach consists in presenting current research then using anecdotal evidence to make it more entertaining and accessible. *Catalyst* has done the reverse. It has presented anecdotal evidence with no other evidence to support it. This approach is not ethical in health and science journalism.

Emphasis and unequal time allocation

One of the ways to give one side of the story more credibility is to give it more time. Research shows that when issues are given extra coverage, audiences rate them as more important (Iyengar & Kinder 1987: 33). More time was given to the anti-chiropractic side than to the pro-chiropractic side. In the opening segment, five people, including the presenter, made negative statements about chiropractic while three people made positive statements. There were also three times the numbers of words in negative statements criticising chiropractic as there were positive words supporting it.

Editing and cuts that change meanings

In this episode, the chiropractic side of the story is literally a "cut down" side because a chiropractor's statements have been edited to remove vital information. *Catalyst* falsified a chiropractor's statement by cutting words to completely change the meaning. This was confirmed by Croke.[4] Croke's statement was: "There was a study published in 2011 which

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[4] Dr Tony Croke confirmed my various assumptions in a series of email exchanges at the end of October 2013.

couldn't find a single significant adverse event in the care of children by chiropractors since 1992". The falsified statement that appeared in the episode had cut the "since 1992" and the removal of these words results in a very different meaning to the original statement.

One statement means that there were significant adverse events before 1992 while the other statement means there have never been any significant adverse events. In other words, the two statements have the opposite meaning. This cut meant that Croke's statement could be claimed to be incorrect and this occurred in the episode and undermined Croke's credibility. Such editing is unethical, and may be unlawful if pursued in the courts. In addition, *Catalyst* used cuts to create a simulation that both sides of the story were being presented and that chiropractors were being given the opportunity to respond to criticisms when this was not so, as will be described below.

Simulation of both sides of the story

Tabloid journalism has "neither the time nor inclination for the rigorous verification required to declare something as 'fact', journalists substitute a 'simulation' of objectivity by 'giving both sides of the story', even if it is necessary to synthesize the alternative side" (Rusciano 2010: 254). In other words, tabloid journalism simulates both sides of the story by artificially creating an alternative to the story that is being presented. The episode appears to offer both sides of the story by switching between a chiropractor and a medical doctor. This has the appearance of presenting for and against, but on careful examination it can be seen that these switches are not one person in response to the other but only cuts in interviews that are then interspersed to look like responses.

An example of this simulation is a segment that switched between Dr Tony Croke of the CAA (Chiropractors Association of Australia) and Dr John Cunningham of FOSIM (Friends of Science in Medicine). This segment is cut to look as if Croke has been given the opportunity to answer the criticism but this is not the case. Croke confirmed he was not given

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These assumptions were also supported by the written complaint that the CAA submitted to the ABC shortly after the episode was shown.

the right of reply in this instance, and the reply artificially inserted into this segment was from a statement he made in response to a different question. The chiropractic doctors were not told of the negative comments by the medical doctors and were not given the right of reply. Catalyst has used a deceptive format by using cuts that simulate giving both sides of the story, and pretends to provide right of reply but as Rusciano states, synthesising an alternative side to a story is tabloid journalism.

Emotive delivery

Arousing negative messages are better remembered than calm messages, and emotional messages are better remembered than non-emotional ones (Lang & Dhillon 1995: para. 5). In addition, Lang states that we initially perceive only a fraction of the information around us, and only a fraction moves into our short-term memory and constructs a mental representation. The fraction that moves to short-term memory is determined by the person's goals, knowledge, environment and culture. Certain types of stimuli, especially those that create emotion, will cause information to be stored better than information that does not create emotion (Lang 2000: 48-55). In other words, emotional scenes and statements will normally be remembered better than those that are not emotional.

The language used for the delivery of the anti-chiropractic information in the episode is extremely emotive, and one of the most degrading instances of this is by a medical doctor who, in response to a statement by a chiropractic doctor, laughingly states that it is "senseless rubbish". The chiropractor is at no time given the opportunity to respond to this emotive statement. When the discussion returns to the chiropractor, his statement superficially appears as a response but careful analysis indicates that it was not and Dr Croke confirmed this when contacted. This sequence has been carefully edited and includes three sensationalist techniques: emotive delivery, edited cuts that change the meaning of statements, and simulation of both sides of the story.

Another instance of emotive delivery is the opening statement that includes the phrase that chiropractic "has become steeped in controversy" by the presenter, followed by the sensationalist statement by a medical doctor that much of chiropractic has "descended into the realm of quackery". Later in the episode, the presenter states that it was alleged that a baby's neck had been broken by chiropractic treatment. The presenter also stated, without the use of the word "alleged", that a doctor confirmed that the baby's neck was broken. However, a report by the Australian Health Practitioner Regulation Agency (AHPRA) released after the episode was broadcast, clearly states that the baby's neck was not broken and this was confirmed by a radiologist. It appears that the unverified statement was included to maximize the sensationalist effect. Few claims could be more emotive and more unethical, given that it was not true, than stating a health practitioner had broken a baby's neck.

Presenter supporting one side of an argument

It is recognised that entertainment education can change the opinion of the audience and one of the techniques that achieves this change is for the person who introduces the information, who has previously developed a positive relationship with the audience, to support one side of the argument (Moyer-Gusé & Nabi 2009: 45-48). The presenter in *Chiropractors* supports one side of the story with both facial expressions and comments.

The facial expressions drew a number of comments from the audience, including "[the presenter's] facial expressions of affectionate admiration during FOS[5] views and derisive sceptical expressions when interviewing Chiropractors et al, would best be described as acting, not reporting" (ABC 2013a). Similar comments were made by the ABC itself when the presenter of the television program *Media Watch*, broadcast 11 November 2013, in reference to a different episode of *Catalyst*, stated that this same person, Maryanne Demasi, who presented the *Chiropractors* episode "nodded enthusiastically" to one person but to another she was "stony faced".

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[5] Friends of Science in Medicine

There were a number of comments by the presenter throughout the episode that supported one side including: i) "not surprisingly, this aspiration has outraged the medical association" where the words "not surprisingly" are an opinion of the presenter supporting the claim that the medical association was justified in being outraged; ii) "that's confronting to watch" is an emotional response to a neck adjustment; iii) "the conflict within the chiropractic union is palpable" is an opinion not supported by evidence because the "conflict" is between one chiropractor and an organization of which he is not a member. While there are probably differences of opinion between chiropractors and chiropractic organizations, no other chiropractors are involved in this public conflict.

A particularly emotive and sensationalist statement is: iv) "but what hope is there", which is a reference to RMIT Professor Peter Coloe's statement that if claims were documented, he would take it back to the school for review, but the university is not given this opportunity. RMIT trains chiropractors and it is amongst Australia's most respected universities. There can be no doubt that RMIT would have responded to any documented criticisms by the national broadcaster. In addition: v) "when it comes to coughing up money, it's the taxpayer that loses" – is a reference to Medicare rebates paid for chiropractic where the patient has been referred by a medical doctor. No evidence whatsoever is given to support the claim that chiropractic treatment is more expensive than any other treatment. All the above statements involve the presenter supporting one side of the argument with personal opinions.

Audience comments

This carry-over of techniques from entertainment genres to news has resulted in *Catalyst* using techniques that covertly change the meaning of the news message, and this has undermined audience trust. This lack of trust can be seen in a number of the audience comments including "Could there be a LARGE bias there?". "very disappointed", "Shame on you", "rubbish and propaganda that is not worth watching", "so biased, and one sided, you

have to ask whether it was paid for by the AMA!!!", "Shame shame shame! What a biased program!" (ABC 2013a). This is not to suggest that all audience comments criticised the episode but to state that many of the people who commented regarded the program as unethical, not because it disagreed with their views, but because they believed it was biased and misleading.

It was generally agreed in the comments that the episode presented a negative view of chiropractic so the message was interpreted reasonably consistently. However, audience opinion was not consistent as to whether this message was correct or not. When "a particular action or object that is foregrounded seems unrelated to the current situation and the prior context, then viewers will generate a predictive inference in order to make the current action or object relevant" (Magliano, Dijkstra & Zwaan 1996: 219). In other words, if something seems irrelevant in a television show, the audience will predict the reason it is there. Many of the statements in *Chiropractors* were not supported by evidence, and based on many of the comments about the episode on the ABC website (ABC 2013a), many people in the audience predicted that the episode and the presenter were biased.

These audience comments suggest a lack of confidence in the ABC similar to that facing the marketing industry. This crisis of confidence is the general distain for the marketing industry, especially by consumers in a postmodern era who have come to understand marketing ploys and manipulations (Brown 2006: 211). It is proposed here that much the same thing is occurring with multimedia news, where seeing is not believing. Young adults understand the technology that creates photoshopped images and allows the impossible to be created on video. Examples of this manipulation can be seen every day on YouTube, on television, and at the cinema.

Concluding remarks

Nowhere is Luhmann's comment, that news is only truthful when it is compared to advertising, more applicable than with the use of subliminal images, liminal music and covert

changes of meaning. News should be based on truth, but it is not because facts are selected

and mixed with opinion, with many items reported for their entertainment rather than news

value: it is only by comparison to advertising and entertainment that news is factual

(Luhmann 2000: 25-41,63-4).

The special effects and many of the statements made in the episode described have been

designed to create fear that chiropractic treatments will result in injury. Fear is a powerful

emotion and the use of fear is traditional in journalism with its ability to grab the attention of

the audience (Boyd & McBride 2014: 177). In addition, statements and a comedy skit are

used to mock the profession. The use of fear and mockery is unethical in health and science

journalism. The National Press Photographers Association states: "Our primary goal is the

faithful and comprehensive depiction of the subject at hand" (NPPA 2014). Faithful and

comprehensive depiction of news is not achieved by giving more time to one side than

another, by using editing to change the meaning of statements, by a simulation of both sides

of the story, and by using liminal and subliminal techniques.

Chapter 3   Communication Theory versus an Alternative Theory

Introduction

In light of the chiropractic example, it now remains to go into multimedia theory in more detail. The theory of multimedia proposed in this thesis does not reference communication theory as it is commonly understood, and which is based on Shannon's "A Mathematical Theory of Communication" (Shannon 1948), or on Weaver's interpretation of Shannon's theory, published a year later in 1949, in the pamphlet book "The Mathematical Theory of Communication" (Shannon & Weaver 1964). The proposed multimedia theory draws on a number of audio-visual, multimedia and media theories, and it focuses on the relationships between the media that compose the multimedia, the cyclical development of the multimedia message over time, and mediation of the message as in McLuhan's medium-is-the-message.

The following criticisms of the original communication theory as it has been applied to human communication are not necessarily a criticism of subsequent theories. Many communication concepts have been developed in past decades that provide insights into the human communication process. However, these can stand on their own merit and do not need to be related back to Weaver's incorrect interpretation of Shannon's theory. In addition, audio-visual and multimedia theories are of a very different nature to communication theories, and cannot be based on or compared to them. To clarify these differences, communication theory as it was originally proposed and the complications introduced by Weaver's (mis)interpretation are discussed. In addition, the basis for the proposed multimedia theory is outlined.

Communication theory

Shannon's theory

Shannon's theory is a general theory of signal transmission (Ritche 1986: 280) that is about transportation of information (McLuhan 2005: 230) and has been described as "the study of the probabilistic decoding of keys and cyphers in cryptograms" (Thims 2012: 1). The aim of Shannon's theory is to enable the transmission of information so that it is identical for the "sender" and "receiver". This is much the same concept as sending a parcel through the post, in that the parcel should be delivered to the addressee undamaged. Shannon's theory applies equally to any type of data – whether the data has any meaning or not – including music and untranslatable hieroglyphics, provided that data can be digitally coded. Shannon did not develop a theory of information or communication of language but a theory to reliably send raw data from one place to another. The term "raw" refers to "the raw material out of which information is obtained" (Devlin 2001:21). Shannon was careful to state that what he defined as information was not related to semantics (Glasersfeld 1996).

Shannon's theory with its concept of "noise" (physical disturbance) can be applied to communication by smoke signals but not language when semantics are involved. When transmitting data by smoke signals the wind is "noise" because it can blow the signal away before it can be seen by the receiver. However, with a conversation this noise would be sounds other than the conversation itself, and such interference is not normally a consideration when determining the meaning of language.

Shannon's theory is about the transmission of data as bits. Bits are binary digits that are either on or off. Shannon showed that error correction in messages could be achieved by adding extra bits to the message to correct errors that occurred through noise (disturbances), and this led to today's sophisticated error-correction systems that ensure integrity of data (Johnson 2001). This concept of error correction allows engineers to determine the channel capacity required at each point of a communications network (Devlin 2001).

Shannon uses the words "uncertainty", "information", and "communication" with precise technical and statistical meanings which are not the same as their common everyday meanings (Ritche 1986: 279). For instance, the term "information" means an "objective commodity, disembodied from a human 'sender' or 'receiver' [... which] can be measured in 'bits' and shipped from place to place" (Devlin 2001: 20-1).

There are important pre-conditions to the use of Shannon's theory, as Ritche points out. The first is that Shannon defines "message" and "signal" differently, and they must be different to be able to apply the theory. The term "message" applies to the shared message set which is used by the sender to translate the signal into the transmission code and then by the receiver to take it out of the transmission code. If the message sets are not identical then the signal will be corrupted. The second pre-condition is that both the sender and receiver share this set of identical messages before the transmission occurs, to allow accurate coding and decoding. The third pre-condition is that the set of messages is finite. The signal (the data which is transmitted) is raw data and Shannon's model does not cater for meaning in information. There is no choice or understanding involved in Shannon's theory and there is no way of ignoring a message or giving it an ambiguous or open-ended interpretation as occurs in human language (Ritche 1986: 284-6,291-4).

This requirement for exactly the same message set in both the sender and receiver is just one element of the theory that shows it cannot be applied to human communication. No two humans have exactly the same vocabulary or exactly the same understanding of the words in that vocabulary. Neither can dictionaries meet this requirement. Even using the same dictionary for both sender and receiver has problems given that dictionaries have multiple meanings for most words, and there is a decision involved in selecting which of the many meanings is applicable for that particular time and context. In addition, a bit system of error correction does not lend itself to interpretation of language. It cannot be said that one interpretation of meaning is right and another wrong. Human communication can never be

simplistically right or wrong, understood or misunderstood. As Luhmann states, "understanding is practically always a misunderstanding without an understanding of the mis" (Luhmann 2000: 97).

Weaver's introduction

It is misleading to refer to a "Shannon and Weaver Mathematical Theory of Communication" because Shannon alone developed the theory and published it in 1948 in the *Bell System Technical Journal*. Weaver later wrote an introduction and both introduction and the original theory were published as a pamphlet book by University of Illinois Press. Weaver misrepresents, misattributes and convolutes Shannon's work (Thims 2012: 61). It is unfortunate that it has been Weaver's interpretation rather than Shannon's theory that has been referenced and used as a basis for communication theory. Shannon's theory is best understood by not reading Weaver because Weaver's introduction has created "three decades of confusion and paradox" from its distortions, proofs by coincidence and homonym, and Weaver's speculations are not supported by Shannon's mathematics (Ritche 1986: 278-9,295).

An example of the distortion involved in this introduction is Weaver's example of the word "yes" as "operationally understandable" (Weaver 1964: 5). While this is so, yes/no is a binary system which has the simplest meaning that is possible in language. Binary systems can be used in Shannon's model because bits are based on the binary system of on/off. But most language is not black and white; there are normally a myriad of grey meanings in between.

In addition, it is common to attribute statements to Shannon and Weaver when it is actually Weaver's speculations that are quoted (Ritche 1986: 279). Academics have propagated the idea that Weaver was involved in developing the original theory. For instance, Friske's description of the origins of Shannon's theory describes it as being a joint venture with Weaver (Friske 1990: 6). This is not true; Shannon alone published his full and complete

theory in 1948 and today his theory remains unchanged from this first publication. It is

indicative of the dubious nature of Weaver's speculations that his biography on the

Rockefeller Foundation website does not mention this work (Rockefeller Foundation 2014).

Shannon's response

Shannon's theory has been described as an "intellectual curiosity" that "has been more

distinguished for what it has promised more than for what it has delivered" (McGill 1957:

343). It is clear that Shannon was concerned by the misappropriation of his theory. He

publically showed his disapproval of the application of this theory to other fields in a short

article titled *The Bandwagon,* which stated that his theory had become a "scientific

bandwagon". He believed his theory had been "ballooned to an importance beyond its actual

accomplishments" and doing so involved an "element of danger". He also pointed out that the

use of "a few exciting words like *information*, *entropy*, *redundancy*" does "not solve all our

problems" (Shannon 1956). In addition, in 1961 in a private conversation Shannon stated that

applications of his theory outside his intended area were "suspect" (Tribus 1983: 475).

Despite Shannon's misapprehension, it appears that there has been valid and useful

application of his work to other disciplines. In discussing the application of Shannon's work

to psychology, Luce points out that the theory is not appropriate for information with an

internal structure; however, it may be feasible for information, which has only dichotomous

choice (Luce 2003: 185-6). Therefore, it is possible that there could be an application of the

theory to language that involved only a yes/no solution, but language is normally more

complex. In addition, the application of Shannon's statistical tools to other fields has been

effective, and many of the uses of Shannon's work are not from his theory but from his

methods (Ritche 1986: 292,295).

Technology versus natural sciences

Many people fail to recognise that technological advancements become outmoded and

this can undermine the theories based on them. This applies to Shannon's theory even when

correctly applied to the transmission of data. For instance, data transmission itself is on the verge of becoming irrelevant in the fast-paced changing world of technology due to teleportation of data using quantum entanglement. Teleportation involves no transmission, no cables, no connections and no time lapse. Teleportation of data based on quantum entanglement has already been achieved and it is only a matter of time before entangled computers make transmission of data redundant (Pfaff et al. 2014; Markoff 2014; Wiener-Bronner 2014; Spencer 2015).

Another issue is the problem in applying technological theories to humans given the complexity of the natural world. To suggest that the complex functions of the brain can be compared to the processes of a machine is dubious. There are over 125,000 trillion switches in the human brain, around a thousand times the number of stars in our galaxy (Garrett 2014). Theories such as autopoiesis, complexity science and emergence theory have their origins in the natural sciences and can cater for this complexity. While theories developed for the natural sciences may develop and change, they will not become outmoded on the basis that they lack the capability to handle complex issues.

An alternative theory of multimedia

The proposed theory of multimedia is not a model or theory of communication or information. A theory of human communication involves two-way communication between people and the proposed theory does not include people. The proposed theory does not attempt to predict the individual opinions of an audience member or even a consensus of opinions. In addition, it does not predict people's reactions. People from different cultural groups, with different experiences, will frequently have different reactions to the same statements.

The closest the thesis comes to referencing a model of communication is Luhmann's concept of communication events, which are very different to any model of communication based on Shannon's theory. For instance, Luhmann states that meaning is founded on

difference and is dependent on context (Luhmann 1995:150-8). Whereas Shannon's

transmission is based on sameness, where the sender and the receiver both use exactly the

same message translation set to encode and decode the transmitted information. These human

communication theories refer to two-way communication. The proposed theory focuses on

one-way communication. The reason for this is that news organisations use multimedia to

communicate information to audiences. If audience members do communicate with news

organisations, they normally use single media, such as email, rather than create multimedia,

such as audio-visual media.

Another issue is that multimedia news does not use normal language in the normal way.

The mass media use a schema of interpretation techniques – such as framing – to create a

specific meaning, and media language along with its interpretation is very different to other

language. The meaning of the message is based on generic cultural codes and these are

framed for a target audience. For instance, sporting news when discussing a game between

different teams often uses language, such as the word "war", that would be more appropriate

in a military conflict.

The focus of the proposed theory is on three areas: i) the relationships between the

media that compose a multimedia text and the perturbations generated by this relationship; ii)

the cyclical messaging process; and iii) mediation of the message. The overriding importance

and deterministic nature of relationships between component parts of multimedia (the media

that compose the multimedia) is not well understood. It is the links and interactions between

the components and the relationships that these create in a specific environment that

determine the interpretation. Messaging is not a human communication theory nor does it

reference communication theory other than Luhmann's communication events, which are part

of systems theory. Messaging is specifically about the cyclical creation of a multimedia news

message and not communication between people. Messaging is a one-way process that

produces a specific message aimed at a target audience whose views are presumed to be based on cultural codes and market research.

The proposed theory is a multimedia/audio-visual theory, which can be used to predict the outcomes of the audio-visual combinations in multimedia for a target audience. It can also be used in the development phase of multimedia to ensure that the meaning and the emotional level are not inadvertently changed. The proposed theory draws on a wide range of disciplines. There is a need for a multidisciplinary approach in today's world where boundaries have "melted away [...] under conditions of electric speed" in an era which decentralizes our world (McLuhan 1994: 35-6).

Figure 3-1 shows that the proposed theory directly incorporates concepts from seven widely recognised theories, four of which are systems theories, and three of which are multimedia/audio-visual theories. It also draws on various other theories, disciplines and research.
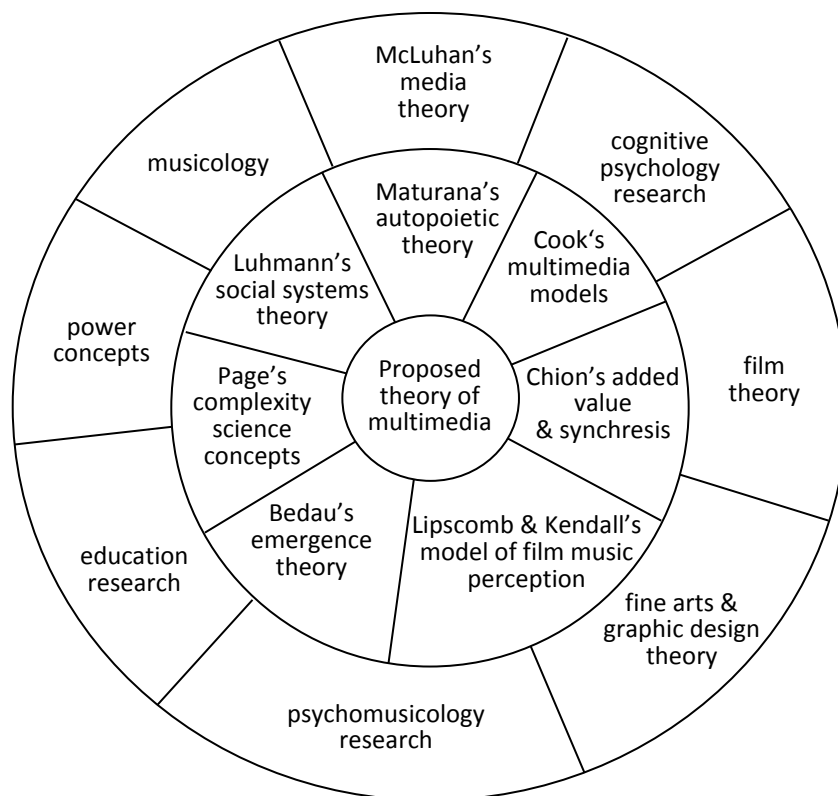
Figure 3-1 Theories, models and disciplines drawn on

Systems theories

The first of the four systems theories and the one which lays the foundation for the proposed theory is the autopoietic theory of Chilean biologist, Humberto Maturana (1975). It has been claimed that autopoiesis is an operational definition that applies to living systems and it provides a universal definition of life, but that abstract systems [such as multimedia] are human constructions, which are not candidates for autopoiesis because they are "of a different categorical type from autopoietic systems" (Fleischaker 1988: 37,42). Even so, autopoietic theory can be applied to non-living systems to increase the understanding of how some non-living systems work, even if it is claimed that these non-living systems are not actually autopoietic. For instance, autopoiesis has been applied widely to various disciplines including family therapy and law (Colapinto 1985; Teubner 1987).

To this autopoietic foundation are added a number of concepts from various theories. Complexity science as defined by Scott Page[6], (2009; 2011) is used to describe how multimedia functions as a complex system. In addition, the emergence theory of Mark Bedau[7] (2002; 2013) is used to explain the type of emergence that occurs in multimedia, how it occurs and how it can be predicted. From the social systems theory of German sociologist Niklas Luhmann (1995) comes additional autopoietic concepts and systems differentiation. The proposed theory applies autopoiesis and extends systems differentiation in ways that have not previously been used or discussed. None of these theories have previously been applied to multimedia. While Luhmann has applied his systems theory to the mass media (2000), he has applied it very differently to how it is applied to multimedia in this thesis.

Multimedia/audio-visual / media theories & models

The proposed theory also draws on several different multimedia and audio-visual theories and models. One is the generalized theoretical framework for the analysis of musical

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[6] Scott Page is Professor of Complex Systems, Political Science, and Economics, University of Michigan.

[7] Mark Bedau is Professor of Philosophy and Humanities, Portland State University.

multimedia of Nicholas Cook[8] (1998). Another is the theory of added value of Michel Chion[9] (1994). Both Cook's and Chion's theories are widely acknowledged as important in their fields, but both focus on entertainment and have weaknesses when applied to informational genres such as news and education. Cook's theoretical framework focuses on musical multimedia in entertainment and advertising while Chion's work focuses on film. In addition, the proposed theory includes concepts from Lipscomb & Kendall's model of film music perception (Lipscomb 2005: 39-41. All are discussed in more detail in Chapter 4[10].

These theories and models see the emergence of a new and unexpected meaning, which can occur when multiple media are combined, as something that benefits the context in which they are used. In these contexts, entertainment and advertising, accuracy is a secondary issue and misrepresentation is normally accepted by the audience. Misrepresentation is often used as a form of humour, and advertising is often deceptive in that it misrepresents a product by inferring a quality that is not in the product, but these inferences are immoral rather than illegal.

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[8] Nicholas Cook is Professor of Music, University of Cambridge.

[9] Michel Chion is A/Professor, University of Paris III, Sorbonne Nouvelle.

[10] A number of other theories, models, concepts and research that involve media and the audio-visual relationship are also referenced. These include McLuhan's media theory, cognitive psychology and musicology research especially that by Marshall and Cohen (1998) and Cohen (1993; 2000), various film theory concepts, fine arts and graphic design theory, musicology, psychomusicology and various research from media studies and education.

Chapter 4 Theories of Multimedia & Audio-Visual Technology

Introduction

The combination of aural and visual media in various forms, such as television, cinema and the Web, form an integral part of Western life. The result is that there are a number of theories from various disciplines that examine the combination of audio and visual media in entertainment, but none focus on the importance of maintaining the correct meaning of factual information. Thus, none of the theories are suitable in their current form for application to news media. In addition to these theories, there is a substantial amount of audio-visual research undertaken by psychologists and, to a lesser extent, by educationalists. One aspect that clearly emerges from this research is that any combination of audio-visual media can lead to a novel perception that is different to any one medium presented alone. Conflict between sound and image in particular causes some type of problem, such as reducing understanding or changing the meaning in some way.

The aim of this chapter is to describe the theories, models and research that are incorporated and referenced by the proposed theory of multimedia and which are not described in detail elsewhere. These include Chion's added value and synchresis (1994), Cook's generalized theoretical framework for the analysis of multimedia including his multimedia models (1998), and Lipscomb and Kendall's model of film music perception (1994). In addition, this chapter also describes audio-visual cognitive psychology research by Marshall and Cohen (1988), Cohen (1993; 2000), and McGurk and MacDonald (1976) which is drawn on throughout the thesis. In addition, this chapter describes research on intermedia conflict and information overload. Autopoietic theory, systems theory, complexity science, and emergence theory are described in Chapters 5 to 8 respectively.

Added Value audio-visual film theory

Chion has been described as "a poet in theoretician's clothing" (Gorbman 2014) and his work on the audio-visual relationship has been described as an "intellectual investigation" (Anderson 2000: para. 2). While this work has been claimed to be "introspective rationalizations that are not grounded in an understanding of current cognitive-psychological issues and methods" (Phillips 2013), Chion's theories are supported by cognitive psychology and musicology research, especially that of Cohen (2000). In addition, Chion's theories are highly regarded and the same author also states that it is "the most coherent and persuasive theory of film-sound perception to date" (Phillips 2013).

Chion's theory of added value states that sound enriches image and image enriches sound because "one perception influences the other and transforms it", This results in us not seeing the same thing when we are also listening, and not hearing the same thing when we are also seeing (Chion 1994:xxvi,5). In other words, when sound accompanies image or vice versa there will always be some type of change to how the medium would be experienced alone.

It has been claimed that the theory of added value means that any sound in film will have an impact on meaning (Phillips 2013) and Chion acknowledges that these changes of meaning can occur. However, the changes may occur on different levels. The combination of sound and images changes the perception in some way, but this change could be to the emotional level, the entertainment level, or it could move the focus from one medium to the multimedia as a whole or vice versa. In addition, the value added by one medium to another is unlikely to be in either if each had been experienced alone. However, the added value appears to be there naturally in each medium because in an audio-visual relationship, one medium influences the other by contamination and projection (Chion 1994: 9) and each medium is difficult to assess separately when they are combined in multimedia. In other words, the influence of one medium on another is not obvious.

The theory of added value incorporates a number of concepts including: vococentric/verbocentric, illusory redundancy, sleight-of-hand, empathetic/anempathetic, sound created tempo, acousmatic sound and synchresis (Chion 1994). In addition, Chion's language has provided a body of terminology to enable discussion of audio-visual processes.

Vococentric/verbocentric is the effect of voices dominating attention even when other media are present. Vococentric is the privileging of the voice while verbocentric is the privileging of the words spoken (Chion 1994: 5-6). Illusory redundancy is the illusion that one medium has the same meaning as another when in fact, the meaning of one is ambiguous and its meaning is being influenced by the other. Sleight-of-hand occurs when one medium creates an illusion in another. Chion gives the example of *Star Wars The Empire Strikes Back*, where doors do not move but are shown closed then open and the sound creates the illusion that the doors can be seen opening, so we believe that we see them moving (Chion 1994: 7,12).

An empathetic effect occurs when music expresses the meaning of the images and language in a scene. An anempathetic effect is created when the music is "indifferent" to the images and language. This has the effect of intensifying the meaning of the images and language. For instance, an anempathetic effect would be created from serene music accompanying violent images. With sound created tempo, the tempo of sound influences the apparent tempo of the image. Acousmatic sound is sound without a visible source.

Synchresis, a term created by Chion from a combination of the words synchronism and synthesis, is a special form of synchronization that occurs when synchronization glues together unlikely combinations of sound and image. A sound can be associated with an image on a sync point and it may seem natural even though that sound is not normally associated with that image. Random combinations of music and image can result in synchresis and it may not always be obvious why this has occurred. Synchresis does not always occur, and a

variety of factors determine whether synchresis of a particular sound and image is achieved (Chion 1994: 54,63,115).

Chion's theory of added value – and particularly synchresis – are an important part of the proposed theory of multimedia. At the same time it is important to remember that in the theory of added value, which is aimed at cinema, concepts such as sleight-of-hand are seen as positive, whereas such functions would normally be viewed negatively in news.

Musical multimedia theoretical framework

Cook's *Analysing Musical Multimedia* (1998) provides a generalized theoretical framework for the analysis of musical multimedia. This generalized theoretical framework – while being music oriented – provides a method for analysing any type of multimedia and is compatible with Chion's theory of added value.

The main features of this framework are: i) the transfer of meaning from one medium to another; ii) the three models of multimedia: conformance, complementation and contest; iii) the possibility of the emergence of something new and unexpected; and, iv) contest between media as the driving force for emergence.

Cook clarifies some aspects of added value when he states that one medium can take on the meaning of another. This occurs when there is limited overlap of meaning between the media, – that is, one medium will absorb the qualities of another when there is adequate similarity between them (Cook 1998: 69-72,82-5). This is particularly relevant to multimedia news because there will normally always be an overlap of meaning between the media that compose a news story. This overlap will be limited because a close match, as occurs in a classroom situation with a teacher reading visually presented words, would not normally be acceptable for a news item. In other words, there must be adequate similarity between media for one medium to absorb the qualities of the other. If they are too dissimilar, there will not be this transfer to qualities. If they are the same, there is only redundancy as described above when a teacher reads visually presented words.

Cook defines three models that are based on the perceived interaction of media, and these models are: conformance, complementation and contest. The first model, conformance, occurs with a close match of the media. This is rare in multimedia because conformance is more a simple joining together of different art forms and multimedia is normally more complex. A match between media does not occur in the other two models. The second model, complementation, occurs where the media contrast and/or one media adds what is missing from the other media. Complementation may "constantly teeter on the verge of contest" but it is not contest. Complementation might also occur less than expected because multimedia is often more about contest (Cook 1998: 120).

The third model, contest, occurs where music and image appear to be in conflict. It is within this context that the possibility of the emergence of something new and unexpected can occur. For this new meaning to emerge the multimedia configuration must have some overlapping attributes at both an obvious level and a deeper less obvious level. However, this overlap must be a limited overlap of attributes, where the characteristics neither completely overlap, nor totally diverge. It is this limited overlap of attributes that creates the potential for a new meaning, but overlap alone will not create a transformation (Cook 1998: 69,73-74,82-86,98-106). Cook's concept of emergence is acknowledged in this thesis, and the proposed theory of multimedia states that emergence can occur in multimedia because emergence is normally one of the outcomes of a complex system.

Figure 4-1 shows the three multimedia models; a match occurs with the conformance model, there is no match with complementation but neither is there is conflict, and with the contest model, conflict occurs and something new can emerge.
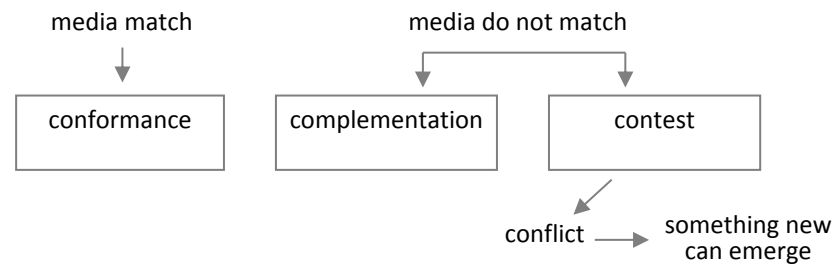
Figure 4-1 Cook's multimedia models

Contest may result in emergent properties where something new and unexpected occurs, but Cook states for this emergence to occur there must be a limited overlap of meaning between the conflicting media, and it is this partial overlap of meaning which allows one of the media to absorb the qualities of another (Cook 1998: 82-5,98-106). However, Cook does not discuss the situation where it is possible that a change can also occur without a limited overlap, such as when two very different media are combined and create an effect of surrealism or irony. In film, conflict between image and music, either diegetic or non diegetic music, is sometimes used to create irony (Gorbman 1987: 23-5).

The strength and weakness of Cook's models occur for the same reason. These models present a relatively simple view of the workings of multimedia, with emphasis on the "relatively" because this is not a simple topic. The models can easily be applied to various forms of multimedia, and this ease of use is a distinct advantage even though a multimedia text is more complex than these models indicate. For instance, there are a number of different types of relationships between the media in multimedia and the conformance, complementation and contest models are only one type. Even so, Cook's models provide an excellent, if limited, method of analysing a multimedia text. They are especially valuable in the arts, which have included the concept of emergence since the time of Eisenstein's montage theory, as previously discussed. Movie and advertising directors are trained and experienced in the techniques which can create emergence. This is not the case in the news industry which has limited time and budgets, and journalists who are not trained in film theory.

Cook's theoretical framework is also valuable for understanding multimedia news provided the following two issues are taken into account: i) Cook's framework views multimedia from the perspective that emergence is of value in multimedia whereas it is a problem for news, and ii) Cook's framework was developed primarily for musical multimedia so its application to a multimedia text, particularly multimedia news, only partially explains the issues involved. Even so, Cook's multimedia models are central to this thesis and are incorporated in the proposed theory of multimedia.

Note that the terms 'contest' and 'conflict' have different meanings in this thesis. The term 'contest' refers only to Cook's use of the term where there is a contest between the media that compose the multimedia. The term 'conflict' has a wider meaning. For instance, a news story can be about a conflict such as a story about war. In other words, while there can be a conflict between media, which is referred to here as a contest, there can also be a story about a conflict.

Model of film music perception

The model of film music perception proposed by Lipscomb and Kendall (1994) defines two judgments which are made when watching a movie. The model is more complex than is described here but only the two judgements are drawn upon. The first judgement is association and is based on experience. This judgement determines whether there is an appropriate match between the meaning of the audio and the meaning of the visuals. The second judgement maps the accent structures of both audio and visuals, and involves a decision as to whether there is an appropriate match between the audio and visual emphasis points. This accent judgment determines whether the rhythms are consonant, out-of-phase consonant or dissonant.

If both the association judgment and the accent judgement are found to match, the attention remains on the movie as an integrated whole. If either judgement finds there is no match, the attention focuses on either the audio or the visual (Lipscomb & Kendall 1994:

Lipscomb 2005: 39-41). This has implications for news because the focus on one medium, if it is not the medium carrying the news message, can change the message. The two judgments, association and accent, are a valuable addition to the proposed model of multimedia.

Psychology research on the audio-visual relationship

The influence of one medium on another can be seen in a series of cognitive psychology experiments by Marshall and Cohen (1988) and Cohen (1993). The first experiment was designed using different pitch and tempo in music (a simple melody) and different height and speed in the image (a bouncing ball) to measure the response to different combinations of the music and image. The music and image were evaluated separately and the various types of bouncing ball and the music were judged as either happy or sad. For the image, this evaluation was based on the various heights and speeds that the ball bounced. A higher bounce and faster speed are normally associated with happiness and the reverse for sadness. For music, the evaluation was based on musical characteristics including pitch, tempo and key. A high pitch, fast tempo and major key are normally associated with happiness and the reverse for sadness. Different variations of the melody were then combined with different variations of the bouncing ball. Responses to the different combinations were measured.

The results showed that when music and image were experienced separately, judgement was accurate and as predicted. When congruent music and image were combined, such as a high bouncing ball with high pitched music (happy-happy), judgement also accurately reflected the music and image. In contrast, when incongruent media were shown together, such as a high pitched melody with a low bouncing ball (happy-sad) neither medium was judged accurately, and the result was more like a compromise, even when subjects were asked to focus on a specific medium. The results were consistent over various combinations of music and image. In these experiments, when the music and images were in conflict – contest using Cook's term – there was a change to the meaning of both media, but where there was no conflict there was no change to their meaning. In other words, where the media agreed, the

result was an accurate interpretation. However, the conflicting media resulted in an inaccurate interpretation. This experiment indicates that conformance is required to accurately perceive music and image when they are combined, and that if they are in contest, the combination will be perceived inaccurately (Marshall & Cohen 1988).

A different experiment used two video excerpts accompanied by two different music compositions. In one video, a man chased a woman, while in the other video two men were fighting. Two different music compositions were used which had previously been evaluated as either representing love or conflict. In the male-female chase, the music strongly influenced the interpretation. If the music had previously been judged as representing conflict, the male-female chase was interpreted as violent. If the music had previously been judged as representing love, the male-female chase was judged as non-violent. However, when the contrasting music was used with the fight between the two males, it had little effect on the interpretation (Cohen 1993). This was later confirmed in another experiment in which visually presented aggressive behaviour was less influenced by auditory incongruency than visually presented friendly behaviour. It was speculated visually presented aggressive behaviours were highly influential of judgements because aggression may capture attention and be important to survival (Bolivar, Cohen and Fentress 1994: 48-50).

These experiments indicate that whether the music is used to interpret the image, and if so how much, depends to some degree on the level of ambiguity in the image and the number of different interpretations possible for the image. In addition, there needs to be some level of overlap in meaning to enable one medium to pick up the meaning of the other. Cook uses a metaphor model to establish this overlap (Cook 1998: 82-5). In the man-woman chase described earlier, the overlap came from the ambiguity that allowed the image to be interpreted differently depending on the music. There was no overlap of meaning with the fight between the two men and the love music so there was little or no influence between the audio and visual in that particular combination. When ambiguity occurs, the music is

unconsciously drawn upon to interpret and understand the narrative in the visuals (Cohen 1993: 173; 2000: 363,366-8,373-4: Bolivar, Cohen & Fentress 1994: 48; Marks 1996: 112).

The results of a very different cognitive psychology experiment in the 1970s, which is now considered classic, is referred to as the McGurk effect. This experiment shows that if the syllable "ba" is heard when viewing lip movements saying "ga" then the listener believes they are hearing "da" (McGurk & MacDonald 1976). This effect is considered robust having been confirmed in many different types of studies, over many decades, including more recent experiments that used a string of phonemes rather than a single syllable (Gentilucci & Cattaneo 2005: 66).

Part II Systems Theories & Their Application to Multimedia

Chapter 5   Autopoiesis in Multimedia News Messages

Introduction

At first glance a multimedia text might appear as simple and straightforward because it contains only sounds and visuals, but multimedia is composed of many different types of media including oral language, written language, video images, photographs, graphics, music and sound effects. Silence, when used to create an effect, should also be treated as a medium. The result is that there are a large number of media relationships, and a multimedia news story is a complex matrix of relations between media.

All the media in multimedia contribute to the message but it is unlikely each will contribute equally. Normally different media, with different characteristics will dominate audience attention at a specific time and the dominance of some media will be at the expense of others. At the same time, and depending on the level and type of dominance, one medium can change the meaning of another. This change of meaning is especially likely with the use of entertainment techniques, such as added music and fast cuts. However, given the reduced interest in news and the falling revenues of news organisations, there are few options other than to make news more entertaining, as discussed in Chapters 1 and 2. A better understanding of multimedia as a system reduces the risk of unintended changes of meaning.

In what follows, I will argue that the application of autopoietic theory to multimedia provides a deeper understanding of the structure and relations of the media in a multimedia text. Understanding these structures and relations help to create a story that is clear and coherent, and where the intended message is communicated to the target audience. Autopoietic theory can be used as a framework to analyse an existing multimedia text but also as a model to create multimedia, so that added media can make a news story more entertaining without compromising the message. This is not to suggest that all multimedia are autopoietic, but that autopoietic theory can be productively applied to multimedia. Therefore,

the aim of this chapter is to describe Maturana's autopoiesis and how it can be applied to

multimedia to assist with understanding how meaning is formed in a multimedia text.[11]

Autopoietic theory

The autopoietic theory of Humberto Maturana has been applied by many theorists to a

wide range of disciplines including information technology, sociology, law and business

systems. Given this broad application and that Maturana's fundamental assertions have at

times appeared in traditional philosophy (Glasersfeld 1991), Maturana could be considered a

philosopher as well as a biologist. The term "autopoietic theory" refers to Maturana's body of

work on autopoiesis, which encompasses a number of concepts including that of the observer

which, as Hayles states, had a strong influence on second order Cybernetics (Hayles 1999:

131-5). To be able to fully appreciate how autopoietic theory is applicable to the study of

multimedia, it is necessary to have a solid understanding of the complexities of this theory,

and this can only be gained by a reasonably close reading of the thinkers who initially

developed it.

Requirements of autopoiesis

A six point key can be used to determine if a system is autopoietic (Varela, Maturana &

Uribe 1974: 192-3). The first requirement is that the system must have identifiable boundaries

through its interactions. In other words, there must be a clear boundary between the system

and its environment. The second requirement is that the system is constituted from

components which can be separately described. In other words, the system must be composed

of parts which form a whole. The third requirement is that the system is mechanistic, which

means that the properties of the system are created by the interrelations of the properties of

the components. In other words, the relationships between the components create the system.

The fourth requirement is that the relations and interactions between components of the

system create the boundaries of the system. The fifth requirement is that all components must

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  2(1): 55-83.

be produced through the self-producing autopoietic process. The sixth states that all components must participate in the production of the components. However, this seems to be at odds with a later statement by Maturana that "the components of an autopoietic system which do not participate in its autopoietic network can be any whatsoever as long as they do not interfere with it" (Maturana 1978b: 34).

Circular processes

The term "autopoiesis" was coined by Maturana to describe the circular processes of an autonomous living system (Maturana & Varela 1980: xvii). Maturana states that an autopoietic system produces its own components which are mutually dependant. In a circular process, at each stage of the system's life, the existing components produce the components which follow and this allows the system to continue producing itself. This self-production is an internal circular process, which continues until the organism disintegrates. Self-producing does not mean reproduction because an autopoietic system does not necessarily have the ability to reproduce (Maturana 1978b: 33-4; 1980d: 9-10). In addition, the components of an autopoietic system must be identifiable; they must act as a unity, and along with the relations between them, must participate in the production process (Varela, Maturana & Uribe 1974: 188). Even though a system, to be autopoietic, must have this self-producing circular process, the medium which carries the autopoietic system need not itself be autopoietic (Maturana 1978b: 34).

Another circular process described by Maturana is that of languaging, the process of behavioural interactions between people. Languaging is "a particular kind of flow [...] in the interactions and co-ordinations of actions between human beings" and it is the "recursive consensual co-ordinations of actions". In other words, these actions in the flow of interactions must be consensual for languaging to occur and they must be harmonious in the way their interactions are co-ordinated. Consensual does not mean agreeing on a topic, but that the

people involved must co-ordinate their responses for languaging to occur (Maturana 1988a: 45-7).

The issue of how an autopoietic system comes into existence is not addressed by Maturana and he specifically states reproduction is not a requirement of an autopoietic system (Maturana 1978b: 34). Therefore, autopoietic theory applies from the time the cell exists, not its coming into being. Maturana has been criticised on this issue. However, as Glasersfeld states, autopoiesis is cyclical and a cyclical process does not have a beginning, so the criticism is inappropriate (Glasersfeld 1991). The autopoietic process can have an end, but this occurs only when the process experiences excessive interference and the autopoietic system disintegrates (Maturana 1978b: 33; 1988b: 6.iv.a).

A composite system

An autopoietic system is a unity where the components interact forming a boundary between the unity and its environment. In other words, an autopoietic unity has properties and operations which are different from its environment. A unity can be one of two types, either composite or simple. A composite unity can be broken down into further unities. A simple unity cannot be broken down into further unities. The properties of a composite unity are determined by how its components are organized, that is, the relationships between the components determine the properties of the composite unity. While a composite unity appears as an integrated whole, it only achieves integration through the relationships of its components (Maturana 1978b: 31-34).

Structural coupling

In autopoietic theory, when there is a recurring relationship between a system and its environment it is referred to as structural coupling. The environment includes the medium in which the autopoietic system is realised. Therefore, a system is structurally coupled to the medium in which it realises its autopoiesis. There is no restriction on what that medium can be, and no restriction on what properties its components can have. Provided there is no

interference with the system's autopoiesis, the medium itself need not be an autopoietic system. Even if the medium is not autopoietic, an autopoietic system changes according to the medium in which its autopoiesis is realised. If an autopoietic system is not in continuous structural coupling with its medium, it disintegrates (Maturana 1975: 313,326; 1978b: 34; 1980b: 14).

Organization

In autopoietic theory, the term "organization" specifies the total components of an autopoietic system and all the potential relationships between the components. The organization of an autopoietic system is defined by the components and the relationships between them. In addition, the organization does not change over time unless the system disintegrates. In other words, the organization is static and specifies all the components and their potential relationships. The organization remains constant because change would produce a different system. If an interaction changes the organization of the system, this is destructive and the system disintegrates. (Maturana 1978b: 32; 1988b: 6.iv.a) An example is a car which is badly damaged so that it no longer functions; the change of organization results in it being a wreck (Mingers 1989: 163).

Structure

The term "structure" specifies the components of an autopoietic system which are active at a particular time, and also the actual relationships between the active components at that time. Thus, the structure of an autopoietic system is different to its organization because the structure is dynamic and changes but the organization is static. Autopoietic systems are structure-specific. The changes to a system are determined by its structure because a given structure determines and limits future structures. It is the structure which determines how the system will behave and not the environment, because the structure determines whether the system will be influenced by external forces from its environment. The changes that occur in the structure are influenced by the medium in which the autopoietic system occurs. The

ability for the structure to change is also referred to as plasticity (Maturana 1975: 320; 1978b: 31-3,37; 1980b: 14; 1988b: 6.iv).

A structure is limited by its organization but it has properties and relations not specified by the organization. In the car example, the organization is composed of the basic attributes which all cars have such as steering, brakes, seating and power, with the required relations between them so that the car functions as a car. Properties such as the shape, colour and size vary from one car to another so are part of its structure. These properties can also vary over time within the same car, such as the car can be re-sprayed so the colour changes and a dent can change the shape (Mingers 1989: 163).

Autopoietic networks

An autopoietic system is determined not by the individual properties of its components but by the system as a whole and the relations between the components of the system as a whole. If the components are examined in isolation rather than as a whole, the properties of the system are not accurately revealed because it is the network of interactions of the components which reveal the character of the system. An autopoietic network is the result of the combination of system components, their properties and their interactions, and no individual part is a determining factor without the others (Maturana 1978b: 33-4; Varela, Maturana & Uribe 1974: 187-8,192).

Boundaries

In autopoietic theory, the components of a composite system form a network of interactions and the interactions between the components create the system. The system is created because this interaction between the components creates a boundary between the system and those things outside it in its environment (Maturana 1978b: 33). Autopoietic theory provides no specific rules for establishing boundaries, so it appears to be adequate to "clearly demarcate the inside from the outside" (Mingers 2002: 284).

Environment of a composite system

The environment of a composite system is everything which is not involved in its structure and which an observer can discriminate as being distinct from the system. In addition, the environment can contain entities which might or might not interact with the system (Maturana 1988b: 6.xiii).

Perturbations

An autopoietic system is organizationally closed to its environment in that the environment cannot directly alter the autopoietic system. However, the environment can interact with the autopoietic system and create forces, called perturbations, which might or might not result in a change to the system. Even though it is the environment that creates perturbations, the structure determines whether the perturbation will result in a change. In other words, an autopoietic system is a closed system because even though a change might be in response to an external influence, it is the structure of the autopoietic system that determines whether there will be a change. As well as external perturbations from the environment, internal perturbations can occur between the components within an autopoietic system, that is, one component can perturb another. (Maturana 1975: 319-320,327; 1978b: 34,42) In complexity science, a system which can be influenced by its environment is referred to as open (Johnson 2009: 14) so the term "closed" when used with autopoietic systems is to some extent misleading.

Autopoiesis and living systems

Maturana states the term "autopoiesis" describes a living system but he also states that autopoiesis is not limited to physical systems. He states that his computer model shows autopoietic organization and could be considered as living. These comments allow for a set of concepts to be considered as autopoietic (Maturana 1980d:xvii; 1981: 23; Varela, Maturana & Uribe 1974; Mingers 1995: 16,43,61).

Observers

An important contribution of autopoietic theory is "the observer" (Hayles 1999: 158). Observers are people who are able to distinguish a system from themselves. They make this distinction through repeated actions or thoughts. Observers have the ability to remain detached from circumstances and their environment in that their observations are not confused with, and remain separate from, their ideas of themselves. Observers can distinguish between the system as a whole and its components as entities within the whole. Observers can also distinguish the system and its environment as separate but related. Observers cannot be impartial and independent, but interpret on the basis of their experiences. This is referred to as objectivity-in-parenthesis. However, this does not mean that people will necessarily disagree because people who successfully live in a culture will have "a history of successful orienting interactions". In other words, people with similar backgrounds and education will normally have similar views (Maturana 1974:section E; 1978a: 31; 1988b:sections 5,6.xiii; Mingers 1989: 161).

Applying autopoietic theory to multimedia news messages

Circular processes: multimedia news messages

In a multimedia news story, the meanings of the media are the components and the interaction of these meanings creates the multimedia message. The multimedia news story is, or should be, maintained by the continuing production of the message. This is a circular process where the message is created and recreated on a scene by scene basis and one scene flows into the next to create continuity. A multimedia scene is a little different to that defined by the film industry because a multimedia scene changes when the structure changes. The structure changes when media stop, start or the properties change such as loud music becoming quiet. The circular process refers only to the message and not the physical media because, as Maturana states, the medium which carries the message need not itself be autopoietic (1978b: 34).

A story is created by the cyclical process of the media components and their meanings creating a flow of messages. The process of creating a story from a sequence of messages, I refer to as "messaging". Messaging is similar to Maturana's languaging. Messaging takes place with a particular type of flow that arises from the interactions and co-ordinations of the meanings of the media in multimedia, where there must be co-ordinated actions over the entire multimedia. The interactions between the media must be co-ordinated to be meaningful. If they are poorly co-ordinated, such as language and image being out of sync, each would distract from the other and the message could become confused and meaningless and disintegrate.

Figure 5-1 shows the messaging process where each scene is created by the active media and each message is created by the meanings of the active media. In the first scene, the message is created by the interaction of oral language, video image and sound effects. In the second scene, the message is created by music, video image and sound effects, and in the third scene the message is created by oral language and graphics. The flow of the messages creates the story.

Multimedia message   recreated message   recreated message
scene 1   scene 2   scene 3

oral language   music   oral language
video image   video image   graphics
sound effects   sound effects
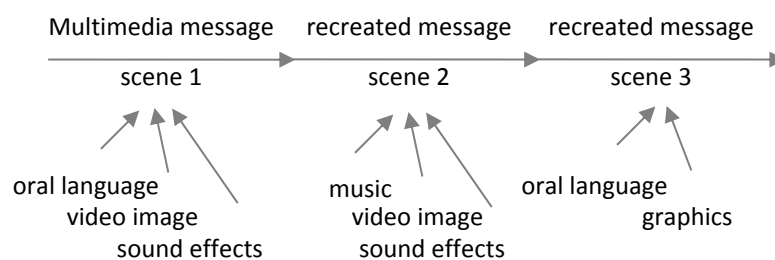
Figure 5-1 Multimedia messaging as a process of change

A flow of information is important in news. As Uko states, in a news story every concept should flow smoothly into the next. This is in contrast to the inverted pyramid style of news reporting, where the most important information is put at the beginning, and each piece of information is ranked in importance resulting in a disjointed message which becomes steadily less important. The pyramid style is outdated and inappropriate because by the time

newspapers are published, the main details of news items have already been broadcast on radio, television and the Internet. A news story should be written as a whole and not as disjointed pieces of information (Uko 2002; 2007: 119-20,128).

A multimedia message should develop scene by scene where, except for the first scene, each scene builds on the previous and is the basis of the next. This can be achieved with messaging where the message flows from the interactions and co-ordinations of the meanings generated by the media. Messaging occurs on a scene by scene basis with the flow of interactions and co-ordinations of the media in a multimedia configuration, with each of the active media influencing the meaning of the others. If messaging breaks down, for instance one scene does not build on the previous scene, the story will not flow and may become incoherent.

It might be claimed that something with a beginning and an ending cannot be autopoietic, but this is not the case. The first scene is equivalent to a living cell coming into existence and a living cell is an autopoietic system. In multimedia, a message can "disintegrate" for a number of reasons. The most common would be that when the multimedia finishes then the message flow ends. Another reason could be excessive interference due to a problem with the broadcast technology, in which case, the message might stop or become incoherent. Additionally, there can be an internal reason for the multimedia to disintegrate. In Cook's three models of multimedia (described in Chapter 4), conformance, complementation and contest, each medium has its own meaning which may agree, complement or conflict with the meanings of the other media (Cook 1998: 98-106).

With high levels of conflict between the meanings of the media, the multimedia message can become incoherent and disintegrate. Disintegration of the message under all of these circumstances is compliant with autopoiesis.

A composite system: multimedia news messages

A multimedia news message is a composite unity because it can be broken down into media meanings which are simple unities, and in addition, the relationships between these meanings create the multimedia message. The meanings of the media can exist independently but their properties cannot. For instance, music is a simple unity composed of elements such as pitch, melody, rhythm and tempo but individually these elements have properties which do not have a specific meaning. An example is tempo. A fast tempo could indicate many things including very different meanings such as joy and panic. It is not until the tempo is combined with other elements such as melody that a meaning is created. While it can be argued that music has no meaning (Stravinsky 1936: 91-92), it is common for people to interpret music as having a specific meaning but they do this interpretation in their own way (Ford 2005: 21). In other words, each person will interpret music according to their experience and culture. The elements for images, sound and language are well defined and widely accepted in each of the areas of language, music and art, where they are known to each create specific influences. I argue that these influences should be treated as partial meanings, and these partial meanings combine to create the media meanings. The media meanings then interact to create the message.

Figure 5-2 shows that in this multimedia story, the message has four meanings generated from the four media: oral language, black and white photographs, music and sound effects. These interact to create the multimedia message. The elements each have partial meanings. The elements of a black and white photograph are line, shape, form, texture, light and shade, and space. While all the media have elements, only those for the photographs are shown here.
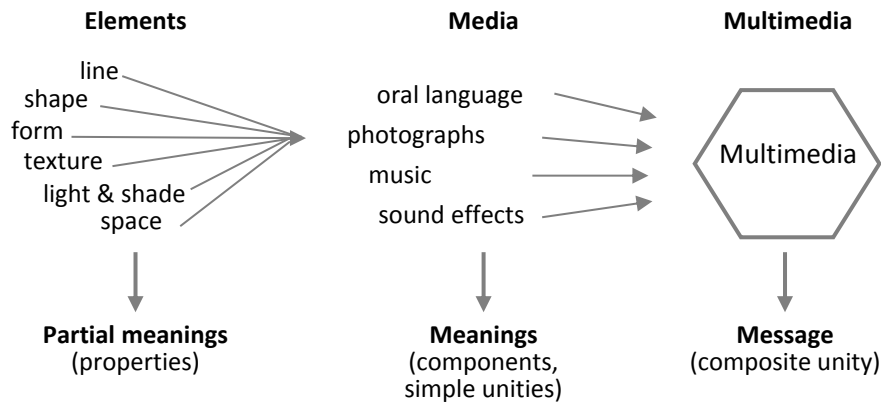
Figure 5-2 Composite multimedia

Structural coupling: multimedia news messages

Structural coupling occurs in multimedia between the message and the multiple physical media. Just as an autopoietic system changes in accordance with the medium in which its autopoiesis is realised (Maturana 1980b: 14), in multimedia, if any of the media change, the message also changes. For instance, in a configuration of language, image and music, if the music changed so that loud, fast and dissonant music became soft, slow and consonant, the message would also change.

Organization: multimedia news messages

The organization of a multimedia message is composed of the potential meanings of the media and their potential relationships, so the organization is static. Different multimedia stories will have different organizations. For instance, one multimedia story might include music while another might not. One might include graphics while others use photographs or video images, but the organization of a single multimedia story does not change over time. The organization of a multimedia story cannot change because if it did the story would no longer be as intended. For instance, if the computer sound card failed so that the oral language accompanying the video images could no longer be heard, the multimedia story would likely be incomprehensible.

Figure 5-3 shows the (static) organization of a multimedia message which is created by the meanings generated by four media which are: language, video images, graphics and sound

effects. A dotted line is designated here as indicating that an item is conceptual. This figure highlights the number of relationships involved. In this configuration of a story, with four media, there are six possible two-way relationships. Each media has a meaning which can influence or be influenced, so in this organization of a multimedia message there are twelve possible different influences between the meanings which create the message. The number of relationships escalates exponentially with each additional medium in multimedia, but this is frequently not understood or has been ignored.
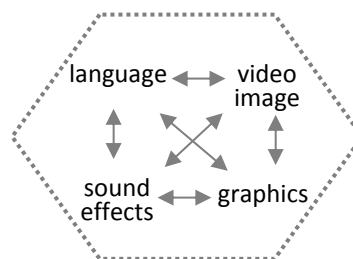
Figure 5-3 Organization of a multimedia message

Structure of multimedia news messages

A multimedia message is a structure-specific system because in multimedia it is the interaction of the meanings generated by the active media that determine the message. While the potential for these relations exists within the (static) organization, an autopoietic system must be functioning for these relations to occur. As the media meanings change, the message changes. A multimedia message is dynamic because the audio and visual media which generate the meanings and create the message continually change and interact. It is the way these media meanings interact that determines the message and how it is perceived by the audience. If all media create exactly the same meanings and so mimic each other then the result would be dull and boring, or worse, like a cartoon with possibly inappropriate humour. If the meanings are too different, they create conflict which can result in the multimedia story becoming confusing or meaningless. Each medium must contribute a meaning in its own unique way to create the message, but at the same time one medium should not mimic another nor should there be excessive conflict between meanings so that the relationships should be

in-between match and conflict. This in-between is a principle in complexity science and is

discussed in Chapter 7.

As previously discussed, each medium is composed of elements. The media have

meanings and the elements have properties as shown in Figure 5-2. The properties determine

the vividness of the media. The term vividness has been defined as referring to the production

of a "sensorially rich mediated environment" (Steuer 1992: 80). Vividness is created in an

image by properties such as brightness and density of colours. Additionally for video image,

the vividness is created by the amount of movement in a scene and the frequency of scene

cuts. In sound, vividness is created by properties such as pitch, harmony, timbre, loudness and

tempo. Moreover, in language, vividness is created by the meaning of the language itself,

because, as Chion states, our response to language is different to other sounds and visuals. If

we understand a language, the first response is normally to interpret its meaning and only

after this is done do we attend to other sounds (Chion 1994: 6). The vividness of the

properties of the media determines the specific structure of a particular multimedia message.

Figure 5-4 shows a common structure of a multimedia message. Oral language with its

meaning is in the foreground, video image in the midground and sounds other than language

in the background.
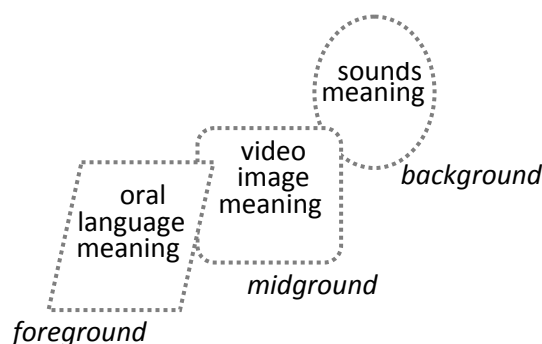
Figure 5-4 A common structure in a multimedia news message.

The concepts of foreground, midground and background are common in art theory but

here I have applied them to encompass all the media in multimedia as well as the meanings

the media carry. The claim that oral language is commonly in the foreground, video image in

the midground and sounds other than language in the background is made based on a wide variety of studies from many disciplines, including film theory, education theory, music theory and cognitive psychology, which discuss the dominance of one medium over another (Posner, Nissen, & Klein 1976; Colavita & Weisberg 1979; Shapiro, Egerman & Klein 1984; Balazs 1985; Sloboda 1985; Grimes 1990; Reese 1990; Kozma 1991; Chion 1994; Bolivar, Cohen & Fentress 1994; Cook 1998; Cohen 2000; Penn 2000; Roach, Heron & McGraw 2006). A full discussion of this relationship is beyond the scope of this thesis but it is discussed in more detail in Chapter 10.

This structure of oral language in the foreground, video image in the midground and sounds other than language in the background could occur in a multimedia news story about conflict in a war zone with a voice-over accompanied by video images of people fighting and the sounds of conflict. The vividness of an oral language message is normally enhanced by making it louder and other sounds quieter. In addition, given our response to language, which as Chion states is to immediately interpret it, the voice would normally be in the foreground. Even so, information overload caused by fast movements, and conflict could interfere with comprehension (Kozma 1991: 194-5; Grimes 1990: 23-24).

A video image normally takes precedence over most sounds (Colavita & Weisberg 1979: 345,347) so the image would normally be in the midground, and the sound in the background. An exception occurs with sounds which are particularly vivid such as very loud, fast or high pitched sounds (Sloboda 1985: 172-4). With a loud sound such as an explosion, the sound would temporarily move to the foreground taking precedence over the language and image. The activity status (active or inactive) of the media and their associated meanings, combined with the changing relations between them, create the structure of the multimedia message. For instance, in the above example, if an explosion occurred then the structure would change.

Vividness is more complex than it might initially appear. There are two types of vividness, overt and covert. Overt vividness is where the vividness is obvious such as with a loud, shrill scream. An example of covert vividness is quiet, ambient, dissonant, minor key music such as is often used in thriller movies and which has become synonymous with fear and danger. Music possessing these properties might appear as not being vivid due to it being quiet but its other properties give it a high level of vividness. Such music could completely change the meaning of the message. For instance, if it accompanied a prediction of catastrophe, its meaning supports and strengthens the message, but if it is used with a speaker who is presenting a positive opinion, it undermines the credibility of the speaker.

The audience is likely to be unaware of this influence of one medium on another. With music, the audience might not even consciously hear the music even though the brain is using the meaning created by the music to interpret the meaning of other media (Cohen 1993: 173; 2000: 363-374; Bolivar, Cohen & Fentress 1994: 48). Therefore, this technique could be considered manipulative and deceptive in a situation where music changes the meaning of speech.

Autopoietic networks: multimedia news messages

The relations between media in multimedia do not occur in a linear fashion where one follows another and one has connections with only one other. If the relations occurred in a linear fashion, it would not be multimedia. These relations occur as a network because normally multiple media interact at any one time. Multimedia is defined by the interaction of its media and it is the relations between these media which form a network of dependencies which influence the message. For instance, if a voice-over refers to specific details in the image, it is those details which the audience will focus on. To evaluate the meaning of the image without considering the meaning of the voice-over would result in a misleading interpretation. Therefore, in multimedia it is the interconnectedness between the media and

their meanings, where each meaning creates and supports the multimedia message in its own unique way, which ensures the multimedia produces the intended message.

Figure 5-5 shows the network of relationships that are possible in multimedia where, in this example, there are six media with thirty possible relationships which interact and change. This example of multimedia, which contains six media components, has been chosen because it is a combination commonly used in documentaries, and because people often forget that there are many individual components involved. For instance, still images and moving images are very different and have very different effects on an audience, so they should be treated as different media. This separation should also apply to music and sound effects, and to oral and written language. The relationships are two-way because all media have the potential to both influence and be influenced. For instance, music can influence the meaning of video image but video image can also influence the meaning of music.
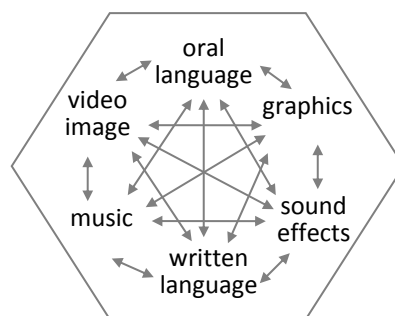
Figure 5-5 Relationships between media in multimedia.

The complexity of this network can create various problems such as information overload. This problem is ameliorated by the many conventions that are normally followed when combining media which limit interference between media and unintended changes of meaning. For instance, the volume levels of music and sound effects are normally reduced when someone is speaking. In addition, the number of media which are active at one time is limited to ensure the message is comprehensible. Even so, these are not always followed as can be observed on many websites which have an overwhelming amount of animation,

usually advertising. The creators appear not to appreciate the concept of information overload that can occur with multimedia and the way it interferes with comprehension.

Research indicates that the brain can become overloaded when processing multiple media, and vision can cause loss of information if the brain's speed of processing the information is lower than the speed the information is presented (Kozma 1991: 194-5). In addition, when there is too high a discrepancy between audio and visual information, the attention capacity can become overloaded and it may become difficult if not impossible to focus on the auditory information (Grimes 1990: 23-24). With additional active media the complexity of multimedia rises exponentially and the possibility of unintended outcomes increases.

Boundaries: multimedia news messages

The boundaries of the multimedia message are created by the relationships and interactions of the meanings generated by the media. The message is structurally coupled to the media and the boundary between the message and the media can be identified because the message is conceptual while the media are physical. Additionally, the broadcast technology (television or computer) creates a boundary between the multimedia sounds and images and other sounds and images in the environment. For instance, a person viewing television or using the internet would not normally confuse the origins of local sounds or images with those coming from the broadcast technology. They could experience information overload and be unable to interpret the message, but information overload is a different issue to boundary discrimination.

Environment of a composite system: multimedia news messages

The environment of a multimedia message contains the multiple media which form the multimedia and carry the message, such as oral language, video image, sound effects and music and the distribution technology such as the Internet.

Figure 5-6 shows that the environment of the multimedia message is multiple "physical" media and the environment of the physical media is the distribution technology.
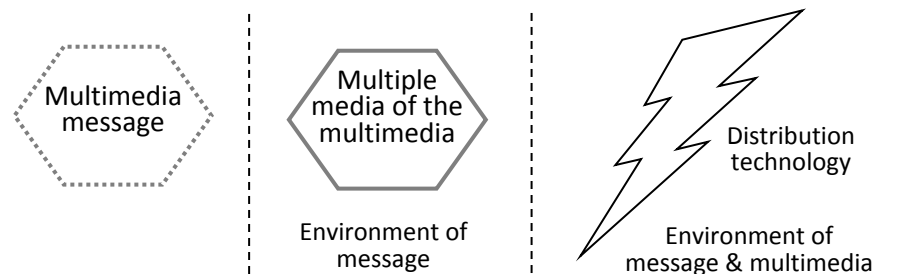
Figure 5-6 Multimedia message and its environment

Within multimedia, the meaning of each medium has an environment which includes the meanings of the other media. Additionally, the environment of a meaning will include the medium to which it is structurally coupled.

Figure 5-7 shows the environment of the music meaning in a multimedia text which consists of music, graphics and oral language. The music meaning is structurally coupled to its medium which is the physical music, so the music is in the environment of the music meaning. The graphics meaning and the oral language meaning are also in the environment of the music meaning because they are part of the multimedia structure.
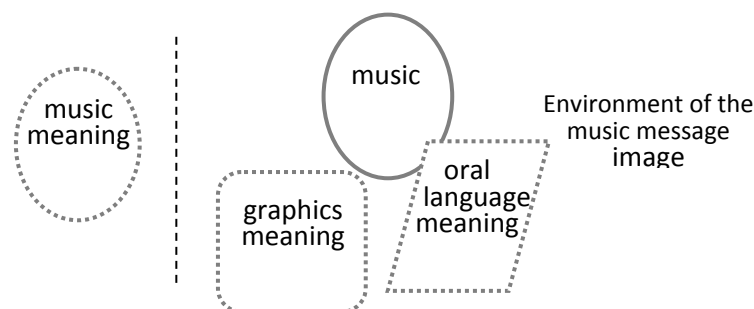
Figure 5-7 Music meaning and its environment

Perturbations: multimedia new messages

The effect of a perturbation can be more easily understood as a type of turbulence. Turbulence from the environment can prompt an autopoietic system to react and make

changes within itself. Alternatively, the turbulence might subside without any change

occurring. As Maturana states, there are two types of perturbations that create influences and

these are internal and external perturbations (Maturana 1978b: 42). For multimedia, external

perturbations occur from the broadcast technology such as the Internet. The message is

structurally coupled to the multimedia so anything which disrupts the physical multimedia

will normally disrupt the message. For instance, Internet users often experience this

disruption when watching YouTube where the video stops and restarts during the download

process. I argue that such an interruption to the video can be understood as a perturbation

which may or may not result in a change to the message.

Figure 5-8 shows that the multimedia is operationally closed because it is the structure

of the multimedia that determines whether the message will be changed, not the Internet.
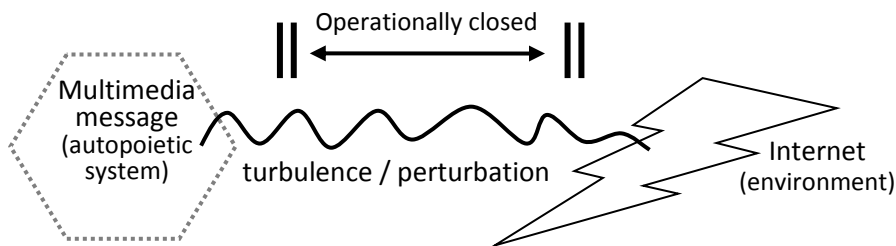
Figure 5-8 External perturbations

Even though the multimedia and the Internet are operationally closed, a perturbation

from the Internet can influence the multimedia message and the influence might result in a

change. The perturbation or turbulence is represented here as a wave created by the Internet

and this wave of turbulence may or may not result in a change to the YouTube video

message. Whether there is a change depends on the structure of the multimedia and its

message. For instance, if someone was speaking continually, and therefore the structure

included continuous verbal language, the stopping and starting could make comprehension

difficult and change the message. However, if there was little verbal language and only the

image was affected, it would be less likely that the message would be changed. Therefore, it

is the structure of the multimedia that determines whether the message will be changed by external perturbations from the Internet.

Internal perturbations occur between the meanings of the media. The meaning of one medium can create a perturbation which can result in a change to another. When this occurs the media do not change, only the meanings change. An image will remain the same regardless of the accompanying sounds, but music can change the meaning of the image by influencing how it is understood by the audience. For instance, within certain parameters, happy music will influence an image to appear as representing happiness. Therefore, the music creates a perturbation which, depending on the characteristics of the image, may or may not influence the image to appear differently to how it would have appeared without the music. Figure 5-9 shows that even though the video image meaning and music meaning are operationally closed, turbulence from either can influence the other, and depending on the structure, the influence may or may not result in a change. The multimedia structure is explained in the following chapter.
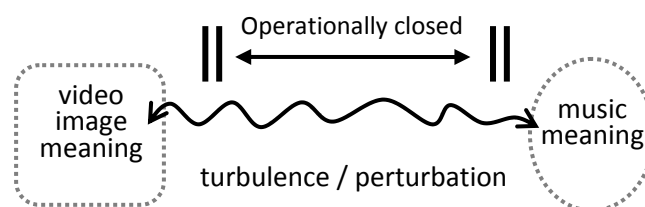
Figure 5-9 Internal perturbations

In a multimedia message, it is the combination of the structure (for instance, whether media are in the foreground, midground or background), and the type of media and their meanings which are active at the time, which determines whether or not the perturbation will result in a change.

Perturbations can be so disruptive that the message can become incoherent and thus "disintegrate". For instance, the multimedia message could become incoherent with too many media occurring at one time where all tried to be dominant at the same time with each

perturbing the others. An example would be if oral language, written language and graphics

all occurred at the same time, all were vivid, and they clashed rather than interacted, the

message would be incoherent. In messaging, as explained earlier, the components must

interact in a co-ordinated way.

Autopoiesis and living systems

Multimedia can be classified as autopoietic on the basis that Maturana classifies his

computer program as autopoietic and states that an autopoietic system need not be in

"physical space" (Varela, Maturana & Uribe 1974; Maturana 1981: 23). Therefore, it is

argued here that even though a multimedia message is conceptual and not physical and even

though it is not living and is constructed by humans, it can be stated as autopoietic if it meets

the requirements of autopoietic theory.

Observers: multimedia news messages

For multimedia, I argue that the observers are the various types of audience, the main

one being the target audience for which the multimedia is created. The audience, as observers,

can differentiate between their observations and themselves but they cannot be objective. In

addition, the audience can perceive the message as conceptual, the multimedia as physical,

and the broadcast technology (television or the Internet) as physical, with all being separate

entities that can be distinguished as such.

Figure 5-10 shows that the message, the physical multimedia and the broadcast

technology are all experienced as separate entities by the audience.
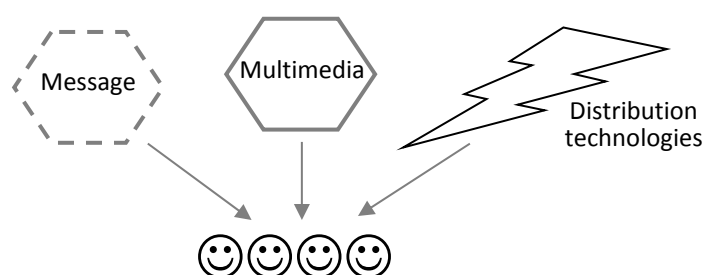
Figure 5-10 Audience as observer of separate entities

While the audience can differentiate these observations, the audience cannot be objective because what we see and what we interpret are determined by our experience, education and culture. Even so, people who are successful in a culture and come from similar backgrounds within a culture are likely to see and evaluate the things around them in similar ways and come to similar conclusions. Therefore, while an observer sees a self-created construct, it is likely that other observers from a similar background will see a similar construct. This means that with the appropriate tools, the message can be evaluated for a target audience.

Meeting the requirements of autopoiesis: multimedia news messages

The six point key to determine if a system is autopoietic (Varela, Maturana & Uribe 1974: 192) is, I claim, met by multimedia as follows:

The first requirement, that there must be a clear boundary between the system and its environment, is achieved in multimedia by the boundary between the conceptual and the physical. In multimedia, the message is created through the interactions of the media meanings. These meanings and the message they create are conceptual whereas the media that carry them are physical.

The second requirement, that the multimedia must be composed of parts which create a whole, is met because the multimedia message is constituted from the meanings of the media. Each medium and its meanings can exist and be described separately from the others, even though the meaning might be different when experienced alone as opposed to being part of multimedia. Therefore, multimedia meets the second requirement because: i) the media meanings are the parts; ii) the multimedia message is the whole; and iii) the meanings create the message.

The third requirement is that the relationships between the components create the system. The components of multimedia are the media that compose it. The components of the multimedia message are the meanings of the media. Multimedia by definition is composed of

multiple media but the meanings of the media do not simply combine to create a message. The media meanings, through their relationships, interact with each other and influence each other to create the message. In addition, the message can be different to each of the individual meanings if each medium were experienced alone (Cohen 1993: 173; 2000: 363-374; Cook 1998: 84).

The fourth requirement is that the relations and interactions between components of the system create its boundaries. The boundaries of the multimedia message are created by the relations and interactions of the meanings which are conceptual, as opposed to the media which are physical. Therefore, the boundary is defined as being between the conceptual and the physical.

The fifth requirement is that there must be no components that are produced in any other way other than through the self-producing autopoietic process. In a multimedia news story, the meanings of the various media change as the properties of the media change. The multimedia message is created scene by scene by the interaction of the meanings generated by the media and from no other source. While different people might interpret a multimedia message differently, this is an issue of interpretation by an observer rather than an external influence changing the message.

The sixth requirement is that all components must participate in the production of the components. In a multimedia message, the integration of all the meanings generated by the media create the message even though different media might have different levels of dominance, and even though all might not be active at all times.

Concluding remarks

I have argued that a multimedia text can be seen as an autopoietic system which is structure-determined in that the multimedia components, and their influence on each other, determine the message. In addition, a story is created by the process of messaging which is similar to Maturana's languaging. Messaging is a cyclical process which creates a flow of

messages and it is this flow of messages which develops the story. Finally, I claim that autopoietic theory, as I have interpreted it here, lays the foundation for a theory of multimedia.

Applying autopoietic theory to multimedia news messages: strengths

In this era of commercially driven news reporting, techniques such as conflict and high levels of vividness can make news entertaining but such techniques risk compromising the intended message. Therefore, any tool which can assist with understanding multimedia is important. It has been shown here that autopoietic theory and especially the concepts of circular processes, structure, autopoietic networks and perturbations can be used as a framework to analyse existing multimedia as well as providing a model for the creation of multimedia so the target audience interprets the message as intended.

Applying autopoietic theory to multimedia news messages: weaknesses

A multimedia news story may not be accepted as autopoietic because multimedia is not living, but I argue that the issue is whether or not autopoietic theory can be used to better understand multimedia and predict audience response. Just as a researcher cannot predict with accuracy how people will interpret news by analysing the headlines, images, camera techniques and the written news report (Kitzinger 2004: 19-20), it is not possible to accurately predict how individuals will interpret multimedia given that each person sees the world through the lens of their experience. However, given that the mass media is aimed at a target audience, I argue that autopoietic theory can provide insights, even if limited, to assist with determining how that target audience will understand the different combinations of media in multimedia.

Chapter 6   Systems Theory & Multimedia

Introduction

The aim of this chapter is to use many of Luhmann's systems theory concepts to expand on the autopoietic theory discussed in the previous chapter and show how systems theory applies to multimedia. These concepts include function systems, communication events and systems differentiation, and their application to a multimedia text. In systems theory, the mass media system is a function system which has three strands, and these are: news (which includes reports such as in-depth reporting and documentaries), advertising and entertainment. All function systems have a code and the same code applies to all three strands of the mass media although it applies in different ways. The code for mass media is the distinction between information and non-information. Information is that which is of interest to the public, something new, fresh or novel, that the mass media selects for distribution. If it is not selected by the mass media, it is non-information, and, in addition, information can become non-information (Luhmann 2000: 17, 24, 27). In other words, something may initially be of interest and is used by the mass media but when it becomes known to the public or once it is used by the mass media, the public interest is lost and it is ignored or discarded by the mass media.

It is stated here that multimedia is a system, however, it would be reasonable to claim that multimedia is not a system in the way Luhmann has defined the concept. A system acts at an unconscious level independently of the consciousness of individuals, but at a conscious level, individuals act as though there is agency to bring about change through the creation and interpretation of multimedia. Luhmann does state that humans can influence actions, "It is true that there are numerous culturally reliable ways of correcting mistakes; and ever since Marx and Freud there have also been ways of casting suspicion on oneself in the knowledge (already conveyed by the mass media) that one is being guided by latent interests or motives. It is for such purposes that society has 'critical' intellectuals and therapists (Luhmann 2000,

11). However, independent of whether or not Luhmann would consider multimedia a system, applying concepts of systems theory to multimedia may help us better understand how multimedia is understood by a target audience.

Maturana's autopoiesis versus Luhmann's autopoiesis

The systems theory of German sociologist, Niklas Luhmann incorporates many aspects of Maturana's autopoietic theory. When discussing multimedia as autopoietic, it might be thought that rather than referring to Maturana's autopoietic theory, which focuses on living systems, it would be better explained using Luhmann's social systems theory which incorporates autopoiesis. It could be argued that this is especially the case given that the mass media is one of the systems that Luhmann has written on at length in *Reality of the Mass Media* (Luhmann 2000), where he specifically describes the mass media as a function system within society. Luhmann's interpretation of autopoiesis and his systems theory concepts are applied to multimedia in this chapter but in some ways differently to how Luhmann applies them to the mass media, and this is especially the case with the concept of differentiation (to be discussed).

Maturana defined autopoiesis as the process of self-production where the components of a system reproduce (but not necessarily replicate) to create the system. An autopoietic system is a self-perpetuating, self-reproducing system where its properties are determined not by the individual properties of its components but by the system as a whole and the relations between the components of the system as a whole. Maturana applies this concept to living systems such as a cell, but Luhmann uses it as part of his systems theory to describe other types of systems, particularly social systems. However, Luhmann's autopoiesis as he applies it to social systems is somewhat different to Maturana's, and he does not claim that Maturana's autopoietic theory can be directly applied to social systems.

Luhmann describes his autopoietic theory as "a general form of system-building" which has been abstracted from Maturana's "biological connotations", and he refers to

Maturana's theory as a more concrete level of autopoiesis, while his is a "general theory of self-referential autopoietic systems" (Luhmann 1986: 172-4). In other words, Luhmann has interpreted Maturana's biological theory and applied this interpretation to social systems.

While Luhmann is criticised for his application of autopoiesis to non-living systems, this is illogical given that, as Mingers (1995: 43,61) points out, Maturana states that his computer model was autopoietic (Varela, Maturana & Uribe 1974). Computers and their software have little resemblance to the human brain with few of the characteristics of a living brain. Computers may appear to have intelligence similar to humans due to a combination of their programming by humans, their high processing speed and their vast amounts of storage. However, it can take thousands of lines of program code to perform an activity which most people could perform with a brief explanation. This is likely to change with machine learning programs but these are in their early stages.

The instructions for a specific computer application normally have to be loaded each time an application is run. While it could be argued that people "build" instructions from childhood, computers must have multiple levels of instructions to reduce the need to respecify a common task, and the operating system provides many of these. Even so, computer application programs which run under the control of operating systems, as well as the operating systems themselves, are normally extremely large in terms of the amount of programming effort and the number of lines of code required. For instance, the Microsoft website gives numerous examples of just how much it takes to create and test a computer program. One statistic is that "Windows XP is compiled from 45 million lines of code" (Microsoft 2011).

The most important difference is perhaps that a human will probably query an instruction that seems to have no objective, while a computer will do what it is told regardless of how illogical or purposeless it is by human standards, so any instructions require a very large amount of testing to ensure that no mistakes by the human programmer have slipped

through. For example, the nightly stress test which was performed on Windows 2000 during its development was "the equivalent of three months of run time on up to 1,500 computers" (Microsoft 2011). But even this is not enough. Microsoft states that each version of Windows 7 was evaluated by eight million beta testers worldwide before release (Microsoft 2011).

Computers cannot make creative leaps and rely on programming (Walker 2014) which is a large part of the reason why the much predicted house cleaning robot is still not commercially available. While there are computerised vacuum cleaners that run by themselves, most do not do the job well enough to replace manual vacuum cleaners. This might change before the year 2020 given it has been predicted that the capability for machine learning will allow computers to do many of the functions that currently only humans can do, which involve reading and writing, speaking and listening, looking at things, and integrating knowledge (Howard 2014). However, given that Maturana stated in the 1970s that a computer model is autopoietic, it is unreasonable to criticise Luhmann on the basis that he uses autopoiesis for non-living systems.

Systems theory

Function systems

Systems theory describes the world in terms of systems, with the human mind as a psychic system, the human body as one of many organic systems, and modern society as a social system characterized by its function systems (Luhmann 1990: 15; 1995: 2-3). Function systems are systems which have a specific and unique function, such as the law, politics, science, religion and the economy, with the functions covering the areas of legal jurisdiction, power, truth, faith and money, respectively (Moeller 2006: 29). New systems that each have a specific function come into being as society becomes more complex, and with new function systems come new problems (Luhmann 1977: 39).

Systems are autonomous but also interdependent in Luhmann's systems theory; there is no redundancy because they have become function specific, and therefore, one system cannot

fulfil the functions of another system but at the same time all systems rely on the "problem-solving capacity" of all the other systems so that they can fulfil their functions (Görke & Scholl 2006: 647). Systems theory states there is "system formation within systems" (Luhmann 1995: 18) in that all systems, including function systems, can have one or more systems within them. Systems are composed of components and these components in social systems are communication events.

Communication events

Modern society is described by Luhmann as "a complex system of communications that has differentiated itself horizontally into a network of interconnected social subsystems" (Knodt 1995: xii). In other words, Luhmann's general theory of autopoiesis states that society is a social system composed of function systems and the basic unit of a social system and its function systems is a communication event. This communication theory is very different to the theories of communication and information often quoted as being based on the work of American mathematician and engineer Claude Shannon as described in Chapter 3.

Luhmann's theory is about communication of information within society. He states that communication is more complex than might initially be apparent. It can be described as consisting of three aspects: "the selectivity of the information itself", "the selection of the utterance", and "the expectation that the selection will be accepted"; it is the last of these three that is the most likely to fail because "understanding always includes misunderstanding" (Luhmann 1995: 142,158). In other words, communication is created by a series of events and each event consists of three phases. The first phase is the preparation of the information to be communicated, the second phase is the transmission of the information as occurs with speech and gestures, and the third phase is the anticipation that the information will be understood by the recipient. However, because understanding always involves misunderstanding, it is only over time and as part of a self-referential process of one communication following another

that it becomes apparent whether or not the communication was understood and how much was understood (Luhmann 1995: 143).

A communication event is recreated from one situation to another and is part of a network of communication events. The network produces itself, event by event, and structures are required for this reproduction of an event by a previous event (Luhmann 1986: 174). That is, it is the context of a communication within other communications that forms the communication (Luhmann 1986: 180-181). This concept of communication events is important in the process of messaging which was introduced in Chapter 5.

Communication events can be claimed to be autopoietic because they follow a circular process where communication events produce communication events. Every interaction in an autopoietic system is followed by another interaction for the life of the system until it disintegrates (Maturana 1988a: 47). Thus, in a function system, every communication is always followed by another communication with the result that "the system reproduces itself through the events that it itself produces" but "reproduction is not replication" (Luhmann 1990: 184), so each communication event is different from the last.

Communication events are not accumulated. Communication events occur for a minimal time and disappear almost as soon as they appear; they are not a collection, not a stockpile of communications because the mass of elements would quickly become intolerably large and the system would create chaos (Luhmann 1986: 180). In other words, there is no collection of communications but only a latest communication which is an outcome of what has preceded it.

Figure 6-1 shows communication events occurring as a series where they are not accumulated, but each is an outcome of the previous event and there is only a latest communication event.

communication event   communication event   communication event   latest communication event

Figure 6-1 Series of communication events

Therefore, a social system and its function systems do not include people but are composed of communications. Luhmann is frequently criticised for his exclusion of people from communication. This criticism occurs at least to some extent because there is not sufficient explanation as to how communications and not people create further communications (Mingers 2002: 290). While a more detailed explanation might be of benefit, Luhmann does not exclude people from systems theory, but he does exclude them from social systems.

Luhmann's general theory of self-referential autopoietic systems separates people's consciousness into psychic systems and these physic systems are quite separate from social systems. Maturana does something similar when he uses the concept of structural coupling to separate the medium, which carries the autopoietic system from the autopoietic system itself. In Maturana's autopoietic theory, the medium which carries the autopoietic system is structurally coupled to the autopoietic system rather than being part of it (Maturana 1975: 313,326-7). In much the same way, Luhmann separates people from social systems in that people are structurally coupled to the communications that occur in social systems. People are not part of the autopoiesis that occurs within social systems even though they are involved in the communication process. While Luhmann's social systems are made up of communication events rather than people, he states very clearly that "no communication can be achieved without the consciousness of psychic systems" (Luhmann 1995: 20). Therefore, people are the medium for communication and are structurally coupled to the communication without being part of the autopoietic system of communication that occurs within the social system.

Luhmann places people into two systems which are linked to social systems, rather than being part of them. He separates human consciousness into psychic systems and the body into organic systems (Luhmann 1995: 2-3). While the separation of people and communication is criticised in systems theory, there appears to be no criticism of the separation of mind and body. Maturana is not so different to Luhmann in that he puts the human mind in a "psychic

space" or "psychic domain of existence" (Maturana 1993: 49), whereas Luhmann puts consciousness in a psychic system (Luhmann 1995: 2). This is not to suggest that domains and systems are the same but only that both Maturana and Luhmann see people as being in psychic arenas.

The general acceptance of mind and body as separate is likely to be because it occurs in Western medicine and can be traced to René Descartes' dualism of the 17th century (Britannica 2013). It is common to separate parts that are co-dependent into different systems so they can be better understood. The natural sciences commonly use the technique of separating one system into many different systems even though in practice they are inseparable. The muscles and bones of the body are referred to as the muscular-skeletal system even though they could not function without a number of other systems in the body including the nervous system. The nervous system sends impulses to the muscles which control their movements and these muscle movements then move the bones. Without the nervous system, the muscles would be motionless blobs of cells. From this perspective it could be claimed that the system should be referred to as the muscular-skeletal-neurological system. The digestive system provides the energy for these functions to occur and without the digestive system the muscles would waste away. It could be argued that this should be referred to as the muscular-skeletal-neurological-digestive system, and this extension could go on until all systems are identified.

The sciences do not state that this method of breaking down the body into separate systems is referring to the body metaphorically, but many people refer to Luhmann's method of defining people and communications as separate systems as a metaphor, so this use of a concept being claimed to be a metaphor is inconsistent. It is also inconsistent that Luhmann is criticised for a supposed radical approach of separating people and communication into different systems, but he is not criticised for separating mind and body into different systems.

The mind-body separation could be considered even more radical were it not common practice in medicine and the biological sciences.

Social science must be empirical and its claims must be "testable and, ultimately, tested", but this cannot be achieved with only quantitative research even though it is valuable (Connell 2011: 4-5). While it can be argued that Luhmann's social systems theory is an unusual approach to society, in that it puts mind, body and society into separate systems, medicine and many other sciences frequently take this reductionist approach. Therefore, Luhmann's work nudges sociology away from being an art towards being a science.

Luhmann believed that the concept of the human being as stated at the time was an over-simplification (Moeller 2006: 11), and he believed the social theories of his day were inadequate to understand twentieth century society (Knodt 1995:x-xii). Placing the human mind into psychic systems, and communication into social systems, is an abstract approach which forces us to look at the world and how it functions in a different way, but a new approach was what Luhmann was trying to achieve.

Perturbations

The concept of perturbations in systems theory is much the same as in Maturana's autopoietic theory. In English translations of Luhmann's work, the word "irritation" is often used but "perturbation" is a better translation, because Luhmann used the German word "irritieren" meaning "to distract" or "to perturb" rather than "to irritate" (Moeller 2006: 221).

Systems theory states that when one system forms the environment of another system each can indirectly influence the other even though there is no direct influence (Luhmann 1995: 16-7). As described in the previous chapter, the influence of a perturbation is an indirect influence because one system is organizationally closed to another system in its environment. A system cannot alter a system in its environment, nor can it be altered by a system in its environment. Even so, a perturbation which is generated by the system in the environment can create an influence; this influence may or may not result in a change, and

whether a change occurs depends on the structure of the system being influenced (Maturana 1975: 319-320; 1978b: 34).

Figure 6-2 shows an example where the influence of a media report about political corruption might or might not lead to changes in the political system. Both the political system and the mass media system are operationally closed, but the mass media can create a perturbation that results in a change in the political system.
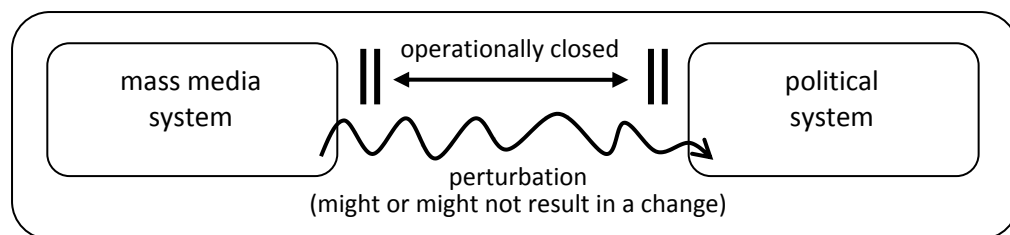
Figure 6-2 Mass media perturbing the political system

Structure

All systems have two important differences within them. The first is the difference between the system and its environment. Every system has an environment and the environment for every system is different; this different environment occurs because every system can be the environment of other systems (Luhmann 1995: 16,177). For instance, the political and legal systems can form the environment of the economy. The second difference within a system is the difference between element and relation; the meaningfulness of elements comes from their relations to one another (Luhmann 1995: 20-1). In other words, it is just as important to identify the relationships between function systems as it is to identify the function system from its environment, because it is these relationships that create the meaning.

The relationships between systems are more complex than they first appear. Each function system has the potential to influence the others but it is an oversimplification to think that relationships between systems only exert a one-way influence; for instance, the political

system influences the mass media system, but the mass media system also influences the

political system (Moeller 2006: 39). The relationships between the systems form a type of

hierarchy, which Luhmann refers to as systems differentiation (Luhmann 1995: 18-9). This is

the structure as defined by Maturana in the previous chapter where the structure of the

components within a system determines how the system behaves.

The media in a multimedia text interact to create a series of communication events and

each multimedia communication event has its own structure, and this structure is the way that

the subsystems are differentiated from each other.

Differentiation

The relationships between function systems create the structure and even though this

structure is hierarchical in nature, as previously stated, it can be more comprehensively

described as being differentiated with the four forms of differentiation being: centre/periphery

differentiation, segmentary differentiation, stratified differentiation and functional

differentiation (Luhmann 1995: 18-9).

Centre/periphery differentiation

Centre/periphery differentiation occurs where one subsystem occupies a dominating

role amongst others; an example in society is a clan system, where the clan of the king

dominates other clans (Luhmann 1995: 18-9,190-1; Moeller 2006: 42-7).

Figure 6-3 shows centre/periphery differentiation where the system at the centre

dominates those at the periphery. Even though there is two-way influence, the subsystem at

the centre is dominant. The arrows indicate that the influence of the centre on the periphery is

greater than the influence of an individual peripheral subsystem on the centre.
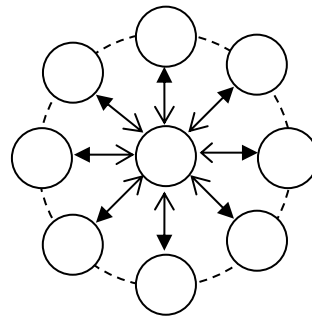
Figure 6-3 The centre dominates the periphery

Segmentary differentiation

Segmentary differentiation occurs where systems are of the same kind and have equal differentiation (equal status in a structure), an example being clans that are equal in their society (Luhmann 1995: 18-9; Moeller 2006: 42-7).

Figure 6-4 shows segmentary differentiation where all systems are equal and each has the potential to influence the others. The arrows indicate that there is an equal level of influence of one subsystem on another.
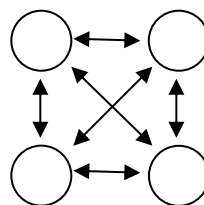
Figure 6-4 Segmentary differentiation

Stratified differentiation

Stratified differentiation occurs where the systems are of a different kind and are ranked as unequal, as occurs within the Indian caste system (Luhmann 1995: 18-9; Moeller 2006: 42-7). As is the case in the Indian caste system, the ranking does not change over time.

Figure 6-5 shows stratified differentiation where there can be one or more subsystems at a particular level, and the dominance of each level is based on its relationships to the other levels.
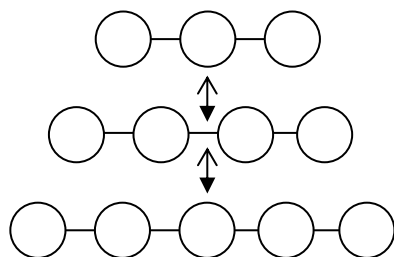
Figure 6-5 Stratified differentiation

Functional differentiation

Functional differentiation occurs where systems are specialised in that they have a specific function that is unique and is not part of other systems. Different systems may be dominant at different times, with system dominance being present in one situation but not another due to different functions being dominant in a particular situation (Luhmann 1995: 18-9; Moeller 2006: 42-7).

Figure 6-6 shows functional differentiation where each system has its own specific function which is independent of the function in the other systems.
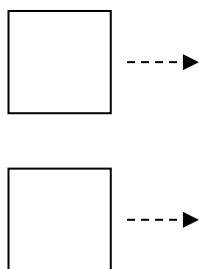
Figure 6-6 Functional differentiation where each system is independent

Luhmann's concepts as described above apply to any type of function system and can therefore be applied to multimedia.

Multimedia message: an autopoietic function system

A multimedia text can be categorized as a function system because it performs a specific function for a specific target audience at a specific time and place. In addition, a multimedia text is composed of media which are function systems but they are also

subsystems within a multimedia text. Therefore, the media that compose the multimedia text can be referred to as subsystems. While Luhmann uses the word "subsystem" to refer to function systems within social systems such as politics, the word "subsystem" is reserved here to refer to the media that compose a multimedia text. A multimedia text can be composed of many different subsystems and each is a function system because it has its own specific function.

Figure 6-7 shows that the subsystems can be grouped into language, visual (excluding written language) and audio (excluding spoken language), and a proposed categorisation of subsystems is: oral language, written language, video images, animations, photographs, graphics (still), music, sound effects and silence.
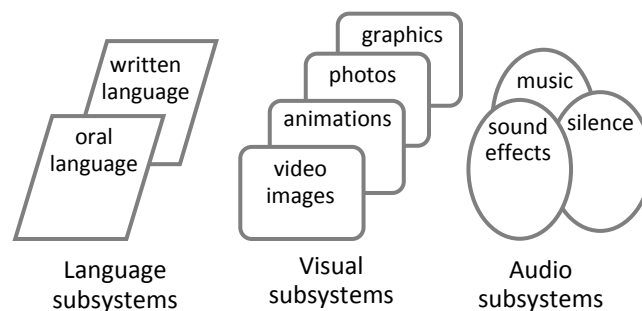
Figure 6-7 Subsystems within each media group

Communication events in multimedia

For a multimedia text, Luhmann's three phases of communication are: i) the creation/production, ii) the broadcast, and iii) the journalist's anticipation of how the target audience will interpret the multimedia text. News, including multimedia is created for a target audience with the assumption that it will be interpreted based on the cultural codes of the target audience. In addition, in journalism the use of news techniques such as framing increases consistency of interpretation. Even so, with multimedia there is a greater potential for a failure due to misunderstanding than occurs with most other forms of communication. This possibility of failure is because a multimedia text is a montage, potentially created from disparate media and each subsystem or medium can influence the others.

The concept of communication events can be used to further explain the process of messaging as defined in the previous chapter. The term "messaging" refers to a process which is similar to Maturana's languaging. Messaging is the ongoing process of creating messages on a scene by scene basis, or using Luhmann's term of "communication event", on an event by event basis.

The term "communication event" may be a better description than the term "multimedia scene" given that viewers segment films into events. This process is referred to by Zacks and Magliano as event segmentation and is based on evidence from neurophysiological and behavioural data which together suggest that viewers spontaneously and reliably segment movies into events. These events may be smaller or larger based on time, with the smaller events grouped into larger events. Events are based on physical and conceptual changes. Physical changes occur with different physical activities, while conceptual changes include changes in character goals and relationships (Zacks & Magliano 2013: 439-440). While event segmentation and communication events are not the same, they both occur with some type of change.

Just as communication events are structurally coupled to people, the message is structurally coupled to the multimedia. In addition, the meanings that make up the message are structurally coupled to the subsystems that compose the multimedia. Therefore, each communication event is created by various audio, visual and language subsystems, and the message of each communication event is created by the interaction of meanings generated by the subsystems. Messaging is a circular process where communication events produce communication events. As the media continue to generate meanings, which interact, messages continue to be created and each message is different from the last. Consequently, a multimedia text is a series of communication events each with a message. Communication events are not accumulated. Communication events and their messages do not stockpile

because each one occurs then disappears. There is only a latest communication event and its message.

Figure 6-8 shows the messaging process with multimedia communication events being created by the active media subsystems on an event by event basis, with each communication event containing a message. While one communication event in a multimedia text leads to the reproduction of another, this is not replication. Each communication event contains a message and one communication event follows another, so message follows message. The multimedia message is not a collection of messages but only the latest or final message which is an outcome of all the previous messages. The final message is created by the influence over time of the meanings of all the media which have been active over the life of the multimedia.

Communication event
(multimedia scene or event)
contains a message

Communication event
(multimedia scene or event)
contains a message

Communication event
(multimedia scene or event)
contains a message

Final multimedia message

Active media subsystems
(contain meanings)

Active media subsystems
(contain meanings)

Active media subsystems
(contain meanings)
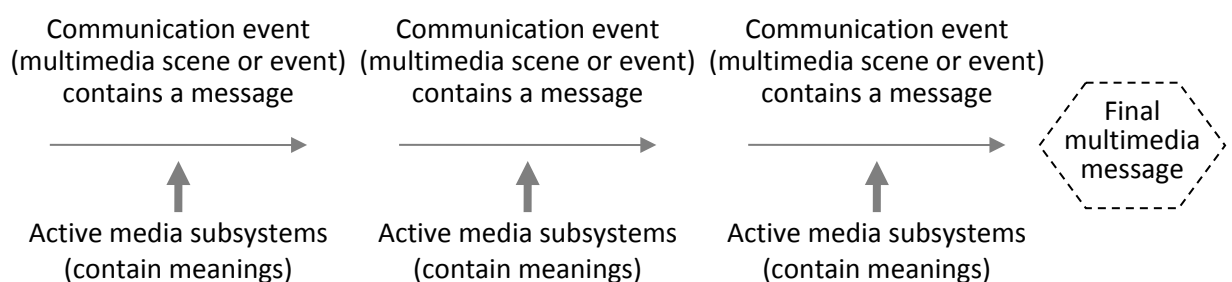
Figure 6-8 Messaging in multimedia

A communication event is similar to a scene in film but, as discussed in the previous chapter, a single multimedia communication event (a multimedia event) has a single multimedia structure, whereas a film scene might contain only one or a number of multimedia structures. When analysing multimedia, each multimedia event, or at least the important multimedia events, must be analysed separately so each structure can be understood. For instance, a video of an interview, which is a single event, even though it might be several minutes in length, is considered as only a single multimedia event, because there is little or no change in the media or their relationships. However, this might change if the interview contrasted between long shots and extreme close-ups. At the other end of the scale, a video is

a montage which can contain many subsystems such as photographs, graphics, music, oral language and moving images, which become active and inactive. Such a video has many multimedia events and each event should be treated separately.

A communication event in mass media operates somewhat differently to a communication event in most other systems. Communication events in most systems occur in a two-way situation. However, the mass media operates as one-way communication, because normally there is no interaction between the creator and the audience due to the "interposition of technology" (Luhmann 2000: 2). In theory, this reason no longer applies to mass media on the Internet because the technology allows two-way communication, and users sometimes have the facility to post a comment about news reports. In addition, social media offers opportunities to discuss news.

News organizations are starting to address this two-way communication issue, as Wasike describes, using the role of social media editors who manage the liaisons with users in the digital sphere. However, this role is in its infancy and activities vary from one organisation to another. In addition, social media editors, being young and technically oriented, tend to focus primarily on science and technology and to a lesser extent on human interest news as opposed to the more traditional approaches to news, where the use of conflict (a story about conflict, artificially created or real) is the dominant framing technique (Wasike 2013: 6,9-10,19). Even so, responses to user comments are limited. So at the moment, the statement that mass media are one-way is still applicable to news generally. Comments by users on news sites can be compared to television where the people watching a program discuss it amongst themselves. Discussions between members of an audience are common with one-way communication.

Systems and environments in multimedia

The often (mis)quoted statement by eighteenth century philosopher, George Berkeley, suggests the environment of multimedia. Berkeley states "the objects of sense exist only when

they are perceived: the trees therefore are in the garden, or the chairs in the parlor, no longer than while there is somebody by to perceive them" (2008: 43). In other words, Berkeley claims that for something to exist it needs to be perceived through the senses. A similar concept is that "communication only comes about when someone watches, listens, reads – and understands" so that "without attention public communication cannot continue" (Luhmann 2000: 4; 1990: 206).

Multimedia needs an audience for communication to occur. As communication of mass media, including multimedia, is normally one-way, to a large extent it is an assumption on the part of the news organizations that there will be an audience, because unless news organizations use market research, they do not know who is watching, listening and reading, and whether or not there is understanding.

The message of a multimedia text can be interpreted in multiple ways or misinterpreted. While communication between people is subject to misinterpretation, it is less likely between mass media and its target audience due to various techniques, such as framing, to ensure the information is communicated as intended. Even so, public opinion cannot be judged on the basis of individual opinions because the combining of individual opinions would be "indescribable chaos" and consequently, public opinion is "not what actual persons actually think" (Luhmann 1990: 206) and is not the "sum of individual mental contents", but is "a communicative product of the mass media" (Luhmann as interpreted by Moeller 2006: 138). In other words, public opinion is a construction, which is an interpretation, and to some extent a fabrication, of what the mass media determines that the public has expressed.

The concept, that public opinion is "not what actual persons actually think" (Luhmann 1990: 206) can be applied to the audience of multimedia. Even though in systems theory the mind is defined as being a psychic system, it can be claimed that a mass media audience is a function system because mass media, as the name implies, is produced for the masses, not individuals. A mass media audience, and this includes the audience of multimedia, is defined

as having certain interests, tastes and beliefs, which vary in different times and different places. A mass media audience is a predicted audience which is a construct and not part of reality. It is a hypothetical audience. It is possible that there would be no one who would meet the exact profile of a target audience member, just as there is no average family with two and a half children. Further, an individual's response to mass media, such as a single written complaint to a broadcaster, is usually ignored in terms of changing programming and production, and it is only a mass response which has the potential to influence the mass media. Therefore, the target audience is a function system in the multimedia environment.

Another component of the environment which is likely to influence multimedia is the distribution technology. There are two ways this influence is likely to occur. The first is that different technologies have different requirements. An example is the font size of written language which will be considerably larger for television than for the Internet. The second is that technological advances can change the distribution technology and any change is likely to influence the production and content of multimedia to take advantage of these advances.

Figure 6-9 shows that the distribution technologies and the target audience form the environment of multimedia even though both are function systems in their own right.
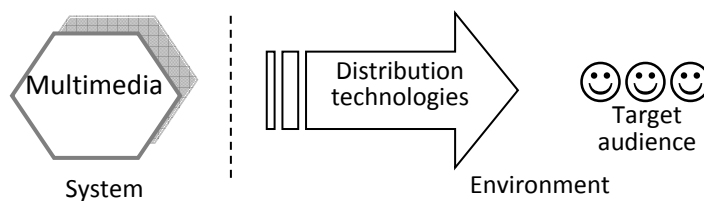
Figure 6-9 Multimedia system and its environment

It is claimed that the target audience and the distribution technologies are the environment of a multimedia text, but these are part of the external environment and a multimedia text also has an internal environment.

Each of the media subsystems within multimedia are function systems, so just as multimedia has an environment, each subsystem within multimedia has an environment. Within a multimedia text, the environment of each subsystem is different to the environments of the other subsystems because each subsystem can have the other subsystems as its environment. This environment continually changes as subsystems become active or inactive.

Figure 6-10 shows the environment of a video image subsystem. This environment, in this multimedia text, at this particular time, consists of oral language, music, sound effects, and graphics subsystems.
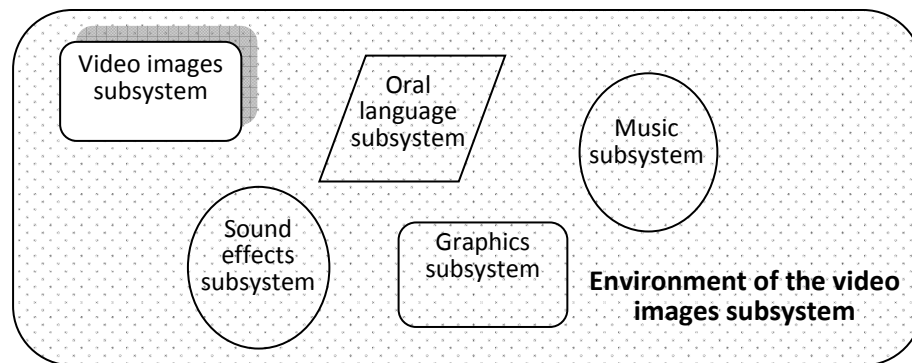
Figure 6-10 Environment of a video images subsystem

The identification of the subsystems and their environments is necessary to establish the types of relationships between the subsystems, and the types of relationships between the active subsystems determine the message of each multimedia event.

Structure of multimedia news

The structure of a multimedia text is critical because the structure determines the message, in that each subsystem in multimedia can influence and be influenced by the other subsystems.

Cognitive psychology research shows that due to the influence of different media on each other, the interaction of media can create a different meaning to that which would result if each of the media were experienced separately (Cohen 2000). For instance, a scene with a woman sleeping accompanied by harsh dissonant music would be interpreted very differently

to the same scene accompanied by a lullaby. Each media subsystem within multimedia has

the potential to influence the other subsystems, and each can cause a change in the meaning of

the others; for example, music can influence how we interpret an image, but an image can

also influence how we interpret music.

Figure 6-11 shows four subsystems occurring in a multimedia text with the dotted lines

indicating the potential for six two-way relationships, a total of twelve relationships between

the four subsystems, where each can influence the others.
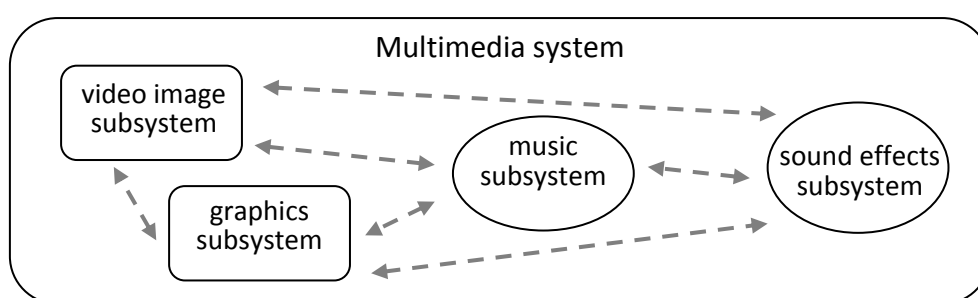
Figure 6-11 Relationships between subsystems in a multimedia text

Perturbations in multimedia news

The influence of one subsystem on another occurs through intermedia perturbations.

The term "intermedia perturbation" is defined as being a perturbation that occurs between the

subsystems in a multimedia text. Each subsystem has the other subsystems in its environment,

and while one subsystem cannot directly influence another, all subsystems can indirectly

influence all other subsystems through perturbations. Even though one subsystem can

indirectly influence another, it cannot actually change the physical properties of the other. For

instance, words cannot change music, only the musician can change the music, but words can

change the meaning of the music.

Figure 6-12 shows that intermedia perturbations between the music subsystem and

video image subsystem may or may not result in a change for one or both subsystems.
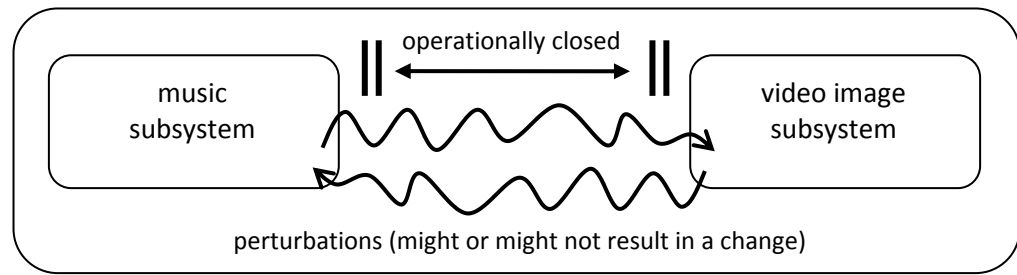
Figure 6-12 Intermedia perturbation between music and video image

Differentiation in multimedia

The application of systems theory to multimedia is somewhat different to Luhmann's application of it to the mass media (Luhmann 2000), as mentioned earlier, because even though Luhmann does apply autopoiesis to the mass media, he does not apply internal systems differentiation to it.

As discussed in the previous chapter, a multimedia text is a structure-specific system because in multimedia it is the interaction of the meanings generated by the active media subsystems that determine the message. Therefore, relationships are key to understanding multimedia and the relationships between the media because it is the structure, rather than the environment, which determines how the subsystem will behave. The structure determines whether a subsystem will be influenced by external forces from its environment. This structure is internal to the multimedia but external to the subsystems.

The relationships between the subsystems are to some extent hierarchical in nature in that in a particular event one subsystem could be more influential than the others. Even so, following Luhmann's systems theory (1995: 18-19), subsystems can be more comprehensively described as being differentiated because it is simplistic to think of the subsystems in a multimedia text in terms of hierarchy. A somewhat simplistic interpretation of Cook's view is that hierarchy implies a predefined dominance of particular media, whereas in multimedia, dominance passes from one subsystem to another, and one subsystem might appear to dominate another in a hierarchical manner at a particular time but this domination

can change even from moment to moment (Cook 1998: 105-107,111-113). However, Cook uses the terms "primacy" and "overwhelm" rather than dominance, and offers a sophisticated interpretation of musical artistic media where elements such as rhythm and tone are evaluated more critically.

An example of dominance moving from one subsystem to another can be seen with the influence of unusual sounds. Fast movements normally dominate attention, but there are a number of sounds that command a high attention level and these include sustained sound, tremolo, sharp high frequency sound, and/or sound rich in high frequencies, all of which can immediately shift audience attention from visual to audio (Chion 1994: 14,20-21). This shift of audience attention is due to the vividness of the subsystem as discussed in the previous chapter. The effect of vividness can be more clearly understood as a form of differentiation because vividness creates differentiation between subsystems. In sum, the properties of a subsystem create its level of vividness, and the different levels of vividness that occur with different subsystems determine the form of systems differentiation. There are four types of systems differentiation created by varying levels of vividness and these are: centre/periphery, segmentary, stratified and functional.

Centre/periphery differentiation

In centre/periphery differentiation in multimedia, one subsystem dominates audience attention above all others by being substantially more vivid than the others. For instance, this domination can occur with a video event which has fast movements and fast cuts. These create a high level of vividness which, in most situations, will put the video image at the centre of centre/periphery differentiation. However, just as in a clan system where the king can be overthrown and a new king can take over, in multimedia the dominance can pass from one subsystem to another. For instance, a high pitch shrill sound such as a scream would be more vivid than most other effects, and would take over the dominant position at the centre. However, a society becomes unstable if leadership changes occur too frequently, and a

multimedia text becomes incomprehensible if the dominance passes too quickly from one subsystem to another. This might be irrelevant for multimedia created solely for entertainment, but information such as news and current affairs should be coherent. Therefore, changes of the subsystem at the centre should not occur so frequently that the message becomes confusing.

Figure 6-13 shows the oral language subsystem at the centre and four subsystems (video image, graphics, music and sound effects) at the periphery.
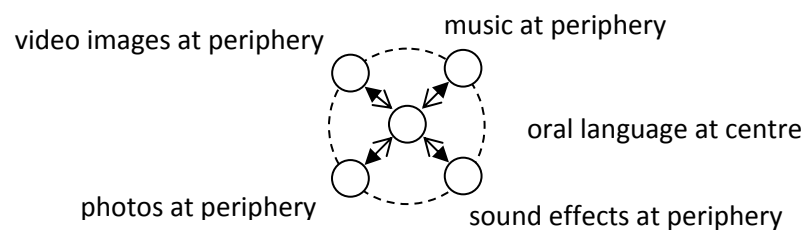
Figure 6-13 Oral language at centre dominates periphery

This type of relationship can also be described as foreground/background as is done in art theory. However, in art theory it is common to include midground. In multimedia, it is unlikely that all the subsystems at the periphery will have the same level of influence and so be at the same level of dominance. While Luhmann describes only one level at the periphery, I extend Luhmann's theory to include two levels of peripheral systems, and these peripheral subsystem levels are referred to as midground periphery and background periphery. In addition, it is possible to have more than one subsystem at the centre, although all subsystems at the centre have the same level of vividness.

Figure 6-14 shows one centre subsystem which has the highest dominance, with two midground periphery subsystems having a moderate level of dominance and two background periphery subsystems having low dominance. There are two-way relationships between all subsystems, including those at the midground periphery and the background periphery. The

arrows between the two peripheries indicate that there are two-way relationships between the

subsystems on both peripheries, and this means that all subsystems can influence all others.
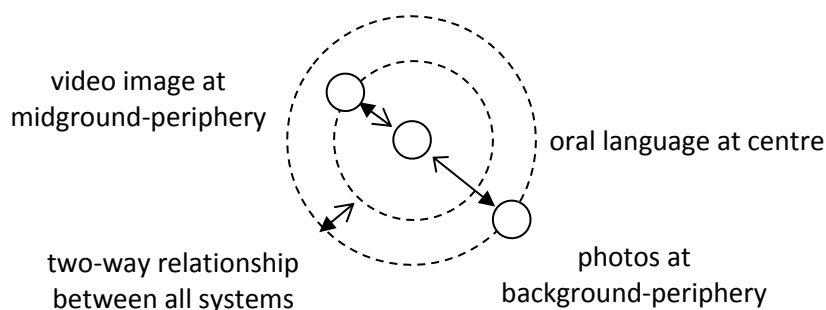
Figure 6-14 Centre/periphery with foreground, midground and background

This form of differentiation, centre/midground-periphery/background-periphery is the

most common form of differentiation in a multimedia text.

Segmentary differentiation

Segmentary differentiation can occur in multimedia where different subsystems work

together to support the multimedia message but none dominate. In other words, they all have

approximately the same level of vividness. When this similarity in vividness occurs they

normally contribute equally to the message. The result is that audience attention is on the

multimedia as a whole.

Figure 6-15 shows four subsystems all with the same level of dominance, with six two-

way relationships between them making a total of twelve relationships; so even in this simple

composition, the number of possible influences between subsystems is high.
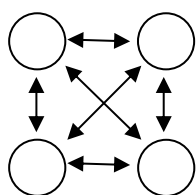
Figure 6-15 Segmentary differentiation

An example of segmentary differentiation is a video scene that is a close-up of a person's face when speaking normally. Oral language and an extreme facial close-up are normally equally vivid. Both sound and visuals will conform so there will be no intermedia perturbations that will affect the vividness level, and the audience attention will be equally divided listening to the conversation and observing the facial expressions.

Stratified differentiation

Stratified differentiation occurs in multimedia where subsystems remain at the same level over the entire multimedia text. This type of differentiation occurs when the vividness level of the subsystems remains more or less constant in relation to each other. An example is an interview, with a video scene that is not an extreme close-up but a distant shot with facial expressions that are not clear. The facial expression would have a relatively low level of dominance while the speaking would be the dominant subsystem. The oral language is clear and vivid but the accompanying images being more distant have a low level of vividness.

It could be claimed that stratified differentiation is not multimedia as the term is normally understood, because it does not meet the requirements that media interact, dominance passes from one medium to another, and there is the possibility of a conflict of meaning. Stratified differentiation is not a particularly interesting format for multimedia.

Figure 6-16 shows a typical talking-heads example where oral language dominates video and sound effects.
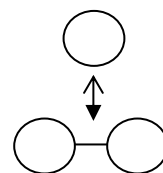
Figure 6-16 Stratified differentiation

It might be claimed that given the use of faces in talking-heads videos, the image becomes dominant, but this type of interview does not normally have the facial close-ups, such as those often used in movies, which make the image vivid even when little movement is involved.

Functional differentiation

Functional differentiation can occur in multimedia with discrete information such as charts, graphs, diagrams, and step-by-step instructions. The information, a chart for instance, is dominant until it is read and understood, then loses dominance because, even if it continues to be shown, it is of no further interest given it has achieved its function. All subsystems that are active during a period of functional differentiation must be carrying out exactly the same function at the same time, otherwise the message will be incomprehensible. For instance, if a chart is being shown, any language that accompanies the chart must relate specifically to whatever is shown. In multimedia, where functional differentiation occurs, only one function can be presented at a time, even though multiple media can be expressing that function. If more than one function occurs at one time then information overload and/or confusion will normally occur. Unlike the other three forms of differentiation, functional differentiation is not determined by vividness. However, vividness determines the relationship of the subsystems within a function. The relationships within a function can be centre/periphery, segmentary or stratified differentiation.

Figure 6-17 shows functional differentiation where three functions each have their own specific function that is independent of other functions, where the squares represent functions and the circles represent subsystems. The dotted lines following the functions indicate that functions must occur sequentially, because if multiple functions occurred in a multimedia text at the same time, it would be confusing. The dotted lines following the subsystems (within a function) indicate that these subsystems are continuing for the life of the function. However, subsystems may start or stop within a function. The important issue is that when multiple subsystems are active concurrently in a function, all active subsystems carry out exactly the same function.
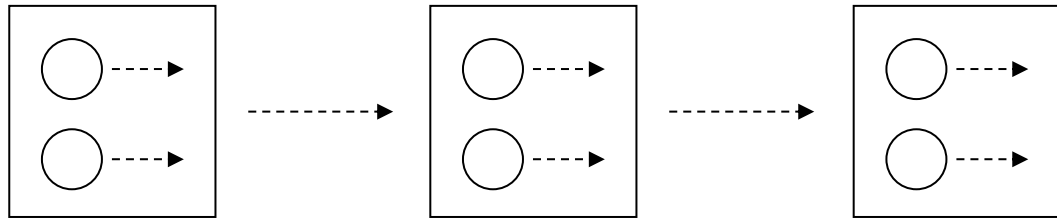
Figure 6-17 Function follows function with functional differentiation

Figure 6-18 shows a function with centre/periphery differentiation, followed by a function with segmentary differentiation, followed by a function with stratified differentiation.
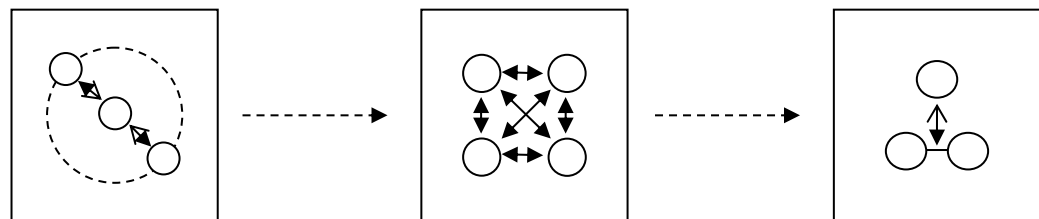
Figure 6-18 Types of differentiation within functional differentiation

Concluding remarks

Systems theory presents a new method of examining the social world in which we live and in addition, it provides new ways of understanding multimedia. A multimedia text is a function system composed of media that are subsystems of the multimedia system, but the subsystems are also function systems identified on the basis of their function. The media in a multimedia text interact to create a series of multimedia events, and each multimedia event has its own structure created by the differentiation between the subsystems. The structure of a multimedia event is created by the arrangement of the subsystems in relation to each other, and these can be in any of the four types of system differentiation (centre/periphery, segmentary, stratified and functional differentiation). The first three types of differentiation are determined by the vividness of the subsystems. The differentiation that occurs within functional differentiation is also determined by vividness.

As Luhmann states, a communication event in society is created by three processes: the sender selection, the sender utterance, and the sender anticipation of understanding. Whether

an utterance is understood or misunderstood is somewhat irrelevant to the communication process because communication can continue without understanding by the receiver. In addition, the order of the three processes could be changed so that anticipation precedes transmission, because the sender can anticipate the understanding before uttering the information (Luhmann 2013: 219, 225). While it might be claimed that the interpreted meaning can only be identified for a specific individual, the meaning of these communication events in a news story can be determined because the meaning is "a communicative product of the mass media" (Luhmann as interpreted by Moeller 2006: 138). In addition, the sender can only anticipate the meaning that the receiver will determine (Luhmann 1995: 254). It is this anticipation of the target audience response by the mass media that determines what the journalist will produce.

Chapter 7   Multimedia as a Complex System

Introduction

The aim of this chapter is to show how the application of complexity science to multimedia assists in understanding the behaviour of a multimedia text. In multimedia, the "interplay of sound/music, image, and narrative forms a delicate synesthetic web" (Stilwell 2013: 126) and while not everyone experiences synaesthesia as it is commonly understood, everyone does experience, even if unconsciously, the delicate web of influences of the meaning of one subsystem on another in a multimedia text. Complexity science can be used to better understand this web of relationships that create a multimedia text. This chapter argues that a multimedia text, where the multimedia is used for information, such as a news story, can be categorised as a complex system as well as an autopoietic system, and it discusses the benefits of applying complexity science to multimedia. Complexity science sheds light on a number of the issues that can occur in multimedia, including unexpected changes of meaning, the level of complexity that a multimedia text should be created with, how a single entity can influence everything else in a system, and the benefits of degeneracy as opposed to redundancy. To appreciate these issues, it is necessary to understand the basics of complexity science.

An understanding of complexity science is also useful because it supports and expands a number of autopoietic, systems theory concepts and the various audio-visual/multimedia theories and their application to multimedia. For instance, the concept of a dancing landscape expands the discussion of perturbations from an environment. In addition, the complexity science concepts of "in-between" and degeneracy expand Cook's generalized theoretical framework for the analysis of multimedia.

There are many different types of systems that can be categorised as complex. As Bar-Yam states, a complex system can consist of simple parts forming a complex whole. Alternatively it can be composed of complex parts forming a simple whole. Yet another

alternative is a complex whole and complex parts, where the parts can themselves be complex systems. Understanding a complex system and how it behaves involves understanding the behaviour of the parts, as well as understanding how that behaviour creates the whole. To do this, the behaviour of each part must be described in relation to the behaviour of the other parts. This is why complex systems can be difficult to understand (Bar-Yam 1997: 1,5).

Complexity science is very different to conventional science. Conventional science has been based on Descartes' reductionism, and reductionism states that a system is the sum of its parts with the analysis of the system done by reducing it to its component parts (Wilson 1999: 31). Reductionism is normally associated with determinism and predictability, as well as the ability of an objective observer to analyse the parts and use this analysis to describe the workings of the whole. A complex system is not the sum of its parts and cannot be explained by a separate analysis of each part. A complex system must be viewed as a whole.

One of the outcomes of a complex system can be emergence, but just as there are different types of complex systems, there are different classes of emergence. Complexity is frequently associated with indeterminate and unpredictable outcomes, but this is not always the case and certain types of emergence can be predicted. It will be argued that while a multimedia text is a complex system, the emergence, at least to some extent, can be predicted and this will be explained further in the following chapter.

Complexity science provides theoretical and conceptual tools which allow different approaches to large complex problems; these tools enable the analysis of complex situations where combinations of causes produce outcomes which are difficult to predict (Walby 2003: 1; Byrne 1998: 20). This has resulted in the application of complexity science to a wide range of disciplines including the environment, financial systems and society. The tools provided by complexity science can be applied to multimedia to unravel the meaning of the message.

Complexity science is still a work in progress and there are many common misconceptions about the concepts of complexity and emergence (Johnson 2009: ix,3; Bar-

Yam 1997: 9). Complexity science as it is today is "little more than a collection of exemplars, methods and metaphors for modelling complex, self-organizing systems", even so, many of the concepts are useful and widely applicable (Heylighen 2008: 3). Therefore, a particular interpretation of complexity science has been selected to apply to multimedia.

The work of Scott Page[12] has been used as a basis for the application of complexity science to multimedia because his interpretations of complexity science are broadly applicable to a wide range of disciplines including economics, political science, computer science, management, physics, public health, geography, urban planning, engineering, and history, and his interpretation of complexity science can usefully be applied to multimedia. In addition, Page focuses on diversity in complexity science. The diversity created by different combinations of media and different content in media is one of the key aspects which can make prediction of the multimedia message difficult. Further, Page has based his interpretation on extensive research of complex systems, which means his approach can be applied in practice.

A problem with applying current multimedia/audio-visual theory to a multimedia text is that current theories are aimed at entertainment. One of the reasons to see multimedia as a complex system is that it highlights the complexity of multimedia when it is used for information as opposed to entertainment. Concepts from complexity science that assist in understanding multimedia as an information medium include the ability of a complex system to influence its environment, the concept of "in-between", and the use of degeneracy as opposed to redundancy.

Complexity science

Definition of a complex system

A complex system can be defined as a system having diverse, interdependent, networked parts that may have the ability to adapt, and where emergence of something new and

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[12] Scott Page is Professor of Complex Systems, Political Science, and Economics at University of Michigan.

unexpected may occur depending on the individual properties of the parts and how they interact (Page 2011: 6-7).

The application of complexity science concepts to multimedia is not to suggest that multimedia has a comparable level of complexity to that found in complex natural systems such as the brain. The application of complexity science to multimedia may not share all the qualities found in the application of complexity science to the natural sciences. Some differences are that humans control multimedia whereas natural systems are not humanly controlled, there may also be some form of homeostasis in natural systems that does not exist with multimedia, finally, multimedia may not be possible to model mathematically while modelling may be a goal of some research in the natural sciences. However, despite these differences, concepts applied to complexity science can be usefully applied to understand multimedia.

Level of complexity

A complex system is limited in the level of complexity that it can have. Complex systems are in between order and disorder, and this position is a balancing point on the edge of chaos (Heylighen 2008: 4). To be categorised as complex, a system cannot have so little complexity that it is ordered because it would not be complex; it cannot have so much complexity that it is chaotic; in other words, the level of complexity of a complex system must not be too high or too low, but must be between order and chaos, and this level can be referred to as the "interesting in-between" (Page 2009: 10; 2011: 30).

Diversity

Complex systems have the quality of diversity in that they have different types of entities, with different functionality, but in addition, there must be a level of sameness. The level of diversity can be determined by measuring variation between entities, as well as how close or distant the entities are from each other, and how diverse the attributes of each entity are from the other entities (Page 2009: 12; 2011: 3-5).

"Diversity begets diversity", and the more diversity there is to start with, the more diversity it is possible to create, but the level of diversity must be "in-between", in that it must not be too high or too low, because if there is too little diversity then the system is not complex and if there is too much diversity it is chaotic (Page 2009: 10,13; 2011: 30-5,89-92). This in-between concept applies to many of the qualities of a complex system. An example of a complex system with a very high level of diversity but which is not chaotic, and so appears to contradict this requirement for being in-between, is the Amazon jungle, with its thousands of plants and animals in a relatively small area. The Amazon jungle is not chaotic because it has slowly evolved over a very long time so that plants and animals fit into niches. When each plant or animal fits into a niche, each one does not interact with all the others, but only those in its niche, so that while diversity is high, this is balanced by low interaction; the term for this is niche assembly (Page 2009: 12; 2011: 10). Therefore, even though the overall diversity is high, within each niche the diversity is in-between.

Robustness and redundancy

The diversity in a complex system normally means the system is robust in that it can withstand trauma and variation and can continue to function successfully through large challenging events (Page 2011: 7-8). Redundancy can also make a system more robust in that if several parts carry out the same task and one fails, then the system will continue to function. A problem with redundancy is that it can be at odds with diversity, in that more redundancy can mean less diversity and vice versa. However, redundancy can come in multiple forms. There can be pure redundancy where there are multiple copies of the same part, and degeneracy, where the parts differ but can perform the same task (Page 2011: 227-8). While pure redundancy can lower diversity, degeneracy can maintain diversity as well as providing robustness.

Connectedness

Connectedness is a necessary part of a complex system and is closely linked to the concepts of interdependence and environments, as will be shown below. When examining a complex system it is inadequate to look at only the parts alone; to understand the behaviour of a complex system it is essential to look at the system as a whole, and this includes looking at interactions between the parts (Bar-Yam 1997: 8). Connectedness occurs where the entities within a complex system form a type of network. For instance, the banking system is a complex system consisting of a network of banks where each bank is itself a complex system. In other words, connectedness is about the relationships between components.

As with a number of other qualities of a complex system, level of connectedness must meet the requirement that it be "in-between" because if the connectedness is too high, then there is statistical regularity, while if there is no connectedness, then the system is not complex (Page 2009: 11). In other words, if every component is related to every other component, and there are very high numbers of components, everything would be influencing everything else and the result would be chaos. If nothing was related to anything else, there might be activity within a component but no component could influence any other component.

Interdependence

Interdependence is closely related to connectedness. A complex system is a type of network where the interdependence of the parts creates the network. In taking a network approach, the focus must be on the relationships between the parts and not the parts themselves (Mitchell 2009: 233). Networked parts are one of the core attributes of a complex system and a network is composed of diverse parts and relationships, with the parts of a complex system being able to influence almost everything within the network (Page 2009: 26,53-56; 2011: 25,38). If there were full interdependence, where every entity depended on every other entity, then the system would be chaotic; if there was no interdependence the

system would not be complex, so the level of interdependence must be "in-between" (Page 2009: 13).

An action by one component of a complex system can trigger further actions by other components, setting in motion a chain of events that can affect the entire system; these events can start locally and propagate across the system, becoming global; like a ripple of a pebble that disturbs the surface of the water locally, but then increases encompassing the whole area (Heylighen 2008: 4). However, even though there is interdependence between all the parts, there can be tight-knit communities in networks that are mostly separate to other communities in that they occupy the same niche, and these are referred to as clusters (Mitchell 2009: 235).

An example of interdependence and connectedness can be seen with the actions of one bank affecting the actions of other banks. For example, when one bank offers a particular loan package, it affects the competitiveness of other banks so that another bank is likely to change its loan packages to remain competitive.

This is also an example of an autopoietic system where the perturbations generated by one bank result in another bank making changes to its client offerings.

Environments

Complexity science states that complex systems have a system-environment relationship, and the connectedness and interdependence between systems create this system-environment relationship. The concept of environments in complexity science is much the same as in autopoietic theory even though the terminology is a little different. The environment of a complex system is referred to as a dancing landscape because it is an environment which continually changes, where nothing stays the same, but at the same time it is not chaotic, and any problem solving must be conducted in light of this dancing environment (Page 2009: 8). In an environment which dances, decisions can quickly become ineffective because any decision made to adapt to a dancing landscape is likely to change the landscape and this change is likely to create further changes (Page 2009: 8). An example of a

dancing landscape is the environment of a bank where a rate change by one bank is likely to affect the action of other banks. If a national bank reduces interest rates, it will affect the competitiveness of a community bank in the same area, with the likely result that the community bank will also reduce rates. In this case, the national bank is part of the landscape of the community bank because it changes the environment in which the community bank operates, and this may cause the community bank to make changes to its own processes and offerings. Therefore, the environment of a bank is a dancing landscape because banks regularly change their offerings to customers, and these changes cause other banks to make changes to their offerings and so on and on.

Adaptation

Adaptation is defined as a "change in behaviour or actions in response to a payoff or fitness function" (Page 2009: 49). In other words, adaptation occurs when there is a change in behaviour by a system or its parts in response to its environment. Adaptation involves small changes which may or may not be maintained depending on their appropriateness, such as occurs in Darwin's theory of natural selection. Mutations that are adaptive encourage survival or reproduction, while those that are not adaptive die out because individuals with those characteristics are unable to survive or reproduce.

Self-organization

Self-organization means that there is no planning in the system but there is a constant reorganization within the system until the best fit is found. In other words, the system reacts to feedback and keeps adjusting accordingly. An example is the bottom-up self-organization that occurs with spatial patterns of flocks of birds or schools of fish (Page 2009: 4). Self-organized systems, such as the Web, may appear as not very orderly but they create order from disorder; the advantages (robustness and resistance to conflicts and perturbations) are significant (Heylighen 2008: 2,6).

Emergence

Systems composed of parts which are diverse, connected, interacting and adaptive are frequently able to produce emergent phenomena, and emergence occurs when the "macro differs from the micro—not just in scale but in kind"; emergence is at the core of complex systems (Page 2009: 4,21; 2011: 25). Emergence occurs spontaneously rather than being planned. An example of emergence is the brain and consciousness. The brain is composed of neurons; a single neuron does not have consciousness but when the neurons act together then consciousness emerges.

Even with the property of emergence, complex systems are "roughly predictable in some aspects" (Heylighen 2004: 4), but this occurrence of emergent phenomena cannot be predicted by looking at the properties of the individual parts (Johnson 2009: 15). Even so, the behaviour of the whole can be seen in the behaviour of the parts if they are examined within their context, because it is through the interdependence of the parts that the emergence of something new and unexpected occurs (Bar-Yam 1997: 10,12).

There can be disagreement and confusion about the definition of emergence, and this occurs for a number reasons including that there is no standard definition of emergence (Halley & Winkler 2008: 11), and because there are different classes of emergence. Two distinctions that can be made between the different classes are: i) the difference between simple and complex emergence, and ii) the difference between strong and weak emergence (Page 2009: 22).

Simple versus complex emergence

Simple emergence is a property at the macro level of a system in equilibrium such as the wetness of water; a single water molecule cannot be wet and wetness emerges from multiple molecules because they have weak hydrogen bonds and this is a case of "more is different" (Page 2009: 22). Water as a system is in equilibrium, because the qualities of any

one portion of water are representative of all water. Therefore, the wetness of water is simple

emergence.

Complex emergence is a property at the macro-level in a complex system that is not in

equilibrium such as flame or slime moulds; when under stress slime moulds have the mobility

to group and move together and if necessary to take on different roles (Page 2009: 22).

Strong versus weak emergence

Strong emergence is the form normally referred to in philosophical discussions, and was

the form referenced by the British emergentists of the 1920s (Chalmers 2006: 244). Strong

emergence is undefinable (irreducible) and it appears to exist only in the world of concepts

and not the natural world. In other words, strong emergence occurs when macro level

outcomes cannot be deduced from the interactions that occur at the micro level (Page 2009:

22). In other words, strong emergence cannot be predicted. Strong emergence is

"scientifically irrelevant" because there is no evidence that strong emergence plays any role in

contemporary science, and many of the original discussions by the British emergentists were

motivated by natural systems that produced weak rather than strong emergence (Bedau 2002:

11; 2010: 51).

Weak emergence can be stated as "deducibility without reducibility", and this form of

emergence is interesting and not obvious (Chalmers 2006: 245). Weak emergence would not

be expected from the interactions that occur at the micro level, but it can be understood once

it has been observed, such as the emergence of slime moulds (Page 2009: 22). In other words,

weak emergence can be predicted even though it would not be expected if only the parts, and

not their relationships, were taken in consideration. Weak emergence is often defined as the

whole being greater than the parts, but this explanation is inadequate given that it could be

applied to a filing cabinet; weak emergence is better defined as occurring when simple low-

level mechanisms combine in simple ways to produce complex, interesting, high-level

functions that are unexpected given the properties of the low-level mechanisms (Chalmers 2006: 244-5,251-2).

Weak emergence is typically the one referred to when discussing complex systems theory (Chalmers 2006: 245). Examples of complex systems where weak emergence occurs are the Web and computer operating systems such as Microsoft Windows. Examples of emergence in an operating system are functions that were not part of the design, such as vulnerabilities that allow viruses to infiltrate the system. Emergence is discussed in more detail in the following chapter.

Applying complexity science to multimedia news

Multimedia as a complex system

A system is an "interconnected set of elements that is coherently organized in a way that achieves something" (Meadows 2009: 11). A multimedia text is an interconnected aggregation of media which is, or should be coherently organized so that the multimedia achieves its purpose of communicating the message intended by the journalist. However, a multimedia text can be more than a system; it has the potential to be a complex system. This is not to suggest that all multimedia are complex systems. For instance, a video of an interview, which is only talking-heads, is not a complex system. A video must be a montage to be classified as a multimedia text and to have the potential for emergence. Multimedia can be categorised as a complex system when montage is involved, either horizontal and/or vertical montage, as discussed in Chapter 1, where different scenes and different subsystems are combined.

Where multimedia is a montage, the combination of multiple media has the potential to change the multimedia message in a way that is unexpected by the audience, and in addition, where the properties at the macro level are different to the properties of the micro level. In other words, emergence occurs when the multimedia message does not reflect the meanings of the subsystems that compose it if the subsystems were experienced separately. This change

of the message, with the potential for emergent properties, is part of audio-visual film theory (Chion 1994; Bordwell & Thompson 2008), and is understood by movie and advertising directors but not normally by news editors, journalists and the general public.

What is best for one component in a complex system is not normally best for the others, so a compromise is the solution; conflict normally leads to instability so for this compromise the components coordinate to "minimize friction and maximize synergy" (Heylighen 2008: 7). There is no conflict with conforming subsystems, but these produce the least entertaining multimedia. Conflict, or contest to use Cook's term, produces the most entertaining multimedia but it is the most likely to produce unpredictable results. The compromise in multimedia is the use of complementary subsystems which neither conform nor contest.

Level of complexity in multimedia

The level of complexity in multimedia must be "in-between" where it is neither too simple nor too complex. The multimedia should not be too ordered (orderliness in multimedia occurs when the media conform), otherwise it will not be entertaining, as can be seen with the talking-heads videos that are often used in news reporting. However, conformance between visual and auditory information has the advantages that it leaves the brain with a high level of resources available for attention and memory (Grimes 1990: 15,23-24). Alternatively, contest between media in multimedia increases the complexity, creating the reverse situation. Contest between media will be more entertaining but more difficult to understand and remember. This occurs because when media are incongruent then attentional resources are stretched (Grimes 1990: 15,22-3).

In addition, high levels of complexity can cause information overload, misunderstanding and irritation (Kozma 1991: 194-5; Grimes 1990: 23-24; Xu, Oh & Teo 2009: 154,171). Therefore, even though very high levels of complexity might make the multimedia more entertaining, it is not suitable for news. This difficulty in understanding can often be seen with art movies, such as those by the revered Italian film director Federico

Fellini, whose films are difficult to follow, and meant more as a sensual feast. As Page states, the level of complexity should be the "interesting in-between" (Page 2009: 10; 2011: 30). A form of niche assembly can be used to resolve the problems of very high levels of complexity, but news organizations normally have neither the time nor resources for such techniques.

Diversity in multimedia news

A multimedia text, by definition, is diverse because it is composed of different types of subsystems but in addition, they have a level of sameness. For instance, video image and music are very different in that one is visual and one is auditory, but they are also similar in that both occur over time and both indicate movement. Provided this movement is co-ordinated, it creates a level of sameness. Oral language and music are similar in that they are both auditory, but they are different in that language can be more explicit whereas music is more open to interpretation. Each subsystem is different to all the others yet there are similarities between all of them.

When the components of a structure are identical, then the structure is typically uniform, but when the components are diverse "the resulting structure is much more complex and unpredictable" (Heylighen 2008: 8). Therefore, the more media that are active at the same time, the more complex the multimedia is and the more likely there will be a change of meaning.

Multimedia functions at its best when the level of diversity is not too low or too high. In multimedia, if the diversity is too low, it is not multimedia, such as the talking-heads which is not normally considered a multimedia text. Alternatively, if there are too many subsystems and they are too different, the result is chaotic. For instance, if video, photographs, graphics and written language were all on the screen at the same time and all had different meanings, then the diversity would be too high and the multimedia message would be incomprehensible. When creating a multimedia text this diversity must be maintained "in-between" for both physical and conceptual levels. At a conceptual level, the meaning of each subsystem should

support the message but should not be an exact match. Conceptual "in-between" occurs when the subsystems complement the message as described by Cook's complementation model of multimedia (Cook 1998: 120).

The niche assembly that occurs over long periods in complex environmental systems, such as the Amazon, can be seen in many movies where scenes are carefully constructed so that each subsystem has its own sensory niche. For instance, the levels of music and sound effects are normally reduced when language occurs. This niche assembly in film is achieved with precision editing, but such editing is normally too time and resource consuming for news organizations.

Robustness and redundancy in multimedia news

To ensure the message of a multimedia text is understood, it should be carried by more than one subsystem so there is a level of redundancy. However, if all subsystems carried exactly the same meaning in the same way (pure redundancy), the multimedia would not be entertaining, as occurs with talking-heads. In addition, it could be argued that this type of audio-visual combination is not a multimedia text. Although each subsystem is by nature different to the others, it can still create pure redundancy if systems match too closely. For instance, if images and text conform precisely, as occurs when text is displayed and spoken word-for-word in a classroom situation, then this would be pure redundancy. If the multimedia is a talking-heads video, then this is also pure redundancy because the facial movements and the voice match exactly. With this level of conformance, the multimedia message is robust in that it is unlikely that there will be any misinterpretation of the intended meaning.

Alternatively, if there was no redundancy, the message would be at risk of misinterpretation. However, if language and image complement each other, as can occur with added images supporting a voice-over, this is degeneracy and helps to ensure that the message is correctly understood while at the same time being more entertaining because it has more

variation. Therefore, degeneracy in a complex system is much the same as Cook's (1998: 120) complementation model of multimedia. Degeneracy can be used to create the "interesting in-between" in multimedia. However, the voice-over must be synchronized with the appropriate images to achieve degeneracy. In the rush to release news, coordination of sound and images often suffers (Grimes 1990: 16).

Connectedness in multimedia news

In a multimedia text, the subsystems are connected in two different ways: physically (the senses hear and see the subsystems) and logically (the mind processes the content of the subsystems). The active subsystems are physically connected in that they occur at more or less the same time because multimedia, by definition, is multiple media occurring at the same time. In addition, all active subsystems must be logically connected – that is, they must be connected through their content. The meanings generated by the subsystems create the multimedia message and if these meanings are not connected, the multimedia message will be disjointed and incomprehensible. To create a news story that is both entertaining and comprehensible, the connectedness of the subsystems must be "in-between".

If all possible subsystems were physically fully connected at the one time, that is, they were all occurring together without any sensory gaps, the senses would normally have difficulty in discriminating one from another and information overload would occur. For instance, if written text, moving and still images were shown together and were accompanied by music, oral language and sound effects, unless the multimedia was extremely carefully constructed using niche assembly, the result would be overwhelming even if all subsystems were communicating the same idea.

If logically there was full connectedness, it would be equivalent to all subsystems representing exactly the same idea, in the same way, at the same time, which would result in a very dull story. If nothing was connected logically, the multimedia would be disjointed and not present a coherent message. If physically nothing was connected, only one subsystem

would be active at a time. Therefore, the connectedness of subsystems should be "in-between" to be coherent, entertaining and informative. There are many ways to achieve "in-between" connectedness such as only having a few subsystems active at one time.

Interdependence in multimedia news

Interdependence occurs in a multimedia text through the relationships between the subsystems, where one subsystem has the ability to influence the meaning of any or all of the other subsystems. These interdependent relationships between subsystems create a network where every subsystem is connected to every other subsystem, directly or indirectly. Direct interdependence occurs between subsystems which are active at the same time, whereas indirect interdependence occurs between a subsystem and the previous or following subsystems.

As previously discussed, research has found that multimedia can be irritating even though it is more entertaining and informative than a single medium, and it is speculated that this irritation is due to information overload (Xu, Oh & Teo 2009: 154,171). Information overload occurs with a multimedia text if there are too many subsystems active at the same time and all with too high a level of vividness, creating too many influences. The amount of interdependence is, or should be "in-between", because if there are too few influences in the network, the multimedia will not be entertaining, while if there are too many it can create information overload. Niche assembly can reduce information overload but as previously stated, it requires more time and resources.

The possibility of creating the wrong message, or creating information overload and confusion, escalates with each additional subsystem. The result of too high a level of interdependence can be likened to the number of things that can occur in a set of objects. The number of things that can occur with a collection of objects can quickly become extremely large as the number of objects increase; for example, two items can be arranged in two different ways, three items can be arranged in six different ways, four items can be arranged

in twenty four different ways, five items can be arranged in one hundred and twenty different ways, and ten items can be arranged in more than three and a half million different ways (Johnson 2009: 23).

Figure 7-1 shows the network of relationships that are possible in multimedia where, in this example, there are six media with thirty possible relationships. These relationships mean that there are a large number of possible meanings of the message.
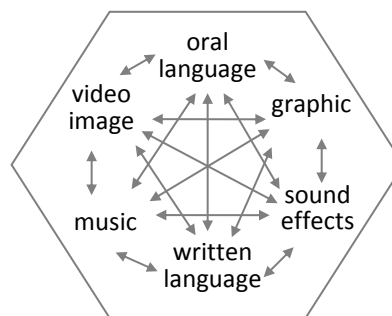
Figure 7-1 Influences between subsystems

A somewhat similar type of escalation to that previously described, but not as dramatic, can occur with multimedia with each additional active subsystem. If there are two active subsystems, for instance image and music, there are four possible outcomes for the meaning of the image and music that are created by the influence of one subsystem on another: i) neither meaning changes, ii) the meaning of the image changes but music stays the same, iii) image stays the same but music changes, iv) both meanings change. The formula to calculate the number of possible outcomes is 2^n where n is the number of subsystems. Therefore, with each additional subsystem, the complexity of multimedia rises exponentially. For instance, with three subsystems (2^3) there are eight outcomes. For four subsystems (2^4) there are sixteen outcomes. For five subsystems (2^5) there are thirty-two possible outcomes and for six subsystems (2^6) there are sixty-four possible outcomes. Each outcome could result in a different message and many of these possible messages could contain an unexpected property.

It would be unusual and possibly inadvisable for six subsystems to be active at the same time except with the use of niche assembly. A simple form of niche assembly, such as having

most of the systems in the background, can increase the number of subsystems that can be active at a time. However, subsystems can appear to be in the background but can be covertly influencing the message. Covert influences are discussed in Chapter 11. Clustering, where the meanings of a group of subsystems conform, can also be used to allow more subsystems to occur at one time.

In multimedia, the ripple effect described by Heylighen (2008: 4), where a local action triggers a global change, means that one subsystem can change the meaning of another system in the same scene, but this change of meaning goes further. Once there is a change of meaning in one scene, it will normally affect the meaning of following scenes. Therefore, the change of meaning can become global. The meaning of a subsystem can be influenced by subsystems occurring immediately before and after, so at any particular time all subsystems should be considered. Therefore, the interdependence of the subsystems in a multimedia text is key to determining the message.

Environments and dancing landscapes in multimedia news

The concept of a dancing landscape is an expansion of the systems theory concept of system and environment. The landscape must dance to get complexity (Page 2009: 8), and a multimedia text has two levels of environments, internal and external, and both are dancing landscapes. The external environment is created by the audience and the broadcast technology. The landscape of this external environment dances with changes in audience taste and with developments in technology. The internal environment is within the multimedia. Each subsystem has a dancing landscape because each subsystem has the other subsystems as its environment, and the subsystems can change from moment to moment. All must be considered when developing or analysing a multimedia text.

Adaptation in multimedia news

The requirement for adaptability in a multimedia text comes from the need to present information to meet the requirements of audiences as tastes change, as well as from the need

for the multimedia to function correctly on the latest broadcast technology. The creators of multimedia continually adapt the multimedia to take advantage of new development tools and new technological advancements. An example of adaptation in multimedia is the increase in the number and quality of images and the use of videos as Internet access speeds increase. In the future, multimedia could include the sensation of smell if a purpose built device were attached to the user's computer. While an individual multimedia text does not have the property of adaptation, multimedia as a form of media adapts over time.

Self-organizing in multimedia news

Self-organization means the system reacts to feedback and adjusts accordingly. Self-organization occurs in multimedia when the creators use a suck-it-and-see approach to determine what will create the desired message. That is, they create the multimedia and view it to check the correct message has been created. Self-organization makes the resulting organization resistant to intermedia perturbations that cause misunderstanding and unintended emergence. However, once a multimedia text is in the process of being broadcast, it cannot draw on self-organization to resist intermedia perturbations that create unintended emergence, Therefore, this resistance to the influence of intermedia perturbations must be built in by the creators during the development stage.

Emergence in multimedia news

Emergence has long been recognised by filmmakers as a potential property of film, as discussed in Chapter 1. In sum, the emergence of something new and unexpected when media is combined was recognised by the acclaimed Russian filmmaker, Sergei Eisenstein, who found that the combination of music and image often created unpredictable results (Eisenstein 1947: 159). These unpredictable results can occur because one doesn't hear the same thing when looking and one doesn't see the same thing when listening (Chion 1994:xxvi,5). Multimedia "constructs" meaning through the reciprocal transfer of attributes and this cross-media interaction creates something new (Cook 1998: 97). This new meaning can occur even

though both music and image project their own individual meaning when experienced

separately (Cohen 2000: 369).

The emergence recognised in the arts is not necessarily that recognised in other fields

because there are multiple forms of emergence. Emergence in multimedia can be likened to

weak emergence where simple mechanisms can produce complex, interesting phenomena that

are unexpected if each subsystem was examined alone. However, even though the emergence

is unexpected when the media are considered separately, the emergence can be predicted

when the relationships between the media are taken into consideration. Emergence is an

important and useful part of entertainment, but in a multimedia text where meaning should

take precedence over entertainment, emergence can be a problem.

Even though emergence in multimedia would not be expected by examining each of the

subsystems alone, once it has been observed, it can be understood at least to some degree, and

either avoided or used in a way that will not change the message. Emergence, its implications

for multimedia, and how it can be understood are discussed in more detail in the next chapter.

Concluding remarks

Applying complexity science to multimedia: weaknesses

Not all emergence as it is recognised in the arts would be considered emergence in

complexity science because in the emergence defined by Page the "macro differs from the

micro—not just in scale but in kind" (Page 2009: 4; 2011: 25). If we accept Cook's

proposition of emergence, that it results from limited overlap of meaning between the media

(Cook 1998: 84-86), it might be claimed that the macro level is not different from the micro

because there are elements of the macro in at least one of the micro parts and probably both

given the overlap of meaning. However, whether this limited overlap of meaning creates

emergence as it is defined by Page depends on the precise definition of what type of change is

required for the macro to be different to the micro in kind. Even so, where surrealism emerges

from two conflicting media, it would be difficult to argue that this does not meet the criteria of the macro being different in kind to the micro.

It could be claimed that multimedia is not a complex system on the basis that a single multimedia text cannot meet all the criteria of a complex system. Only by adopting the position that the creators develop multimedia over time, does multimedia meet the adaptation and self-organization requirements. However, the definition of a complex system adopted for this thesis does not state that adaptation is a necessity, but that a complex system may but need not adapt (Page 2011: 6-7). In addition, self-organization is part of the emergence process (Page 2009: 4; Halley & Winkler 2008: 11-12,14) and it is claimed that multimedia do have emergence. The specific form of emergence that occurs in multimedia is discussed in the following chapter.

However, not all multimedia texts produce emergence, and it can be claimed that there are many combinations of media where no emergence occurs. Even though there may be a change in the emotional level, this is not normally considered emergence. However, the definition of a complex system states that interactions often, but not always, produce something that is more than the sum of the individual parts, so emergence need not occur in every multimedia text.

To be effective in their role, the creators must understand how a multimedia system creates its meanings and how these meanings create the multimedia message. As Zbikowski states, the creators need new tools so that they understand the numerous ways that sound, images and language can combine to create results that can be difficult to interpret (Zbikowski 2002: 252). Regardless of whether a multimedia text can be claimed as meeting the criteria required to be called a complex system, the concepts of complexity science can be applied to help explain how multimedia works.

Applying complexity science to multimedia: strengths

A number of concepts from complexity science are important for understanding multimedia. The first is that an entity in a complex system can influence almost everything (Page 2009: 53-56). This level of influence, where one subsystem can influence any other subsystem with the potential to change the meaning of the multimedia message, should be a primary consideration during the development of a multimedia text.

The second is the concept of the "interesting in-between" (Page 2009: 10; 2011: 30). In multimedia, the level of complexity must be in-between, and this in-between status includes the levels of connectedness and interdependence. Being "in-between" means that the multimedia text must not be too simple nor overly complex, but must create entertaining and informative multimedia that will avoid information overload and irritation. High levels of complexity can be addressed with niche assembly, and while for most news items there is not normally either the time or budget for this, it may be feasible for stories with a longer life.

The third concept that is useful in multimedia is that of degeneracy replacing redundancy. In multimedia, conforming subsystems create redundancy but the resulting multimedia is not normally entertaining. The concept of degeneracy can be applied to multimedia by using complementary subsystems. Subsystems which are complementary support the message and at the same time normally make multimedia more entertaining. The fourth concept is that of emergence which is explored in more detail in the next chapter.

Complex systems can produce "amazing novelty" (Page 2009: 5) and such novelty can be used in multimedia texts to bring audiences back to news. Even though complex systems cannot be controlled, their power can be harnessed but only once we understand them (Page 2009: 53-56). Complexity science concepts can be used to harness the power of multimedia to be both entertaining and informative.

Chapter 8   Multimedia, Causality & Emergence

Introduction

The aim of this chapter is to expand the discussion of emergence started in the previous chapter. This expanded discussion is from the perspective that emergence occurs in a multimedia text and a multimedia text is an autopoietic system. In an autopoietic system, a type of causal relationship occurs which can be understood using Fleischaker's consequential theory. In addition, the emergence in multimedia can be understood using Mark Bedau's definitions and hallmarks of emergence and his process of "crawling the micro-causal web". This process of crawling the micro-causal web involves conducting a computer simulation to see the emergence process.

It would be reasonable to suggest that terms such as "system", "complexity", "emergence" and "autopoiesis" have specific technical meanings when used with the natural sciences and that these intricate meanings are not applicable when the terms are applied to multimedia as this thesis does. From this aspect it could be claimed that when discussing multimedia these terms are used metaphorically. However, in the social sciences these terms have a more general meaning such as that referred to by Cook (Cook 1998: 6-8,84) and Eisenstein (Eisenstein 1947: 159). It is claimed that when multimedia is compared to individual media, or where media meanings do not conform, then multimedia can be seen as a complex, emergent, autopoietic system as the concepts are understood in the social sciences. It is also claimed that treating multimedia as a complex autopoietic system where emergence occurs, even though it is not comparable with such systems in the natural world, assists with understanding the meaning that will be created by the relationships between the media.

The topic of emergence is contentious. Exactly what emergence is and the correct application of the term is disputed (Bedau 2002: 7). One criticism is that the term has been frequently used in an "overly facile" way (Ronald, Sipper & Capcarrère 1999: 225). In addition, as mentioned in the previous chapter, there are differences between the application

of emergence in the sciences and in philosophy. While it is common to categorise emergence into strong and weak, other types of emergence have been defined. For example, as discussed previously, as well as the distinction between strong versus weak emergence, there is also the distinction between simple and complex emergence (Page 2009: 22). Fromm defines four types of emergence: simple/nominal, weak, multiple and strong, with seven subtypes (Fromm 2005), while Francesco defines three types: minimal, moderate and radical emergentism (Francesco 2010: 68-69). The concepts of emergence discussed here, and which are used to classify and explain emergence in multimedia, are predominately those of Bedau who defines three kinds of emergence: nominal, weak and strong (Bedau 2002: 8).

The diversity of opinions on emergence has resulted in much controversy, and so the explanations given here are more extensive and comprehensive than would normally be used for a more clearly defined topic with more generally agreed parameters. A clear understanding of the different types of emergence as specified by Bedau is important for understanding the different levels of emergence in multimedia and how they can be predicted. In addition, it is necessary to ensure there is no confusion with regard to strong emergence, given that strong emergence is the form most often referred to in the social sciences.

Bedau states that there is no one true view of emergence and that his categorisation is not exhaustive. He states that there are no clear dividing lines between one type of emergence and another and that emergence occurs along a continuum. In addition, the emergence wars, which argue about what emergence truly is and how it should be defined, should be put aside because we should take a pluralistic view which acknowledges that there are many and varied types of emergence, and new forms of emergence can and will be found (Bedau 2002: 8; 2010: 48; 2013).

As we have seen, emergence in multimedia was originally identified by Eisenstein when he stated that unexpected results could occur with montage (Eisenstein 1949). It was further described by Chion in his theory of added value (1994), and formalised by Cook in his

generalized framework of multimedia and the multimedia models it incorporates (Cook 1998). Emergence in multimedia is somewhat different to other forms of emergence. In the spirit suggested by Bedau when he stated that instead of being involved in the emergence wars, we should be hunting for new forms of emergence, it is suggested here that the emergence in multimedia can be classified as progressive emergence.

It is proposed that progressive emergence has a starting point of richness which occurs due to the complexity of the multimedia, but richness is not emergence as it is normally defined. In other words, the change that leads to emergence has its beginning in the richness produced by additional media, where these media are not an exact match. Progressive emergence then moves through nominal emergence to weak emergence and will end in chaos if the multimedia becomes excessively complex. That is, there are four stages in progressive emergence, and these are progressive richness, progressive nominal emergence, progressive weak emergence and progressive chaos. Progressive nominal emergence, based on Bedau's definition of nominal emergence, occurs when the meanings of the subsystems, if experienced alone, are different in kind to the meaning of the message. This form of emergence is compressible because it is easily explained by examining the micro level, using the rules of the proposed model of multimedia. Progressive weak emergence, based on Bedau's definition of weak emergence, occurs when there are multiple, different occurrences of emergence that normally involve conflict. The final message cannot be easily explained but needs Bedau's step-by-step simulation process of crawling the micro-causal web. While Bedau's simulation is conducted using computer software, crawling multimedia's micro-causal web involves conducting a manual simulation of the messaging process. Progressive emergence and the process of crawling the micro-causal web provide a way of understanding emergence in multimedia.

Emergence

Characteristics of emergence

It is generally agreed that there are many different types of emergence. However, there are a number of characteristics which are considered an important part of complex systems[13] where emergence occurs. These characteristics include structural determination, non-linearity and broken symmetry. While non-linearity and broken symmetry are prerequisites for emergence they do not explain emergence.

Relationships, emergence and structural determination

The macro properties of a system, "are structural properties, in the sense that they are constituted by micro entities processing appropriate micro-level properties" (Bedau 2002: 14). In other words, the emergent properties are created by structural properties and these structural properties come from the micro level. Even so, for a system to be categorised as a complex system, it is not enough for the parts of the system to be interactive, interconnected or interwoven; they must be interdependent because it is only with interdependence that the emergence of something new and unexpected can occur (Bar-Yam 1997: 12). The term "relational properties", rather than "emergent properties" could better describe the transformations that occur in a complex system because emergence can be used to give the impression of a "mysterious" occurrence, while in fact it is a result of the relationships in the system and how they interact (Cilliers 1998: 143 Note 2).

Given the importance of relationships, complex systems can be described as networks where "the connections between the nodes are more important than the nodes themselves", because meaning is conferred by the relationships between the structural components of a system, and the process that creates the meaning involves both its current state created by the structural components as well as its previous states (Cilliers 1998: 11; 2007: 57). In other

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[13] It is to be noted that in this chapter, a system and its subsystems are referred to using different terms depending on the source of the reference. A system is referred to as the whole or the macro or macro level, while the subsystems are referred to as the micro, or micro level, micro parts, component parts or just parts.

words, the relationships between the current micro properties, in conjunction with the influence of the states created by the previous micro properties, determine the macro.

Non-linearity and symmetry-breaking

Non-linearity is an essential precondition for a complex system because when systems are linear they are relatively simple and generally easily understood, but in complex systems there is a rich level of interaction that is not transparent (Cilliers 1998: 120). Another concept that is central to emergence is that of broken symmetry (Halley & Winkler 2008: 11). Broken symmetry occurs when the symmetry of the structure breaks down and becomes unbalanced and from this structural breakdown emergence can occur. Broken symmetry magnifies the power of non-linearity (Cilliers 1998: 120). An example of symmetry is a snowflake. The change of state that occurs when the snowflake starts to melt breaks the symmetry so the snowflake becomes asymmetrical as it melts.

Hallmarks of emergence

Bedau states there are two hallmarks which structure and unify the different notions of emergence and provide a framework for comparing different types of emergence. Any way of simultaneously meeting both hallmarks indicates a candidate for emergence. The first hallmark is that macro-level phenomena arise from and depend on the basic micro-level phenomena, so emergence has a bottom-up perspective. In this bottom-up emergence, the macro depends on the micro, so there is a particular type of dependence involved where the emergent phenomena are dependent on underlying processes. The second hallmark is that emergent phenomena are autonomous from the underlying processes. This is a top-down perspective in that the macro is autonomous from its micro parts and a particular type of autonomy is involved. Where there are different types of dependence and autonomy they lead to different types of emergence (Bedau 2010: 48; 2013).

It may seem controversial that these hallmarks state that macro level phenomena arise from and depend on more basic micro-level phenomena while at the same time being

autonomous from their micro-level base, and these explanations may make the hallmarks

appear inconsistent, obscure and incoherent (Bedau 2010: 47-8; 2013). However, they can be

understood and are compatible because the first hallmark is straightforward in that the macro

is dependent on the micro; in the second hallmark the macro emergent properties do not apply

to the underlying parts; therefore, it can be seen that emergent phenomena can be

simultaneously dependent on and autonomous from their underlying parts (Bedau 2010: 49).

Types of emergence

Different types of dependence and autonomy create different types of emergence. The

types of emergence referred to here are classified as: nominal, weak and strong and this

classification is based on different types of dependence and the autonomy between the macro

and the micro levels. Each classification is extremely broad and there are large numbers of

examples of nominal and weak emergence, but it appears there are no practical examples of

strong emergence, which may be only a theoretical concept (Bedau 2002: 8-9; 2010: 48).

Strong emergence

Strong emergence cannot be explained by the potential of the micro properties to create

the macro properties, and this suggests that science has no explanation for strong emergence

(Chalmers 2006: 245). Therefore, "[s]trong emergence starts where scientific explanation

ends" and this implies that new laws of nature are needed to explain this form of emergence

which is of a primitive or brute nature and contravenes the existing laws of nature and the

concept of causal fundamentalism (Bedau 2002: 11). Therefore, as it is claimed that strong

emergence does not actually exist, it is only briefly mentioned here.

Nominal emergence

The nominal emergence defined by Bedau is a very simple form of emergence that

some may say is not actually emergence. Even so, nominal emergence meets both hallmarks

of emergence: it meets the first hallmark of emergence because nominal emergence is a

bottom-up emergence where the macro depends on the micro parts; it meets the second

hallmark because the properties of the macro in nominal emergence are autonomous from its micro parts in that the properties of the macro level are different to the properties of the micro level even though the emergent results, and how they occur, can be easily understood (Bedau 2002: 9). In other words, in nominal emergence, the sum is more than the combination of the parts and the reason this occurs is easy to determine.

Weak emergence

Weak emergence is everywhere including being widespread in nature; it occurs with a bottom-up system where the macro depends on its micro parts, but at the same time the macro is autonomous from its micro parts in that there is a complex cause that is not obvious (Bedau 2002: 43; 2013). In weak emergence, the cause of the emergence exists and can be understood but not easily understood. In theory, weak emergence can be understood from the micro parts but the understanding is not a simple matter because the micro parts individually do not explain the macro. It is only when the sum of their interactions are considered that the outcome can be derived. Even though deriving the cause of emergence is not a trivial process, if weak emergence cannot be understood then it is likely to be due to ignorance (Bedau 2002: 12-13).

The main concept in Bedau's explanation of weak emergence is that the emergent causal powers can be derived from information at the macro level but only in a "certain complex way". Therefore, a characteristic of weak emergence is "explanatory incompressibility". If something is compressible, the global state that finally emerges can be derived from having the knowledge of the initial conditions and understanding the bottom level rules. For instance, nominal emergence is compressible because it can be easily understood even though the macro differs from the micro, but this ease of understanding is not the case in weak emergence (Bedau 2002: 12; 2010: 49-53; 2013).

In an incompressible causal web, as Bedau says, the global state that finally emerges can only be derived from applying the knowledge of the initial conditions and bottom level

rules (the rules governing how the micro parts create the macro), while working step-by-step through the process to determine the results at each step. In other words, it is not enough to understand the starting points and the rules that determine emergence because emergence is too complex to determine. The emergence will be exposed only by working step-by-step, from the starting point, through the rules. In a compressible system, the explanation does not need to explain every moment of the system's actions because the results of the activity can be abbreviated so that an earlier activity explains a later activity. If the explanation cannot be abbreviated then it is incompressible. However, even though weak emergence is defined as incompressible, incompressibility is a continuum and there is no hard line between compressible and incompressible (Bedau 2002: 12; 2010: 51-3; 2013).

An important form of weak emergence is robust weak emergence. Bedau defines robust weak emergence as having regular repeating salient patterns that have explanatory incompressibility. In other words, salient patterns recur at the macro level and are irreducible (the higher level cannot be deduced from the lower level), based on the properties of the micro level. These patterns at the macro level cannot be understood based on the characteristics at the micro level. Their original meaning can be described only at the macro level and the regularity of these patterns can be used for explaining the emergence that occurs, so they are factual, they actually occur, and are not merely a theoretical concept. Repeating macro-level patterns can be seen in computer simulation models such as *The Game of Life*. While it is easy to see these patterns, determining what the patterns mean is more difficult (Bedau 2002: 42-3; 2010: 56-7; 2013).

Weak emergence meets both hallmarks of emergence: it meets the first hallmark of emergence because it is a bottom-up emergence where the macro depends on the aggregation of the micro parts; it meets the second hallmark because the properties of the macro are autonomous from its micro parts in that the properties of the macro level are different in kind to the micro, and the explanation is incompressible because it can only be derived in a

"certain non-trivial way" (Bedau 2002: 12; 2010: 56). In other words, the explanation cannot be derived by simply working backwards from the macro to the micro.

Even though weak emergent systems are reducible to their parts in principle but not in practice due to their complexity, the reduction of a weak emergent system can be understood using the step-by-step analysis that can be achieved with a computer simulation; therefore the "explanatory incompressibility" of the emergence can be described as being un-derivable by any means other than simulation (Bedau 2010: 51-2,56-7; 2013). In other words, the notion of explanatory incompressibility means that when the causes of the macro-level are sufficiently complex, the behaviour cannot be explained by working backwards from the outcome. However, the outcome can be understood by "tracing forward" through all the "explanatory arrows" of the web of micro causes because the dependent details are always enlightening (Bedau 2002: 42-3; 2010: 58-9). This concept of tracing forward though the explanatory arrows can be explained using a consequential theory.

Causal versus consequential theory

The concepts from emergence theory, that there is a causal relationship between the micro and the macro, and that the relationships between the micro parts are more important than the parts themselves, also applies to autopoietic systems. "The crux of autopoiesis is also a systems idea – that the organism maintains itself as a unity, not by its parts per se, but by virtue of the relationship among its parts" (Fell & Russell 1994a: 29). In other words, an autopoietic whole is dependent on the interrelationships between its component parts. The structure, which is created by the interrelationships between the parts, determines what the outcome will be because it is the structure that determines whether an intermedia perturbation will result in a change.

The question arises as to whether this structure allows us to predict an outcome in an autopoietic system including anything unexpected that might arise due to emergence, given that structural determination and emergence might appear to be mutually exclusive. In

discussing causality in an autopoietic system, Fleischaker sheds light on this issue. Fleischaker's explanation questions our notion of causality; we normally think of causality as starting from an earlier determining event that is not understood until sometime later, but this is very different to Fleischaker's consequential theory which replaces causal theory in an autopoietic system (Fell & Russell 1994a: 38). In a causal relationship our perceptions and explanations of evolution are based on what occurred in the past but consequential theory is very different.

In an autopoietic system, consequential theory is a more appropriate way of understanding events than a causal theory (Fleischaker 1988: 85). Consequential theory sees any event as a possibility made definite which then opens another set of possibilities (Fell & Russell 1994a: 38). Fleischaker describes this difference between a consequential and a causal theory stating that the "arrows projected through the chain of related events in the two theories point in opposite directions and reflect the point of view from which they are defined". The "multiple arrows of consequence extend forward in time, generating various events possible from a single starting point"; whereas from a causality perspective, we explain an event by attributing "a necessary determiner of that event, extending a single arrow of cause backward in time from the determined event" (Fleischaker 1988: 84-5). In other words, in consequential theory, each event is determined according to the appropriate principle and each event is an outcome of what preceded it. At any point where there is a change, one set of possibilities is made concrete while terminating the other possibilities that were viable until that point. Therefore, an event is a possibility which, when and if it occurs, makes possible or terminates other events.

This process can be seen with Darwin's natural selection. Darwinism provides an unusual form of causation in that the causal chain runs in reverse to the normal sequence because in natural selection the environment allows the most appropriate organism to most efficiently reproduce, so that even though natural selection is described as having causal

powers, it is actually neutral and acts as a sieve for the most appropriate organism to continue; therefore, natural selection is better thought of as a constraint rather than a cause (Davies 2006: 44). This reverse causal chain in natural selection, where the selection of one species or genetic variant results in the termination of another, is an example of Fleischaker's consequential theory.

Luhmann, when discussing the possibilities of outcomes in a complex system, takes a similar view to Fleischaker's consequential theory. Luhmann states that there are more possibilities in complex systems than can be actualised (Cilliers 1998: 2). In addition, it is the selection of parts of the system that determines the system and its outcome; different kinds of systems and different outcomes can be formed by selections from a substratum of very similar parts (Luhmann 1995: 25,283). However, the structures of a system constrain the system by limiting the selections that can be made by the system (Luhmann 1995: 25).

As stated earlier, the concept that emergence is irreducible comes from strong emergence which is a theoretical concept and does not apply in the natural world. In discussing complex systems, Bedau states that emergence and reduction are not inconsistent, and that weak emergence actually depends on "a particular context-sensitive form of micro-causal reduction" (Bedau 2010: 46). He states that the mistake of confusing reduction as contrary to emergence comes from mistaking strong emergence for all emergence. Weak emergence comes with the awkward notion of "in-principle irreducibility in practice", meaning that weak emergence has actual and valid explanations of emergence, but the macro is incompressible and so it makes the explanations useless in practice (Bedau 2010: 56,59).

With living systems, even using consequential theory, each is so complex with so many possible states that "their analysis is beyond computation: although history-dependent, they are in principle impossible to infer", and this can be described using von Fœrster's statement that they are synthetically deterministic but analytically indeterminable (Fleischaker 1988: 85). This phrase, synthetically deterministic but analytically indeterminable, means that an

event can be duplicated and observed but the outcome is too complex to predict because there are so many possibilities. This applies to complex systems with weak emergence which can be described as being un-derivable by any means other than simulation (Bedau 2010: 51).

The concept of explanatory incompressibility from weak emergence confirms von Fœrster's claim that nontrivial machines are synthetically deterministic but analytically indeterminable. Bedau proposes a solution to this dilemma which is conceptually similar to Fleischaker's consequential theory. Cause and effect relationships are a natural part of emergence even though the cause is not initially obvious; the process of emergence always raises the question of causation and causality where there is a search for "a hidden cause for an apparent effect" (Fromm 2005: par. 4.1). Bedau's solution to this search for a hidden cause of an apparent effect involves "tracing through all the explanatory arrows" to predict the emergence (Bedau 2010: 59).

Crawling the micro-causal web

The weak emergence that Bedau proposes, as previously stated, is based on the notion of explanatory incompressibility. This means that when the causes of the macro-level are sufficiently complex the behaviour cannot be explained by working backwards from the outcome, but the outcome can be understood by tracing forward through all the explanatory arrows of the web of micro causes. Bedau calls this process of tracing forward "crawling the micro-causal web" (Bedau 2010: 58-9). Crawling the micro-causal web puts consequential theory into practice.

Whether or not it is necessary to crawl the micro-causal web depends on whether the explanation of the emergence is compressible or incompressible, and whether a system requires a compressible or incompressible explanation depends on the complexity of the micro-causal network that forms the system. In other words, the more active micro elements there are and the more complex their interactions, the more complex the system and the more likely that the system is incompressible (Bedau 2010: 52-3).

Weak emergence, Bedau states, typically occurs with large numbers of parallel micro-level components that interact independently with other components in their environment. In addition, the micro-level components normally interact in a non-linear way, so that the behaviour of a micro-level element is highly sensitive to its environment. The large numbers involved and the fact that they *interact* rather than simply *act* together make the system more complex. This complexity makes the system's behaviour impossible to predict from knowledge alone, even though all the micro information and micro-level rules are available. This means that weakly emergent phenomena have micro-level generative explanations but, at least in principle, incompressibility makes the explanations useless in practice. In other words, from a practical perspective, there is no alternative other than using a computer to simulate the system's micro-level behaviour and only in doing this can the emergent macro behaviour be observed. This computer simulation is used to crawl the micro-causal web (Bedau 2010: 58-9; 2010: 54-6).

Using Bedau's concept of crawling the micro-causal web involves the consequential theory approach of working forward in time, through the interactions of the parts at each step in the system's processing including the outcome of the previous step. The outcome of the previous step must be included in this evaluation because it is part of the context of the emergence. Therefore, the processes to be considered at each step include changes of state and location of the parts. This type of simulation is particularly long-winded because it involves each individual step. While it will always produce a result, it might be possible to achieve the same outcomes using a tool such as a mathematical formula to create a short-cut. Mathematical formula and the short-cuts the create are the main-stay of conventional scientific explanations (Bedau 2002: 15,42-3; 2010: 51-2,56-9; 2013).

The amount of simulation needed to derive an outcome indicates something about the system; the more simulation that is required to derive an outcome, the more emergent the outcome will be (Hovda 2008: 462).

Emergence in multimedia

The concept of emergence can be applied to properties, objects, phenomena, behaviour, laws, whole systems, and many other things (Bedau 2002: 7), and it has been applied to the message of a multimedia text in discussions of the emergence that can occur with the influence of music on images in advertising (Cook 1998). Cook states that contest may result in emergent properties where something new and unexpected occurs, but for this emergence to occur there must be a limited overlap of meaning between the conflicting media, and it is this partial overlap of meaning which allows one of the media to absorb the qualities of another and for emergence to occur (Cook 1998: 82-5,98-106). However, emergence can occur without a limited overlap such as when two very different media are combined and clash creating a surreal effect such as would occur if hip-hop music accompanied images of antiques.

The concept of emergence in multimedia is supported by music psychology research (Cohen 2000). It is also supported by cognitive psychology research on unitization. Unitization is the process that occurs when two or more items are experienced together. When unitization occurs, the brain processes the combinations of items differently to how it processes them individually. The separate items become associated and the result is the emergence of a new item; in addition, the recognition and familiarity of the individual items is reduced (Shao & Weng 2011: 316-7; Graf & Schacter 1989: 938-9). Unitization does not occur when individual items are experienced separately.

The message of a multimedia text is created by the unity of its subsystems rather than the meanings of the individual subsystems. According to the concept of unitization, multimedia always means some type of change to one or more subsystems, but different factors determine the level and type of change. Types of changes that can occur in multimedia include: a richer more entertaining message, emergence of a new meaning, a stronger or weaker version of the message, a change of emotional level, and surrealism. Given the effects

of unitization it might be claimed that all multimedia exhibit emergent behaviours, but this is not how emergence is commonly defined.

Emergence affects more than the single multimedia event it occurs in. Given that after unitization, the recognition and familiarity of the individual components is reduced, the effects of unitization can apply in subsequent multimedia events. When this concept is applied to a series of messages which are created event by event, it implies that in multimedia, once the individual media are experienced together as a multimedia whole, the individual meaning of each of the media is compromised in following multimedia events. In other words, if an image has one meaning with added music and a different meaning without it, once the image is experienced with the added music, it will change the meaning of the image so that if that same image is seen later, even without the music, the new meaning will persist. This is one of the ways that earlier messages influence later messages.

Characteristics of emergence in Multimedia

Multimedia, where emergence occurs, has many of the characteristics of complex emergent systems including non-linearity, broken symmetry and structural determination.

Non-linearity and broken symmetry in multimedia

A multimedia text is itself non-linear given that it is defined as a montage where subsystems are integrated to form a composition. In contrast, a video of a live situation such as an interview, which is essentially unedited, is not considered multimedia. In a montage, the interactions between the subsystems normally create a richer and more salient effect. In addition, non-linearity in multimedia occurs when a story can be accessed in a non-sequential manner, as is often offered on news websites with hyperlinks within the story to other parts of the same or another story.

Symmetry in multimedia occurs when the subsystems conform, as the term is defined by Cook (1998: 120). The symmetry is broken when there is conflict between the subsystems and when symmetry is broken, there is the potential for emergence. This is confirmed by

Cook who states that when there is a contest between sound and images, where there is a limited overlap of meaning between them, then there is the potential for the emergence of a new and unexpected meaning (Cook 1998: viii,82-86,98-106,113). However, even when there is no overlap of meaning a form of emergence can still occur with surrealism. Non-linearity, broken symmetry and the emergence they create, can be intentionally created in multimedia to make the message more entertaining. The issue is whether any emergence that does eventuate will unacceptably change the message.

Structural determination in multimedia

In multimedia, the emergence is similar to other types of systems in that the structure of the system is a primary consideration. Structure is primary because the connections between the parts are more important than the parts themselves and the meaning comes from the connections (Cilliers 1998: 11; 2007: 57; Bedau 2002: 14). This is also the case in autopoietic theory where the system is structure-specific as discussed in Chapter 5. In addition, the structural coupling of the autopoietic system to its medium means that while the medium does not directly determine the behaviour of the autopoietic system, it has a "predisposing influence upon it" (Fell & Russell 1994b: 229). Therefore, the meanings are structurally coupled to the subsystems and the meanings are determined by the structure of the subsystems within the multimedia whole because it is the structure which determines whether an intermedia perturbation will result in a change that can cause emergence.

The structure affects more than the immediate meaning. The media subsystems are independent parallel, micro-level parts, where each subsystem interacts with the others and even though each is independent, it is influenced by the other subsystems as well as the context created by the previous subsystems. In other words, each subsystem is sensitive to its environment, which includes the temporal environment (what comes before and after) and the immediate environment (the other subsystems active at the time).

In multimedia, this structure specific nature of the macro-level message is created by the state (active or inactive) and location (for example, foreground or background) of the media subsystems. For instance, in multimedia, if oral language in the form of a voice-over stops, its individual meaning will no longer be actively creating the message. Its influence will continue but only as part of the previous message. If the voice-over continues to be active but its vividness is reduced due to the addition of loud sound effects and fast movements, then the voice-over moves from the foreground to the background. When this move to the background occurs, the voice-over is still actively involved in creating the message but its influence is low because the loud sound effects and fast movements dominate the message.

Types of emergence in multimedia

A new and unexpected message only emerges in multimedia under certain conditions, and different types of emergence occur in different forms of multimedia. Emergence occurs along a continuum (Bedau 2013), and the continuum in multimedia ranges from no emergence (enrichment) through nominal emergence to weak emergence with murky areas at the crossover points. Only the first two of Bedau's classifications of emergence apply to multimedia, those of nominal and weak emergence. There are three forms of multimedia where the level of emergence is on a continuum starting from enrichment with no emergence through nominal emergence to weak emergence. There is no strong emergence in multimedia but there can be chaos. In addition, the hallmarks of emergence can be applied to multimedia given that Bedau states that these hallmarks are vague and can be met in many ways (Bedau 2002: 6).

Richness but no emergence in multimedia

Any type of difference between subsystems can generate intermedia perturbations but these intermedia perturbations do not necessarily result in emergence, particularly when the subsystems conform or are complementary. The interaction of multiple media can create richness where the meanings of the media are much the same. This richness can occur when

the subsystems conform or are complementary. When this richness occurs the outcome will result in changes in salience and changes in emotional levels, but no changes in meaning. These changes of salience and emotional levels are straightforward to predict because the macro is of the same kind as the micro. An example is a Christmas scene of children opening presents; including the song Jingle Bells adds richness and makes the scene more entertaining. The addition of Jingle Bells does not change the meaning, which is that Christmas is a happy celebration with gift giving and a focus on children. Another example is a news story about an accident fatality. A photograph of the accident will increase the drama and emotional level and a video of the accident would increase them further. Even so, the micro and the macro are of the same kind in that the meaning is not changed by the added visuals.

Nominal emergence in multimedia

Nominal emergence in multimedia occurs when, in a single multimedia event, the micro creates the macro but the macro is different from the micro. That is, where the meaning of the message is created by the subsystems but the message is different to the meaning of at least one of the subsystems. However, even though the macro is different from the micro, the emergence can be predicted from information about the subsystems (such as active/inactive and foreground/background) and knowledge of the starting point (the cultural codes and the context such as other news being broadcast). This is a simple form of emergence in a single multimedia event that can be easily predicted based on the prerequisite knowledge.

Emergence can result from a number of situations where intermedia perturbations are generated when there is a difference in kind between micro and macro which is not a difference of intensity, salience or emotional level but a difference of meaning. This difference may occur in only one of the subsystems but it must involve something new to be emergence.

The triggers for nominal emergence include intermedia perturbations generated by ambiguity and conflict. Both can result in the emergence of a new concept that can be predicted and explained. For example, a scene of people playing and relaxing on a beach normally suggests a relaxed, happy holiday. However, if the music of the thriller movie *Jaws* (1975) accompanied the images, there is a conflict between the music and images and a new and very different meaning for the beach scene will emerge. The meaning of the beach scene is no longer one of relaxation and playfulness but becomes ominous and foreboding.

Another type of emergence often used in movies is the conflict used to create surrealism. An example is Kubrick's *2001: A Space Odyssey*, where the classical waltz music *The Blue Danube* (1867) by Johann Strauss II accompanies the futuristic space travel environment. The combination of the classical waltz music with the futuristic images creates a surreal effect. The surreal effect does not occur if either the music or the images are experienced separately.

Synchronization can increase the salience at a particular time, focusing attention on whatever is happening at that time and creating emergence. However, this emergence may or may not be a result of conflict. If loud, dramatic chords are played in sync with images of crashing waves so that the particular chord sequence becomes associated with the waves, then this is synchresis. This special meaning, which is an emergent meaning created by the combination of sound and image, would not have occurred without the synchronization but there is no conflict involved.

Weak emergence in multimedia

Emergence in multimedia progresses from nominal to weak as the multimedia becomes more complex. Weak emergence occurs in multimedia when different forms of nominal emergence occur across multiple multimedia events, or when there are different forms of nominal emergence in a single multimedia event. With increased complexity, the emergence becomes incompressible so that determining the final message is complex. Robust weak

emergence occurs in multimedia with multiple occurrences of nominal emergence that fall

into repeating patterns. For instance, multiple occurrences of the same or similar negative

dissonant music accompanying positive statements will create a pattern of recurring

statements where the positive meaning of the statements is undermined by the music.

Chaos

Weak emergence is often described as being on the edge of chaos (Heylighen 2008: 4).

When complexity in multimedia is excessive, the emergence continuum extends to chaos

where the message disintegrates into meaninglessness due to the complexity of the media

relationships. This may be the aim when the multimedia is an art form but it should not occur

in news. Research shows that multimedia can cause irritation, and the reason is thought to be

information overload (Xu, Oh & Teo 2009: 154,171). The information overload is most likely

due to the high level of complexity in the multimedia as it approaches chaos.

Consequential theory and simulation in multimedia

Consequential theory can be applied to multimedia where each multimedia event is

determined according to the appropriate principles (audio-visual, power-dominance and

intermedia perturbation principles as described in previous chapters). In addition, each

multimedia event is an outcome of the events that preceded it, and at any point where there is

a change in a multimedia event, one set of possibilities (a specific message) is made concrete

while terminating the other possibilities (alternative messages) that were viable until that

point. Therefore, a particular message is a possibility which, when it occurs, makes possible

subsequent messages culminating in the final message. This is the process of messaging.

While predicting the message of an individual multimedia event with two subsystems

might not be overly difficult because it is nominal emergence and compressible, predicting

the final message, where there has been conflict and different messages in different

multimedia events, can only be done by crawling the micro-causal web, That is, by working

through the multimedia text on an event by event basis to determine the message of each

multimedia event or alternatively, working through the salient events, and then using the messages of the events to determine the final message.

In the early days of computing, when computers were extremely slow, limited and hugely expensive with few tools to assist programmers, it was common to do many activities manually that are done on the computer today. For instance, it was common to manually draw flow charts to check the logic of a software program and then manually, to work through these charts, tracing through the program's logic step-by-step to simulate the computer actions. This involved using actual data to check the entire logic flow through to the end of the program for that particular instance of data. The results were recorded manually using pen and paper often in a table or matrix. This tracing through the logic would expose any emergence that would occur when running the software, and emergence was normally an unexpected bug in the logic. This manual simulation process was often referred to as desk-checking.

Simulation of a complex system normally requires simplifying the system to the key aspects to be observed because programming all the components of systems such as a rain forest or an ocean would be close to impossible. Social systems are much the same, in that they have many components and high levels of complexity. Therefore, a simulation normally looks at a limited number of behaviours or activities. There are currently no computer simulations available for multimedia to determine the possible outcomes of combining media even though development of such simulators is feasible. However, multimedia is a digital system and it is likely that in the future, rather than software to run a simulation to determine whether any emergence is likely to occur, the software could run an analysis directly on the multimedia text.

Currently such software does not exist so determining the message and any emergence that might occur in multimedia requires a manual simulation. The person conducting the simulation must understand the structure-specific nature of the multimedia including the

relationships between the media and the patterns that create the message. In other words, understanding the messaging process is essential for determining the message.

Messaging

Complex systems "unfold in time" in that they have a history which "co-determines present behaviour and they anticipate the future"; but this behaviour is not symmetrical over time because complex systems have "a past and a future which are not interchangeable" (Cilliers 2007: 57). This unfolding over time occurs in multimedia with the process of messaging. Messaging was discussed in more detail in Chapter 5 and Chapter 6, but those aspects of messaging that relate to emergence are expanded here. In sum, messaging refers to the behaviour where the various meanings of the media act and interact to create the meaning of the message and this occurs event by event through to the final message. Messaging is not about semiotics but is similar to Maturana's languaging.

Languaging does not refer to the transmission of information but to the activity that comes from the coordinated actions of systems which are adapted to each other (Glasersfeld 1991). Languaging refers to the behavioural aspect of the autopoietic system, the "structured (patterned) flow" of behaviour and should not be regarded as "communicating or transmitting information using symbols" or as "representations of an independent reality" (Fell & Russell 1994a: 36; 1994b: 220). In other words, languaging is not a process of an interchange of words, but the interaction and interrelationship of actions, and it is this interaction and interrelationship of actions that creates the reality of the aggregated components. In the same way, messaging does not refer to the transmission of information but to the coordination of subsystems where each subsystem interacts with the others and the message is a framing of that reality. If the subsystems are not coordinated then messaging does not occur, and what should have been the message is chaotic and meaningless.

Messaging involves both linear and non-linear processes. The process of one message following another message in a series is linear and the influence of one message on the next

message is linear. However, the creation of each individual message is a non-linear process which involves the interaction and interrelationships of the active subsystems that create that message. Therefore, the message is created within two types of context: the before-after (linear) context and the interrelationships (non-linear) context and its non-linear processing increases its complexity.

Emergence can be an outcome of messaging and each message in a series of messages in a multimedia text has the potential for emergence to occur. Figure 8-1 shows a series of multimedia events. The three upward arrows represent the three groups of media (language, image and sound). Each event has its own message and one event has a message with emergent properties. The final message is created by the influences over time of the meanings of all the subsystems which have been active over the life of the multimedia system including those where emergence has occurred.
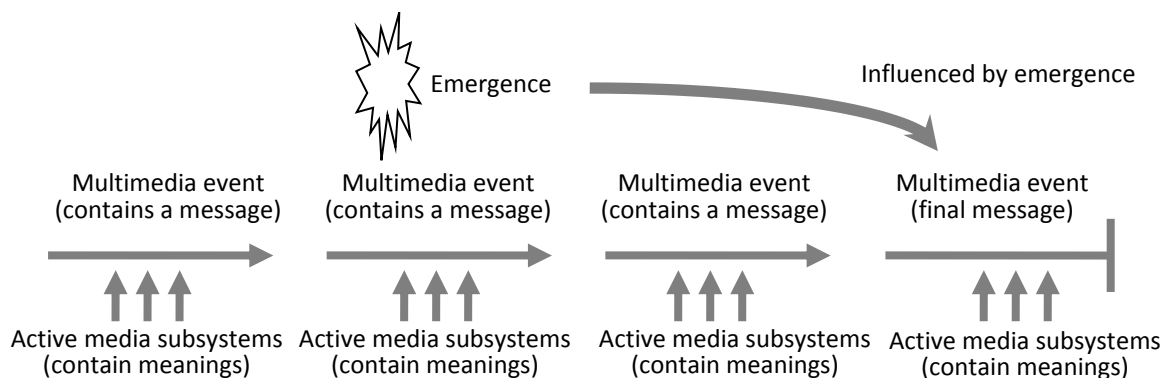
Figure 8-1 Nominal emergence occurring in a single multimedia event

Messaging and the proposed theory of multimedia are very different to communication theory and this can be seen in the viewer comments on the *Catalyst Chiropractors* episode discussed in Chapter 2. While there was general consensus that the message was that chiropractic was not a safe and useful form of health care, the reactions to this message covered a wide spectrum. While many comments stated that the episode was extremely biased, there were other comments stating the opposite such as it was a "rational, factual evaluation" (ABC 2013a). Messaging and the proposed theory do not predict audience

responses, such as whether the message is accurate or not; they predict meaning and

emotional level.

Crawling multimedia's micro-causal web

Crawling multimedia's micro-causal web involves conducting a manual simulation of

the messaging process. This manual method can be done on an event by event basis recording

the message of each multimedia event and any emergence that has been exposed. The analysis

can be done on every event or alternatively on only the salient events. The active media and

how they interact are evaluated in each multimedia event and a prediction of the message for

each event is made based on all the factors involved including the rules of autopoiesis,

complexity science, differentiation, and the meaning of the previous message. This crawling

though the multimedia micro-causal web can be conducted using the proposed model of

multimedia described in the following chapter.

Concluding remarks

Bedau's classifications and hallmarks of emergence offer a way of understanding

emergence in multimedia. In addition, his concept of crawling the micro-causal web can be

applied to multimedia and provides a method of predicting the emergence that can occur in a

multimedia text.

Part III Message, Meaning & Modelling

Chapter 9   Mediation in Multimedia

Introduction

The aim of this chapter is to describe the concept of mediation as it is used in discussions of media and to describe the mediation process as it applies to the multimedia message. Mediation here refers to the process of intervention or intercession where the meanings carried by the content of media are changed by that media. That is, it refers to the mediation that is created by the multimedia as a medium as opposed to the meaning created by the content of the multimedia.

The words medium, media and message all have multiple meanings making the discussions in this chapter somewhat complex. The term "medium" and its plural "media" have different meanings in different contexts including something intermediate, a data device, an environment, a method of mass communication, and even art materials. As well as referring to mass media such as newspapers or television, the term "media" can also refer to the components of the newspaper story such as photos and written text, or it can refer to a television program composed of language, sound effects and images even though these components are also referred to as media. Another issues is that the medium is a "vague middle ground between materials and the things people do with them" and the vagueness of the concept of media is a major stumbling block in media studies (Mitchell 2008:4)

The word "mediums" is commonly used in physics and chemistry, and is sometimes used by academics as a plural instead of "media" due to the confusion caused by the multiple meanings of "media". In this chapter, the word "medium" refers to the carrier of content.

Until now, most of the references to "message" have been to the news message. For example, the message of a news bulletin might be that the war in the Middle East is being won by the insurgents. The message that McLuhan refers to in his medium-is-the-message is very different. For instance, McLuhan states that the message of lighting systems is the movement of information, the message of print and typography is repeatability and the

message of clothing is a statement of political or personal views or of circumstances (McLuhan 1994:8,119-22). In this chapter, the word message, if used for a news story will be qualified as "news message" even though this type of message has broader scope than only news. The word "message" when used alone represents McLuhan's use of the term. While both types of messages are different they are not independent.

Mediation in multimedia

Western culture seeks to increase its reliance on media while at the same time erasing all traces of mediation (Bolter & Crusin 1999: 5), but erasing mediation is a dubious activity given that to understand how media manipulates us it is necessary to be aware that media does manipulate us. This erasing of the traces of mediation is made easier with multimedia because as McLuhan states, mediation in media is subliminal and, in addition, new technology introduces a "new scale" of consequences from the medium that carries the message (McLuhan 1994: 7,20,209,299,329). With multimedia, part of this new scale of consequences is the activation of more regions in the brain due to multiple media occurring at more or less the same time. This is suggested by neurological experiments where the brain regions that mediate emotions are more active when processing combinations of music and image than when processing either the music or moving image individually (Eldar, Ganor, Admon, Bleich & Hendler 2007: 2828). In other words, multimedia will create a more emotional experience than a single subsystem, such as music or image if each were experienced alone. Therefore, part of the mediation process is that multimedia mediates the emotional level of the message which invariably means an increase in the emotional level. In addition, multimedia will take more attentional resources so may act as a distractor.

The result of this additional stimulation is, that with multimedia, it is easier to erase the evidence of the mediation process because more stimulation normally means more emotion and more immersion or involvement. Such emotional stimulation is not necessarily positive in the context of factual information even though increasing emotional level of audiences does

seem to be an aim of news organisations, particularly with their use of conflict in news stories. Therefore, mediation can have negative as well as positive consequences because a medium "excludes as well as includes, distorts as well as clarifies, conceals as well as reveals, denies as well as affirms, destroys as well as creates" (Chandler 1995). This is an additional reason to understand mediation in multimedia more than in other forms of media such as hardcopy newspapers where mediation is more limited and more obvious.

Medium as the message

The statement "the medium is the message" is a focus on the mediation process rather than the medium (Strate 2010:31) and McLuhan could more accurately, although less flamboyantly, have stated "the medium mediates the message". While the-medium-is-the-message is a well worn phrase there is sometimes confusion about its meaning. This confusion has the same origins as the controversy that occurred in the 1960s over McLuhan and his theories. McLuhan's work was controversial given that some people adamantly supported it, while others claimed it was based on a distortion of facts, and in part this controversy occurred because McLuhan "delighted in [...] contradicting common sense without bothering to explain or debate" (Wolfe 2005:xv,xx-xxiii). Even though McLuhan's flamboyant and imprecise language attracted much criticism that was to some extent justified, it should not detract from the accuracy of his claims including that he accurately predicted the Internet and the Web.

The medium-as-message is part of medium theory and is a technological deterministic approach. As Potts states, medium theory focuses on the characteristics of each medium and its technology, emphasising the impact of technology on culture. Therefore, it would be more precisely referred to as media-technologies-effects theory. The concept from medium theory, that the effects of media on culture and society are the most significant of all influences, and these effects are from the inherent characteristics of the media, has created much scepticism. This scepticism has occurred even though the power of media, particularly the Internet, is

continually acknowledged by many and various sources. Such comments suggest that medium theory should be reconsidered. This reconsideration should be from the perspective that a theoretical model addressing the media-technologies-effects should take into account both the properties of the technologies and the social context they operate within (Potts 2008). Such a position, that both the effects of media technologies and the social context they operate within (automatically taken into account when meeting the requirements of a target audience), appears essential for understanding the process of the medium-as-message in multimedia.

McLuhan's media theory makes more sense when "reconfigured for the digital age", but even so, many of his statements should be taken as metaphors because they express general concepts and often cannot be applied literally (Levinson 1999: 5-9,26-7,40,43). This frequently applies to the medium-as-message, which normally cannot be literally applied but there are situations when the medium quite literally is the message, as can occur with music (discussed below). The medium-as-message is not a simple concept and McLuhan always hesitated to explain it; however, he did explain that it is not a communication theory because a communication theory is about transportation of data with minimal distortion whereas the-medium-is-the-message is about how data is transformed by its medium (McLuhan 2005: 230,242). More precisely, communication theory is about transmission of data from one place to another so that the data arrives exactly as it was when it was dispatched; it is not about understanding semantics (Shannon 1948; Glasersfeld 1996) and this was discussed in Chapter 3.

McLuhan's medium-as-message is a focus on the "noise" created by the medium and McLuhan specifically stated that his "medium" is Shannon's "noise" (Krapp 2014: 65). For Shannon, any effect from the medium is noise to be eliminated and he provides a theorem for a noiseless channel (Shannon 1948).

Shannon's theory is the antithesis of the-medium-is-the-message and cannot be applied to any situation where the effect of the medium cannot be completely eliminated. The medium or noise is vital in the arts and it would be nonsense to approach art as content (McLuhan 1994: 242).The response of an audience to a concert of a Mozart symphony is unlikely to be positive if there was no orchestra but instead, scores of the music were handed out and the conductor talked the audience through the printed copies explaining the notation and his musical interpretation. It seems doubtful that the conductor's final bow would receive enthusiastic applause.

The concept of the medium-as-message highlights the differences between the different forms of media and their different effects on content as occurs with music but also with the difference between reading and listening to literature. For instance, there is little prose that can be read aloud and be convincing (McLuhan 2005: 162). In essence, the-meaning-is-the-message means that we should not focus on the content without considering the medium (Levinson 1999: 35-7).

In other words, we need to examine the medium as a whole because the way the medium presents the content is as crucial as the content itself. The presentation or medium, as in the case of music, can be more important than the content. This concept is as important a consideration for the Internet and Web as any other medium.

Even though Levinson's comment that the-medium-is-the message means that we should focus on both the medium and the content, it could be claimed that McLuhan's phrase can now be taken literally given the process of self-assembly, also called 4-D printing. Self-Assembly is "a process by which disordered parts build an ordered structure through local interaction" (Self-Assembly Lab 2014). In other words, the properties of a material can adjust to changes in the environment. In self-assembly, the fourth dimension is time and the medium literally is the message because the object, which is also the medium, reshapes itself over time with no external force involved (Tibbits 2013). An example is a water pipe that self-adjusts its

size to fit the water flow (Self-Assembly Lab 2014). It is likely that not even McLuhan could have foreseen that his prediction would become more pertinent as time progressed.

Media as extensions of human abilities

The medium-as-message has a wider application than may initially be apparent. McLuhan refers to technology as an "extension of man" (McLuhan 1994: 3-4) and each extension, each technological tool, can be a medium with a message that mediates content. However, the concept of extensions-of-man is sometimes misunderstood and misinterpreted. This misunderstanding is typical of much of McLuhan's work which is more complex than is normally represented (Uricchio 2014: 105). Regrettably, McLuhan's throw away lines are often misinterpreted and sometimes dismissed as superficial and exaggerations. The dangers of dismissing McLuhan are shown by Hansen's statement that "[f]ar from living out the global embrace gleefully envisioned by Marshall McLuhan, then, we face a situation in which the prostheses we adopt to cognize and intervene in the technologically driven material complexification of the universe only seem to expand our experiential alienation" (Hansen 2000: 71).

Hansen disputes McLuhan's positive views of technology with two claims. The first claim is that the technological tools that we adopt, referred to by McLuhan as extensions, only increase our experience of alienation to our technological environment, and/or that we are further alienated from our human experience and connection. The second claim is that McLuhan's optimistic predictions of the future, where technology would provide extensions of our abilities which would be enthusiastically taken up worldwide, will not occur. However, Hansen's statements can be easily disputed. His view is especially likely to be rejected by the over thirteen thousand million Facebook users, and the billion plus unique users who visit YouTube each month, who watch over six billion hours of video, and who upload over 100 hours of new videos every minute (Statista 2014; YouTube 2014) with these figures growing by the minute. These websites have provided extensions to our lives that

many now consider as indispensible and that many people rely on to maintain their connection with distant friends and relatives.

An additional problem with interpretation of McLuhan's work is that some of these interpretations are poorly thought out. The use of the term "prosthetic" by many, including Hansen, to describe McLuhan's "extensions of man" is an example of poor interpretation because a prosthetic is a device used to replace something that was in place initially but is now missing or defective due to damage. While the original Greek meaning of "pros" is "to, towards, with" and "thesis" is "to place" which is an addition, the common understanding and the dictionary meaning of a prosthesis is not to extend the original abilities but to replace something damaged. This is not what McLuhan was suggesting. McLuhan did state that while on the telephone a person does not have a body and is a "disincarnate being" and these same extensions can be a "self amputation" (McLuhan 1994: 42; 2005: 268). In other words, from the perspective of the other person on the telephone line, a person is a voice extended by the telephone but the other senses are missing and in using the telephone we accept this loss of the other senses. However, these do not involve a prosthesis and are references to the ratio of the senses (to be discussed).

The "extensions" McLuhan discusses were not originally part of man or society and he is not suggesting that man was defective before them. These extensions are tools and machines that provide additional abilities rather than replace defective abilities. This can be seen in McLuhan's statement "[a]s contrasted with the mere tool, the machine is an extension or outering of a process. The tool extends the fist, the nails, the teeth, the arm" (McLuhan 1994: 152). In addition, he said the "extension" is a "translation" stating that "media are extensions of ourselves, or translations of some part of us into various materials" (McLuhan 1994: 139).

User interfaces as extensions

Translation is a key concept in the medium-as-message because "[a]ll media are active metaphors in their power to translate experience into new forms (McLuhan 1994: 57) and as new forms they become extensions of man. For the Web, these extensions of man are the user interfaces. Different types of user interface are needed by different types of devices. For instance, the very different requirements for the interfaces of television and computers are highlighted by the terms "viewer" and "user". For television, the interface is normally a simple hand-held control, although video recorders are more complex. A computer user interface is complex and often referred to as a GUI (graphical user interface) because it normally contains graphics such as icons, but a user interface is more than software; it is an entire system created by hardware, software and firmware which works together to make the device quicker to learn and easier to use.

User interface systems require a method of input and output and these are normally a display screen and a keypad with mouse or touchpad. In addition, a user interface normally includes a desktop, icons and windows which display on the screen and can be controlled through the keyboard, mouse or touchpad. Colours also play an important part, such as red for error or green to proceed. An example of a user interface in an application is the top of the window of MS Word, which is packed with symbols. The user interface plays a large part in creating the message of new media in that it mediates the message of the content. For instance, if the user interface is difficult to use, the message is that the online content and services are not interactive.

Figure 9-1 shows that access to the Internet and Web is always through an interface. For many, particularly older users, the interface can initially be extremely difficult to use but once users become familiar with the technology, the interface becomes transparent.
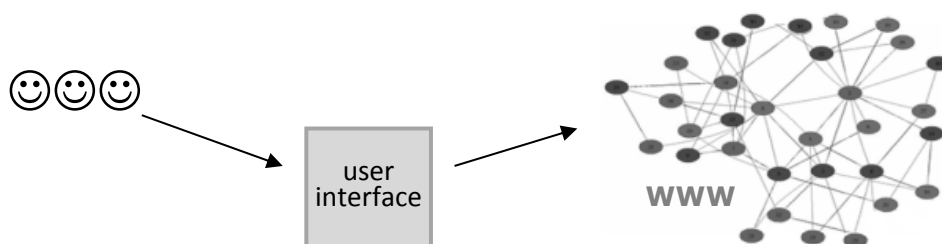
Figure 9-1 Interface between user and the Web

Final extension: Web storage, recording and access

McLuhan was utopian in his predictions (Marchessault 2014: 83) and not least when he stated "[r]apidly, we approach the final phase of the extensions of man–the technological simulation of consciousness, when the creative process of knowing will be collectively and corporately extended to the whole of human society" (McLuhan 1994: 3). This prediction describes the vast "library" of information stored on the Web that is now available to everyone everywhere who has Internet access. Oddly, Hansen seems to ignore this information storage and access as a primary function of the Web. He states there has been "a shift in orientation and function of media, it no longer primarily functions as and through the operations of recording, storage and transmission of past experience the way that photography did, the way that cinema did, and there obviously are exceptions […] but rather media today functions as a platform for immediate action, facilitating interconnection with, and feedback from, the environment" (Hansen 2011: 4'12-4'42)

It is true that the Internet does function as an immediate action platform but it is not the only primary function. The recording, storage and transmission of information, including that of past experience, are more important for the Web than most other media. It was estimated in July 2014 there were 3.32 billion webpages (Kunder 2014) and more data is stored every moment. While immediacy is a major characteristic of the Web so is storage of information and it is only possible to have immediate access to information through storage. It could be claimed that without recording and storage of information, much of the immediacy that the

Internet provides would be useless. For instance, before video recorders were available, a television viewer had no choice but to view a program when it was broadcast or miss seeing it. The Web has built in recording and storage in that its information sits there 24/7 waiting, at the convenience of the user. Even emails, an almost instant form of communication, sit in storage waiting until the receiver is ready to read them.

McLuhan foresaw the use of computers for recording, storage and retrieval of information when he challenged the statement of the French symbolist poet, Stéphane Mallarmé that "the world exists to end in a book". McLuhan stated that we can now "transfer the entire show to the memory of a computer" (McLuhan 1994: 59). This transfer of all information to the Web is now occurring with cloud storage, but real clouds are fragile and technology clouds are not so different. With the use of a cloud for storage the possibility is present that with a widespread disaster, or aggressive hacking, the information could disperse into nothingness. While adequate backup and security systems should in theory prevent this, they have a history of failing. The more advanced the technology, the more reliant it becomes on its environment. Even so, we are on the verge of transferring the entire show to computers and more and more information is available only through the Web.

Much of the immediacy on the Web is only possible because of storage and therefore immediacy is only part of the primary function. The primary characteristic of the Internet and the Web is interactivity, and immediacy is only one part of interactivity. While interpersonal interactivity is about transmission of information, content interactivity must include access to information and so recording and storage are critical.

Sensory information and the ratio between the senses

When considering how media mediate the message we need to establish which media are actively doing the mediation and to what extent. This is necessary because as McLuhan states, the ratio of the senses involved at any time changes with "self-amputation" from the continual interplay between the senses even from moment to moment, where one sense limits

another (McLuhan 1994: 42; 2005: 268). This limitation can be temporary or of a more profound basis because when a new medium such as the Internet becomes established it changes the interplay between the senses more dramatically and more permanently. In McLuhan's own words, we adapt to a situation using a particular ratio of our senses and this ratio changes "to accommodate the impact of the invading culture" (McLuhan 1994: 47).

The ratio of the senses also applies to the internal environment of multimedia. For instance, McLuhan refers to the intensification of a sense by a new medium such as television that can "hypnotize an entire community" (McLuhan 1994: 112). A similar type of intensification of a sense can occur with the subsystems of multimedia and this intensification can be measured as the level of vividness, as discussed in Chapter 11. For instance, when colour television became available it intensified the image subsystem in the audio-visual relationship.

This concept of ratio of the senses is confirmed and taken further by psychology research which shows that perception is not a fixed concept but is regulated by our external and internal environments. Our understanding of our environment is based on how all our senses actively work in their perception of that environment, because perception is not a fixed concept but is modulated by sensory information from the environment combined with internal influences such as experiences and associations (Newell 2004: 135).

In addition, increasing amounts of evidence from psychology research show that instead of one sensory modality occurring at a time, the brain has "multisensory organisation" where all or many senses are involved; this has three possible outcomes: dominance of one sense over another, concatenation of senses, or emergence where something new results (Howes 2011: 162-3). An example of multiple senses involved in what seems a single sense occurs in a noisy environment where understanding of a conversation is improved by the ability to see the speaker. In a noisy environment, vision takes a more dominant role in perceiving language

than in a quiet environment. Therefore, the ratio of influence of each sense in determining the message depends on the environment as we perceive it.

Many people are to some extent bedazzled by technology and its rate of change. Some see the interactivity of digital devices as providing more information to the senses than is provided directly by experiencing the environment. For instance, Hansen claims that because "digital devices are always on and constantly sensing", [they provide] "massive amounts of behavioral and environmental data without any active involvement" and this "[y]ields a massive expanded production of sensibility or worldly sensation" (Hansen 2011: overhead slide at 7'36). However, this is only true from a specific perspective. There is a massive reduction in the use of our senses when operating digital devices compared to doing many everyday activities. An example of McLuhan's self-amputation is the reduction in the sense of proprioception when the activity of walking is compared to using an iPhone or tablet. When we walk almost all of our body and senses participate, whereas controlling a keypad and viewing a display involves the movement of a few fingers and limited visual activities.

Today, it is the array of user interfaces – these many and varied extensions – that provide access to the information stored on the Web and which mediate that information and the way we communicate with the world at large.

Mediation

Mediation and Environments

Mediation and the environment are intrinsically linked but this is not a new concept. However, Hansen states that he came up with the concept of "atmospheric media where media rather than impacting us as media objects [...] impacts the environments in which we are ourselves are implicated; so it's not a subject-object relationship, its rather a relationship of immanence [...] in which we are compositions of atoms of sensibility of mediated forces in the environment, mediated sensibilities in the environment" (Hansen 2011: 6'36 -7'09).

McLuhan explained this concept in 1974 in his lecture *Living at the Speed of Light* when he stated that one of the meanings of the medium-as-message is that there is a hidden environment of services created by innovation, and it is this hidden environment that changes people (McLuhan 2005: 242). In other words, it is not the technology but the environment it creates that changes people. This social change created by a new environment can be seen with Facebook. Facebook has created an environment that has dramatically changed personal communication. For millions of people, this environment provides for recording, storage and access to media via multiple types of communication processes more or less simultaneously.

Media are environments (McLuhan 1970: 11) and complexity science, autopoietic theory, systems theory and McLuhan's media theory all recognise the importance of environments. McLuhan uses the terms "figure" and "ground" to represent "system" and "environment" (Logan 2013: 28-29). In addition, he specifically states that the "environment is an active process pervading and impinging upon all the components of the situation" (McLuhan 1966: 1). In other words, an environment is not merely a receptacle of content but an active process that changes content and reality. McLuhan believed that the environment is the context and from this context the meaning of the system emerges. In addition, he made the observation that new technology creates new environments and new environments are invisible until they have been superseded. This means that changes in the environment occur before they occur in the system and we are not aware of the impact of those changes (McLuhan 1994: 20,209,299,329,352; Logan 2013: 28-9,32).

The subliminal nature of the environment to some extent explains why the music industry, with its vast resources, neither anticipated nor later recognised the facilities and opportunities offered by the Web for music, and had to be dragged kicking and screaming into the age of downloads. McLuhan described this situation precisely when he stated in 1966 that the "typical response to a disrupting new technology is to recreate the old environment instead of heeding the new opportunities of the new environment" and the "[f]ailure to notice

the new opportunities is also failure to understand the new powers" (McLuhan: 1966: 86). Had the music industry set up its own download system when Napster (the peer-to-peer Internet file sharing service that allowed illegal sharing of audio files) first appeared it would have been making billions instead of conducting court cases. These legal proceedings to stop downloads disenfranchised customers and many musicians. The success of Apple's iTunes confirms that people are willing to pay for downloads provided the process meets their needs, is easy, convenient, and appropriately priced.

Different media environments create different effects. An example of the effect of different environments is the comparison of printed newspapers to news on a computer screen. Written language in a newspaper is very different to that displayed on a computer screen even if the words are the same because of hyperlinks and the physical presentation. This has been recognised for a very long time, as seen in the 1993 statement that the computer screen "makes text into a painting, frames it in a new way, asks for a new act of attention–and smiles at the seriousness that the text calls forth from us" (Lanham 1993: 37).

Transfer of digital content between media platforms

A very different view of environments claims that the "digitalisation of information effectively produces liquid content that can flow across different digital media platforms, unlike traditional media, where content was constrained within a single medium format" (Goneos-Malka, Grobler & Strasheim 2013: 124). A similar concept is the belief that if data is reduced "to one standardized digital series of numbers, any medium can be translated into another" (Kittler, von Mücke & Similon 1987: 102), and that there has been "a move from medium-specific content toward content that flows across multiple media channels (Jenkins 2006: 243). These statements suggest that the digital era means that information transfers easily from one medium to another because it is coded in a way that can be interpreted by multiple media. However, such thinking is contrary to McLuhan's medium-is-the-message.

While this transfer of content appears to be supported by another of McLuhan's concepts, that of one medium always being the content of another, such as his explanation that a movie has a novel as content (McLuhan 1994: 18), this is an example of a simplified interpretation of a complex concept. He does not mean that the content is exactly the same in new media or that it has the same message. His statement is clarified by the explanation that when one medium becomes the content of another, the "hybrid or the meeting of two media is a moment of truth and revelation from which new form is born" (McLuhan 1994: 55). The process occurs in two stages. The first stage is the use of the content of one medium in another. The second stage is the adaptation of that content for the new medium. For radio, the first stage was when the novel was read over the radio. The second stage was when it was refined to create a hybrid of the two media and the new form was a radio play. An example of a hybrid is the adaptation for radio of Orson Welles' novel *The War of the Worlds* into a simulated news broadcast. For television, the first stage was televising a play as it would be performed in a theatre. The second stage was when the play was rewritten as a telemovie and shot in various locations. The telemovie is the hybrid.

The ability to transfer information between media that digital encoding can provide is seen by many as beneficial but it can create more problems than it solves. The belief that digital data is easily translated from one medium to another (Kittler, von Mücke & Similon 1987: 102) is not necessarily correct. Reducing data to a digital format does not always mean it can be easily translated from one medium to another where technology is involved because such a belief entails discarding the concept of the-medium-is-the-message. The transfer of digital data can be problematical due to incompatibilities between different brands and types of hardware and different brands and versions of software. It could be claimed that the concept of the-medium-is-the-message has been extended by new media. While it seems likely that at some time in the future a single file will be readable by all types of new media, such a capability is not yet available.

An example of incompatibility is data archived on magnetic tape and floppy disk which can no longer be read unless the drive was stored along with the tapes and disks. Not only does the drive need to be archived, the software also needs to be archived and new software needs to be developed to act as the interface between the old hardware and software, the new hardware, and the user. For instance, originally files could not be easily copied between Apple computers and PCs; both were digital but incompatible. It was only when software was developed to provide compatibility that file transfer became possible. Design standards help to reduce incompatibilities but they also limit innovation. Data only flows between media when compatibility of software and hardware enable it to flow. The specially written software program, combined with the appropriate hardware connectors, and design standards, remove the medium from the message. Digital content must be continually transferred as each new medium becomes available while conversion software and hardware are current otherwise the content will be lost. The ancient stone tablet with chiselled letters will remain intact and legible long after tapes, discs, USBs and other new media have been consigned to the trash bin.

In addition, thinking that entertainment content is easily translated into another medium indicates poor understanding of content production, broadcasting and viewing. Any film director will be able to discuss the problems of producing content for multiple platforms such as cinema and television. Cinema and television are very different media. Even though they are both audio-visual and both may present the same text such as a movie, the medium changes the output. For instance, the disrupting advertisement breaks in a telemovie are placed at points of high interest to entice the viewer to continue watching (Mundorf, Drew, Zillmann & Weaver 1990: 603). Therefore, for telemovies high interest points are created at pre specified intervals. In addition, a film such as the classic masterpiece *Lawrence of Arabia* (1962) with its extensive use of panoramic shots of desert scapes makes for a very different

viewing experience on television to cinema. Even so, when movies are shown on television the effects created by the television as the medium go unnoticed (McLuhan 1966: 2).

Cinematography created for a particular screen size is only one aspect of these differences. Television is "a kind of happening" that is a "live vortex in action" (McLuhan 2005: 163), at least with shows that appear to be live productions. Shows that display texting from viewers are an even better example of a happening and while reality television is popular, reality cinema seems unlikely even though live performances of the New York Metropolitan Opera are currently recorded and shown at cinemas. This understanding of a "happening" is, at least in part, recognition by McLuhan of the increased brain activity that occurs with multimedia described by Eldar and associates (2007: 2828) as stated earlier.

Information may appear to flow from one medium to another but it does not. The concept of flow implies that the medium is not part of the message, and this is not so unless software removes the medium from the message. For instance, information designed for a computer desktop screen, and even a laptop screen, does not flow onto an iPod; it overflows due to the different screen sizes. While the medium-as-message alludes to far more subtle problems, as well as highlighting gross ones such as screen size, it is probable that with digital media, the gross problems will be more complex to solve. At the moment, the Google search engine home page has catered to hand-held devices at the expense of desktop users with its app launcher program which only initially displays nine icons and requires additional clicks to see more. This is appropriate for a small mobile device but not for the large screen of a desktop user. To solve this problem, the Google software must first identify the device it is being displayed on and then use a different format for different devices.

The impact of the medium can be seen with television news. Television has profoundly changed news, and television news is very different to radio, not only because moving images were added but because of the way it presents serious news. Television presents serious news including wars and natural disasters in a tabloid format (Thussu 2007: 7-11,111-3). In

television news, emotional content is given priority over accuracy of information (Meyrowitz 1985: 103-6). This can be effectively done because, as previously stated, television is a medium that allows higher levels of emotion than a newspaper or radio, given that the regions of the brain that process emotions are more active when they process multimedia than when processing either sound or image individually (Eldar et al. 2007: 2828), as stated previously. We do not notice that television is presenting news in a tabloid format because, as Luhmann states, when compared to other forms of media such as advertising and entertainment, news appears factual (Luhmann 2000: 1,23-41,63-4).

The medium as an environment always has an impact and multimedia has multiple environments and multiple types of environments.

Concluding remarks

The observation that the medium is the message is just as relevant for multimedia as it is for the media McLuhan discussed, if not more so. The message of multimedia is construction or fabrication, emotion and stimulation. The temptation to construct emotional and stimulating multimedia is likely to lead to over enthusiastic and inappropriate use of additional media, resulting in confusion and irritation. Further, the use of additional media can result in the emergence of a new, unexpected and unintentional meaning. If these problems are not to dominate multimedia news, and if additional subsystems are not to create a meaning that is not in the original message, the mediation of the medium on the content must be taken into account.

Chapter 10 Association, Accents & Meaning

Introduction

The aim of this chapter is to describe the physical and corresponding conceptual configuration of a multimedia text that determines the relationships between subsystems, and the two different types of relationships between its subsystems that create the expressive meaning: association and accents. A multimedia text operates at both a physical and a conceptual level. The physical is what is seen and heard, while the conceptual is the meaning of what is seen and heard. On the physical level the multimedia text is a system composed of subsystems, such as language, music and images. The conceptual counterpart is the meaning of the multimedia news message, and the meanings of the subsystems. The expressive meaning is created by two types of relationships within a multimedia text. This expressive meaning is more than, and possibly different to, the common dictionary meaning and includes an emotional component. The expressive meaning is formed by associations and accents. The relationships between the subsystems for both associations and accents can be in different states. These states are: conforming, complementary, compatible and contest. These different states, their sub-states and how they apply to association and accents are explained later in the chapter.

The multimedia configuration

Drawing on Luhmann's systems theory, discussed in Chapter 6, a multimedia text has been defined as a function system composed of subsystems that are also function systems. Each subsystem has a specific function that can and should be identified as distinct from the other subsystems because each has its own unique qualities. These qualities allow the subsystem to perform a specific function which is to express meaning in its own way. Each subsystem and its function must be identified, so that each media with a different function is categorised as a different subsystem, as was described briefly in Chapter 6. This is done so

each subsystem can be evaluated both separately and in combination with the other subsystems.

In film, the different media that compose the film are referred to as channels. Channels in film are similar to subsystems in multimedia. In film, normally five channels of information are referred to and these are: image, speech, music, noise and written material (Green 2010:81). This categorisation is inadequate for a multimedia text, which can be composed of more subsystems than might initially be apparent. In a multimedia text, there can be various combinations and permeations of subsystems, each with their own specific function, so that the breakdown into which subsystems are appropriate for analysis is a judgment that must be made for each multimedia text. Therefore, two multimedia systems composed of the same media could be categorised as having different subsystems.

A subsystem that may or may not be identified is silence. If silence creates emphasis it should be evaluated in its own right because it is being used as a type of sound effect. Chion refers to a similar concept when he states that audiences "can appreciate spare images and rare or nonexistent sounds in a film", and it is necessary to consider a dimension that is "beyond sound and image" such as the ability of one sense to create another sense through immersion, as with a film creating the feeling of the wind (Chion 2013b: 327-9; 1994:137). While such influences might be evaluated as subsystems in multimedia, the concept is not discussed here.

If speech is stripped of its conceptual meaning, it becomes a sound effect, and even though sound is capable of expressiveness, it is very different to language. Therefore, if language is in the background and cannot be understood or if it is in a language the audience is not familiar with, then it should be treated as a sound effect. In addition, it is important to recognise that written language is very different from oral language and the importance of written language in today's films has not been sufficiently emphasised (Chion 2013a: 79).

As stated in earlier chapters, a useful categorisation of subsystems is: oral language, written language, music, sound effects, silence (if silence is used to create an effect), video images, animations, photographs and graphics (still images such as charts, designs, maps and diagrams). Alternatively, visuals could be categorised as only moving images or still images. There are important differences between moving and still images, but these are not discussed here. The choice of subsystems for the purposes of analysis depends on the purpose and content of the multimedia text. The film theory concept of five channels of information, image, speech, music, noise and written material (Green 2010:81) could be used but there will be occasions when silence and the differences between moving images versus still images should be considered in multimedia text analysis.

Figure 10-1 shows a possible configuration of a multimedia text with a total of nine possible subsystems, each with a different function.
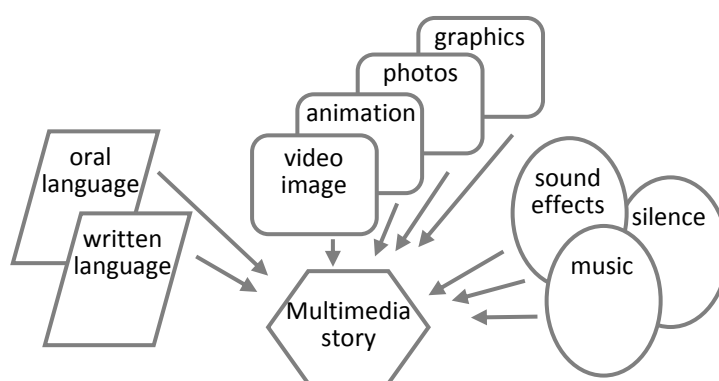
Figure 10-1 A common multimedia categorisation

Subsystems start and stop depending on the story so that even though a particular configuration might consist of nine subsystems as shown in the figure above, the active subsystems (the media active at one particular time) will normally be less. For instance, silence and speech cannot occur at the same time, so both cannot be active at exactly the same time. However, silence before a word can create an effect of emphasis on that word.

Elements that compose the subsystems

Media are composed of elements and each subsystem has its own specific elements. For instance, the elements of music are commonly stated as pitch, tempo, rhythm, melody, timbre and dynamics. The elements of a still image are commonly stated as line, shape, colour, form, texture, tone/light-shade, direction and space/size-mass. Video images have the additional element of movement. The number of elements is different for different types of subsystems and can vary within a subsystem, and not all elements are present in all subsystems of a particular type. For instance, colour is normally an element of image but it is not an element of a black and white photograph.

Figure 10-2 shows that a multimedia text is a system, composed of multiple media which are subsystems, and each subsystem is composed of multiple elements. These are the physical components.
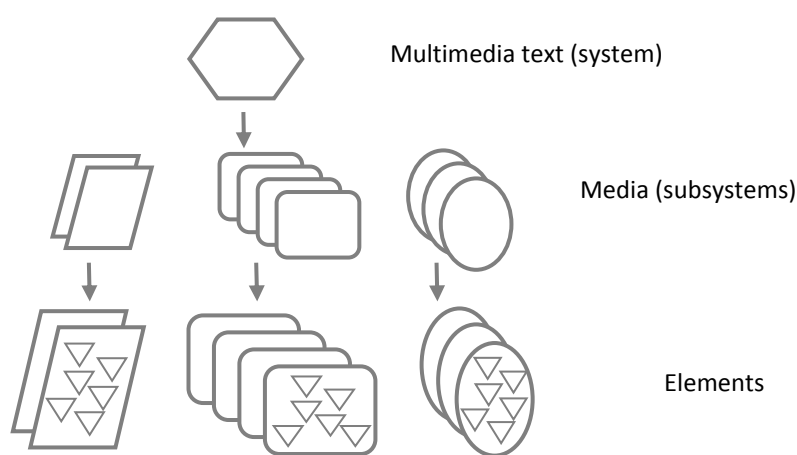
Figure 10-2 Breakdown of multimedia

Relationships and how they form the news message

Intermedial relationships are crucial in a multimedia text because the news message of a multimedia text is created by the dancing landscape within multimedia, where the interaction of meanings of the subsystems creates message after message on an ongoing basis. Each subsystem is composed of elements but the elements have properties that are only partial meanings. An element cannot exist independently and exists only as part of a subsystem. In

the same way a partial meaning cannot exist independently and exists as part of a meaning. For instance, in music, a fast tempo is a partial meaning because it could mean happiness, excitement or fear. It is the combination of tempo with other elements that determines which partial meaning is applicable.

Figure 10-3 shows that in a multimedia event (a single instance of the news message), partial meanings combine to create the meaning of a subsystem and the meanings of the subsystems interact to create the news message. Partial meanings, meanings and the news message are conceptual as opposed to the physical media that can be seen and heard. Note that the dotted outlines for the symbols used in this figure indicate that these are concepts; whereas unbroken lines used in the diagram above indicate physical media. The many lines from the meanings to the news message suggest the confusion that can occur if too many subsystems are active and interactive at the same time.
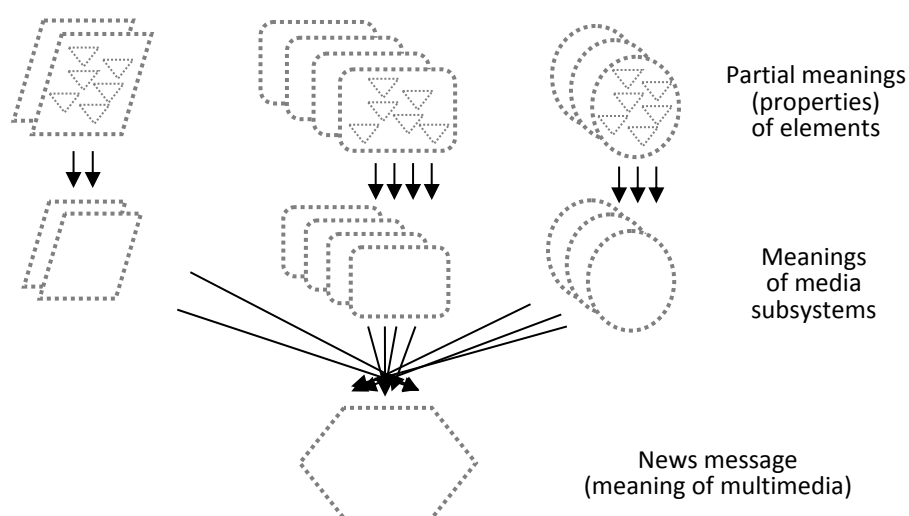
Figure 10-3 Process for a single instance of a news message

Figure 10-4 shows that in this multimedia event in a multimedia text, the news message has four meanings generated from the four media: oral language, photographs, music and sound effects. These interact to create the multimedia news message. The elements each have partial meanings. While all the media have elements, only those for the photograph are shown

here. The elements of a colour photograph are line, shape, colour, form, texture, light and shade (tone), direction and space.
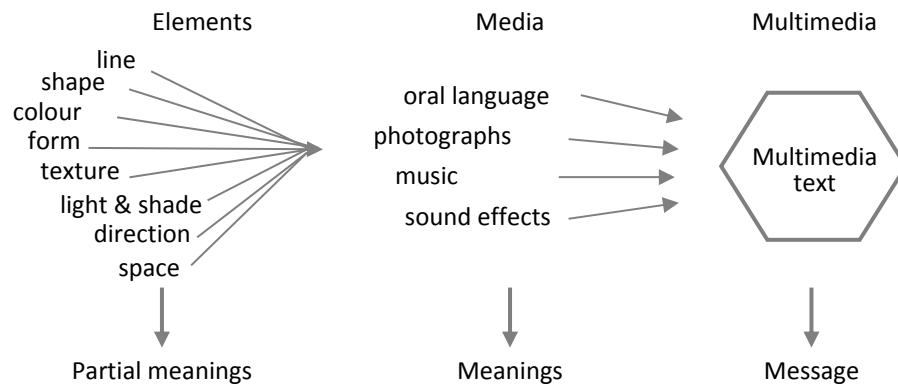
Figure 10-4 Elements, media and multimedia

Meaning and how it is interpreted in each media group

Meaning is interpreted differently in each media group. For instance, meaning in language is normally more specific than meaning in music. Meaning in language, while it can be influenced by characteristics of language such as tone of voice, is less susceptible to the influence of image and music than music and image are to the influence of language because language is more specific.

Meaning in language

The meaning of language comes from its learned semantic meaning, its context, and for spoken language, its tone and pace. Journalism often uses sensationalist language, and readers normally understand this to be an exaggeration of, or different to, the dictionary meaning of language. For instance, the word "war" is often used in sporting news reporting. A football team wants the game to end with them winning it, but the game itself is not considered injurious and a team does not want to put an end to the opposition team because eventually there would be no teams to play the game. Therefore, understanding the meaning of news reports depends on being part of the target group that the news is aimed at, in which case the non-literal meaning is normally understood.

Meaning in music

Music, more than any other subsystem, puts the news message at risk due to the variety of ways any piece of music can be interpreted and the influence of these many interpretations on other subsystems. Many composers, theorists, aestheticians, performers and critics from different cultures and persuasions believe that music has meaning and reports from composers, performers, critics and listeners show that music creates an emotional response (Meyer 1956: 1). Even so, there is not necessarily agreement as to what a particular piece of music means and each piece of music can have many meanings, depending on the culture, era, and the listener's experience and background. Some music has a precise meaning for a very wide target audience such as *Auld Lang Syne* and *Happy Birthday*. In addition, the way a piece of music is interpreted by the performer will affect its meaning, but interpretation will have much less influence than culture and experience if the piece is played as intended by the composer. If the performance contradicts those intentions, the outcome is unpredictable.

While many people believe that music has meaning, there are those who believe it has no meaning. For instance, composer Philip Glass is often asked why his music is sad when he is a happy person, and he responds that he didn't know his music was sad (Glass 2008). Composer, writer and broadcaster, Andrew Ford says much the same thing. He has composed music that he feels is positive and life affirming but listeners have found it as almost unbearably sad. Ford believes that music is "in the ear of the beholder, varying from listener to listener and from listening to listening" (Ford 2005: 21).

We listen through an internal filter created by our education and experience which influences how we interpret the meaning (Feld 1984: 6-8). In Western culture, such meanings include tones being characterized by physical elements such as high and low, rough and smooth, light and dark, or with certain characteristics linked, such as "large" being associated with a "low" tone (Meyer 1956: 48,74,259-261; Huron, Kinney & Precoda 2006). This

association of music with certain ideas, experiences, emotions and cultures is an important consideration when adding music to news.

Music can have an apparent meaning because a narrative based on the music is created by the listener so that the scope of the narrative is extensive (Nattiez 1990: 51,128). Some listeners clearly state what a particular piece of music means to them, because for them, music readily takes on specific meaning (Walton 1994: 47). They might associate certain musical characteristics with specific emotions or events. In addition, many studies support the claim that music can cause a measurable emotional response (Juslin & Västfjäll 2008), even though it appears that music does not have an inherent meaning across all cultures and all age groups (Feld 1984: 6-8). In other words, different cultures and age groups frequently interpret music differently, which is why a target group must be defined.

Music has the potential to take on meaning at the slightest provocation, so asking what music means at a particular time and place is more appropriate (Cook 1998: 8,22-3). With the use of music in a multimedia news story there is a high risk of changing the news message, depending on the associations created by the music. Therefore, when using music with news, it can be tricky to select music with a generic meaning for a target audience that is a reasonable quality because, as O'Leary suggests, stock music will sound "cheesy" and stale (O'Leary 2009).

Therefore, there is a double issue with musical meaning, which occurs with all subsystems but is more pronounced with music because music generally is more open to a wide variety of interpretations than language or images. Music can influence the other subsystems but the other subsystems can influence music. The influence in both directions occurs along a continuum. For instance, it would be difficult to change the meaning of the music for *Happy Birthday*, unless it was accompanied by contesting subsystems, such as sad images. However, at the other end of the scale, unknown music, which has few distinguishing features, has a wide range of possible meanings.

Meaning in visuals

French critic, theorist and semiologist, Roland Barthes believes that the image is interpreted in three ways. The first is through any language associated with or accompanying the image such as descriptions or explanations. The second is the literal meaning given by the creator, which is what the image represents. So an image of an apple would represent an apple provided you know what an apple looks like. The third is the interpretation by the viewer. All occur through cultural and experiential filters. For instance, a green apple in a fruit bowl will have very different associations to a lush, red apple, dripping with juice from a bite taken from it. Therefore, the interpretation depends on i) context, ii) the way it is presented, and iii) how it is interpreted by the viewer (Barthes 1986: 5-8,20-5,31). Art historian, Sir Ernst Gombrich says much the same thing in that for a correct reading of an image, the interpretation by the artist must match that of the viewer and this relies on a number of factors including an understanding of artistic techniques and cultural symbols (Gombrich 1982: 142,145,147). For instance, if one figure in a painting is small and another large, the size may indicate perspective or, as in many past cultures and eras, it may indicate social status.

"We see things with our brains, not our eyes" because when we look around us we interpret our visual environment rather than accurately see it; what we think we see is only loosely based on reality because we do not have time to fully take in all the visual information we need, and the missing details are generated by the imagination (Greenfield 2000; 2001: 79). Therefore, any image that is accompanied by music will be interpreted by a person's imagination filling in details that coincide with their interpretation of the music.

An image contains many symbols that we might not even be aware of, for instance colour, light, shape and line, and all create meaning. This can be observed in experiments where moving shapes were combined with music, and the shapes were attributed personalities. A small circle was perceived as weak and submissive whereas a large triangle was perceived as being aggressive (Marshall, & Cohen 1988: 96,100). Lighting or light and

shade can create a dramatic effect. For example, darkness is particularly associated with fear

of the unknown. Lines also have emotional meaning. For example rising lines will seem

either cheerful or agitating (Pickford 1972: 22,32). Colour has meaning even though this

meaning is culturally based, with colour research contradicting many common beliefs; colour

associations are based on learning and vary from culture to culture (Fehrman & Fehrman

2004: 64-73). Age is also a factor and young children do not associate colours as warm and

cold, as reliably as adults, leading to the assumption that colour associations have a cultural

rather than an evolutionary or a physiological basis (Morgan, Goodson & Jones 1975: 125).

Even so, within an adult cultural group, the meanings of images tend to be consistent

(provided they are not influenced by the other subsystems), and these cultural meanings

should be considered when creating multimedia news.

Meaning in multimedia

Background

Research suggests that the meaning of multimedia is likely to be more intense than the

meaning of individual subsystems because multiple media are more stimulating than a single

medium (Eldar et al. 2007: 2828) as discussed in Chapter 9. In addition, added media enrich

and reinforce the story message. Therefore, multimedia creates a stronger emotional

experience than a single medium, so that referring to the meaning as expressive meaning is

even more appropriate for multimedia than individual subsystems.

Determining the meaning of multimedia is more complex than determining the meaning

of a single medium because multimedia creates meaning through the transfer of attributes

between interacting subsystems in a process that includes perturbations and differentiation.

The influence of one subsystem on another can be seen in the film *Good Bye Lenin* (2003),

which shows that the interpretation of visuals is strongly influenced by sound. This film tells

of a young man trying to protect his fragile mother, who has recovered from a long coma. He

believes that if she learns that her beloved nation of Communist East Germany no longer

exists, the shock could be fatal. To protect her he recreates the history of the 1990s. This recreation of history is done by changing the commentary that accompanied film footage from the time of the fall of the Berlin wall. New voice-overs, which are very different to the original, are added to archival newsreel footage and they totally reverse the meaning of the film footage. At the same time they appear completely natural. For anyone unfamiliar with the history of the time there would be no reason to doubt the authenticity of the new voice-overs. The director of *Good Bye Lenin*, Wolfgang Becker (2003) states:

> All we had to do was take the existing archival footage and put it in a different context. You can see how quickly you can fake things with picture and with a slightly altered commentary; which makes you doubt whether the pictures were already completely truthful in their original context. And how much truth is to be found in pictures to begin with.

The story of *Good Bye Lenin* is an example of one subsystem taking on the meaning of another so both subsystems appear to have the same meaning. The archival film footage takes on the meaning of the oral language even though the images were originally shown as meaning the opposite. In other words, the images were ambiguous and were liable to take on the meaning of the sound accompanying them, whether it was music, sound effects or language.

Creation of the expressive meaning

Each subsystem, as well as the multimedia as a whole, has an expressive meaning which goes beyond the semantic meaning. The expressive meaning includes both the semantic meaning and the emotional meaning as those meanings are understood by a specific cultural group, at a specific time and place. This conformity of meaning within a group occurs because similar backgrounds, experience and education create similar views, and this is supported by research on the framing of news. It is striking that research shows most participants within a group share the same perspective of the language, images and emotions,

and it is clear that readers "share very similar 'readings' of the core 'meaning' of the story."
(Kitzinger 2004: 186-9). In other words, there is normally consistency of interpretation of
meaning within a target audience.

The meaning, whether it is for a single subsystem or the multimedia as a whole, is
initially created by associations which are a result of education, experience and culture.
Association is the first of two judgments proposed by Lipscomb and Kendall in their model of
film music perception described in Chapter 4. They state that when viewing a movie, an
association judgment is made. This judgment is based on past experiences (Lipscomb &
Kendall 1994: 90-1). Meaning is also created by emphasis from accents, which create
meaning by emphasising one thing as opposed to another. This is the second judgement
proposed by Lipscomb and Kendall in their model. The Congruence-Association Model of
music and multimedia (Cohen 2013: 17-47) also supports this concept of meaning through
association and accents.

Figure 10-5 shows that expressive meaning is created through association and accents.

associations   accents

expressive relationships
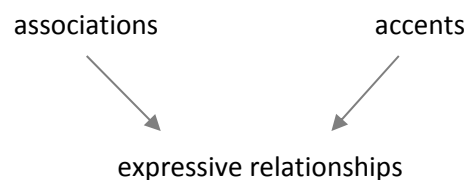
Figure 10-5 Expressive meaning

While Lipscomb and Kendall state that association is an individual judgment, a more
general association judgment can be made for a target audience. An example of a general
association is colour. For example, in Western culture white is associated with purity and
cleanliness, and in Eastern cultures it is associated with death. There will always be some
level of association because meaning is normally based on memories of past experiences and
learning. Within a culture, many of these experiences are shared between individuals. This
claim, that there will be a general meaning which is consistent for a target audience from a

particular cultural group, is supported by the research on the framing of news referred to above.

Different outcomes of intermedial relationships

Cognitive psychology experiments (Cohen 2000), which are discussed in Chapter 4, suggest that there are a number of outcomes of intermedial relationships. The term "intermedia" is defined as being "those instances where such interaction is to be found" (Cook 1998: 106). In other words, intermedial relationships create interactions between the media in multimedia. Different relationships between media result in different outcomes

The first outcome of these influences between media is that they can create a type of compromise or averaging of the meanings of the media occurring more or less together. The second outcome occurs when one media subsystem takes on the same meaning as the other so that both subsystems appear to have the same meaning. The third outcome involves the meaning of one subsystem dominating the news message, so that the meaning of the other is ignored, even though it is clearly different. In addition, there are several more outcomes of media relations.

A fourth outcome occurs when the enrichment of one media leads to it taking on the characteristics of another as is suggested by Chion's theory of added value (1994). This taking on of characteristics is also part of Cook's theoretical framework described in Chapter 4. He proposes a limited overlap of meaning is involved in the process. An example is a car advertisement where a Citroen hatchback takes on the properties of liveliness and precision from a classical overture by Mozart (Cook 1998: 6-8). This is not a simple averaging of the meanings as in the first outcome described above, because the car must be one that already has some of the characteristics that could be associated with classical music, so there is an overlap of meaning. However, there would not be any overlap of characteristics between a hot pink Moke and classical music, so the combination would not enhance the Moke. Nor is it the

second outcome described above because while there is some ambiguity in the image of a car, there are also clearly defined characteristics that exist from previous cultural associations.

A fifth type of outcome of media relationships, as stated in Chapter 7, is surrealism or irony. Surrealism occurred in Stanley Kubrick's film *2001: A Space Odyssey* (1968) where classical music accompanying futuristic images of space travel resulted in a surreal effect.

Relationship states

The first step towards determining which of these outcomes will occur is to understand the relationships between the media subsystems. The relationship between the expressive characteristics of subsystems can be in one of a number of states. Cook describes these as three multimedia models, conformance, complementation and contest (Cook 1998: 98-106), as explained in Chapter 4.

Figure 10-6 shows that conformance is a close match, complementation is where something is added but there is no conflict, and contest is when there is a conflict.
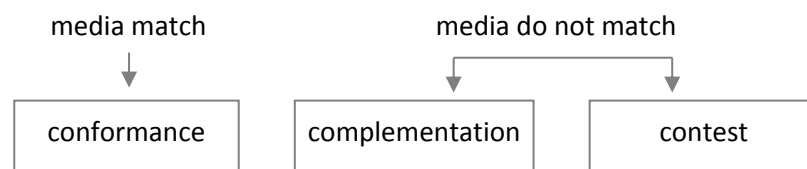
Figure 10-6 Cook's relationship states between subsystems

However, these three states apply to musical multimedia, whereas there is an additional state that occurs in news and which is referred to here as "compatible". Cook's models do not include compatible because they focus on musical multimedia in entertainment and advertising and not on information that is meant to be portrayed and remembered accurately. Remembering specific information, understanding specific meanings, and avoiding information overload are not relevant to entertainment and advertising especially given that advertising often presents misleading information.

The compatible relationship state occurs where the relationship is approximate or neutral. An example is news where a voice-over is accompanied by standard images. Standard images are stock films and photos that are reused in news bulletins when actual films and photos are not available, such as a video clip of limousines drawing up in front of a government building (Brosius, Donsbach & Birk 1996: 180-1). Standard images are used in much the same way as clip art. In comparison, a complementary image would show the actual meeting attendees arriving at the specific location and entering the appropriate building. A conforming relationship is often used for celebrities and royalty where the arrival of each prominent person is followed closely by a camera and described in detail. This description might include details of their progress into the building, the type of reception they are receiving from onlookers, their clothing and their companion. For an audience with a high level of interest in celebrities or royalty, conforming media will not be boring. However, such a high level of audience interest does not apply to the majority of news stories.

Standard images provide an approximation of the situation but are not close enough to be considered conforming; they do not add information so are not complementary, and they do not create a conflict so are not in contest. Superficially, they seem to be an ideal answer for the inexpensive addition of images on the basis that that it is generally believed that images add interest to news items. Given the positive aspects of a conforming relationship on meaning, it would seem reasonable to think that standard images, being compatible, would also be positive. However, standard images appear to have a number of disadvantages.

Conforming images enhance memory retention of news information but standard images do not; in addition, while conforming images are evaluated by their audience as positive from a journalistic quality perspective in that they improve the news story, standard images are not evaluated as an improvement (Brosius, Donsbach & Birk 1996: 180,191-193). It is speculated that one of the reasons for these reactions is that standard images do not

represent anything new (Wicks 1992 in Brosius, Donsbach & Birk 1996: 191-193). The result is reduced interest and attention.

The relationship states can be seen as a continuum from conforming relationships through to contesting relationships. While it might be thought that the continuum would be in the sequence conformance-compatible-complementary-contesting, research on standard images suggests this is not so. Complementary images, even though they do not conform, are a positive addition whereas compatible (standard) images are not a positive addition. The research suggests that the reaction to television news with standard images is little different to radio news (Brosius, Donsbach & Birk 1996: 180,191-193). Therefore, compatible images should be avoided.

Figure 10-7 shows that based on the value of the multimedia from an information perspective, the compatible state is on the negative side because it does not enhance memory and is not evaluated as improving news by audiences.

+   **0**   **−**

conforming   complementary   compatible   contesting
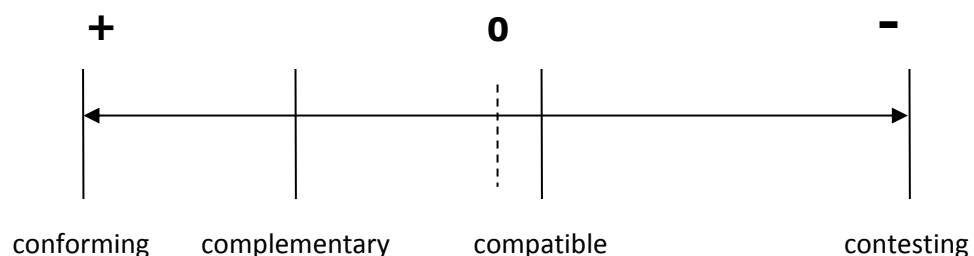
Figure 10-7 Value of multimedia from an information perspective

While the compatible relationship state is claimed here to be negative, it could be argued that if there is no conforming or complementary images available, then compatible images at the very least avoid the sensory gap that would occur if no images were used. However, the images of the journalist speaking rather than a voice-over with standard images might be preferable. Note that this is not a continuum that shows the level of audience interest because contest is likely to create the most interest, but it is also likely to result in misunderstanding and information overload. It is likely that the negative assessment of the

compatible state between language and image applies to all types of subsystems having a compatible state.

The internal environment of multimedia is a dancing landscape, and all relationship states create intermedia perturbations between subsystems that result in some type of change, even though this might be the reaction of "same old thing" in the case of standard images. This change could be a change of meaning of one or more subsystems, a change of intensity, a change in the emotional level, or some type of change to the news message. These relationship states determine the expressive meaning, and they can be applied to both the association relationship and the accent relationship. However, how they apply to each type of relationship (association or accent) is somewhat different.

Association relationships

Each subsystem has an association meaning, which is a combination of the semantic meaning and the emotional meaning as understood by a specific cultural group at a specific time and place based on education and experience. Association applies to sounds as well as to images because we do not normally perceive pure noise; when we hear a sound we normally immediately associate a meaning (Melcher & Zampini 2011: 278). Each of the four relationship states (conformance, complementation, compatible and contest) can be further categorised into more specific relationships. All relationship states will create some type of change even if that change is a change of emotional level or strength of the news message.

Figure 10-8 shows the four relationship states and their sub-states with an explanation of each below.

Association relationship states

Conforming association

congruence

ambiguity

Complementary association

additive

Compatible association

standard

symbolic

neutral

Contesting association

overt

covert
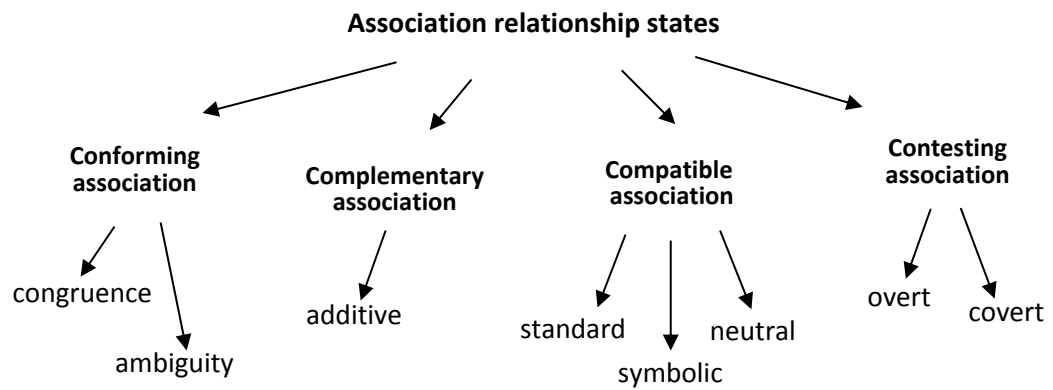
Figure 10-8 Relationship states and sub-states for association relationship

Conforming associations

The first model, conformance, occurs with a close match of the subsystems (Cook 1998: 98-106). However, this conformance may be apparent but not actual and therefore the conformance may be created by congruence or by ambiguity. Congruence is a close match of characteristics. For instance, the song Jingle Bells has a meaning of Santa delivering presents for Christmas, so if Jingle Bells was accompanied by images of Santa on a sleigh, the meaning would be stronger. A downside of this strengthening from the conformance relationship is that it may result in a boring or cliché message which has a low entertainment value.

The second reason for conformance is that the characteristics can appear to conform even though they do not because one subsystem is ambiguous. Ambiguous media will always be influenced by and will normally take on the meaning of accompanying unambiguous media. Cognitive psychology experiments show that sound is used to interpret images when the images are ambiguous and when this transference of meaning occurs the images do not appear to be ambiguous; however when the images are clearly not ambiguous, particularly in regard to aggressive images, the sound will not influence their meaning (Cohen 2000: 363-73). Cook, drawing on Marks, refers to this transfer as the image "absorbing" the qualities of sound (Cook 1998: 77-8) Therefore, the level of ambiguity in the image is key to whether

sound is used to interpret the meaning of the image. While ambiguity is common with images, it also occurs with music and to a lesser extent with language.

Figure 10-9 shows that there are two sub-states for conformance and these are congruency and ambiguity.

conformance association

congruence   ambiguity
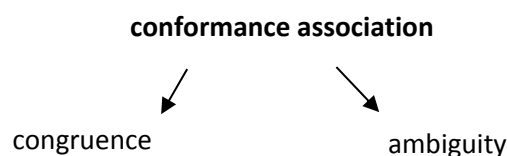
Figure 10-9 Conformance created by congruence or ambiguity

Cook states that conformance is "vanishingly rare" in musical multimedia (Cook 1998: 106). Cook is evaluating the conformance relationship involving music from an artistic view where elements such as rhythm and genre are appraised more critically than is normally done by non-artists, such as journalists. However, it is likely there will be a greater level of conformance in factual information than entertainment. Another difference is that Cook does not refer to ambiguity as a condition for creating conformance. Therefore, here conformance is defined more loosely when used for the comparison of subsystems in a multimedia text.

Complementary associations

A complementary relationship state is an additive relationship where the subsystems do not match but neither do they conflict. A complementary relationship is a contrasting relationship where the contrast adds what is missing from the other media (Cook 1998: 103-4). An example would be the use of complementary colours or images in a news report that show additional details to what is being stated by the voice-over. Too much additional information could create information overload.

Figure 10-10 shows that a complementary association is always additive.

complementary association

additive
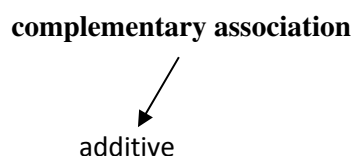
Figure 10-10 Complementary association

Compatible associations

A compatible relationship state occurs when subsystems approximate each other but neither match nor conflict. The compatible state is often used in television news where standard images accompany voice-overs. A special form of the compatible state is the use of symbols. For example, when society had more restrictive views regarding sexuality, to suggest a sexual encounter the camera would cut to scenes of mountains or water. A neutral state may also occur where a subsystem is transparent in that it is not noticed or adds no meaning or emotion. For instance, a scene of a journalist in a studio environment has no particular meaning.

Figure 10-11 shows the three sub-states of compatible relationships: standard, symbolic and neutral.

compatible association

standard   symbolic   neutral
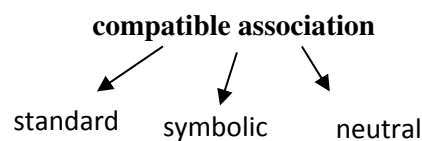
Figure 10-11 Compatible associations

Contest associations

Contest occurs when the expressive meanings between subsystems conflict and this conflict normally results in a change of meaning or some type of problem. However, conflict often creates the most interesting forms of multimedia (Bantz 1997: 133). Conflict is often used for its entertainment value and Eisenstein claims that conflict is the "fundamental principle of the existence of every art-work and every art-form" (Eisenstein 1947: 46).

This type of conflict, referred to as the contest state and described in Chapter 4, refers to a conflict between the subsystems rather than a story about a conflict. It could be a contest between the meanings of the subsystems, as would occur if a video of a funeral was accompanied by Jingle Bells played in its normal jolly way. Alternatively, contest could be a conflict between the physical properties so that the subsystems interfere with each other, such

as loud music making oral language difficult to hear. There can also be conflict between the message of each of the media as in McLuhan's medium-is-the-message. For instance, the message of the Internet is interactivity which is very different to radio, so that putting radio content on the Internet in the same form as it is broadcast on radio creates a conflict between the messages of radio and the Internet as identified by the-medium-is-the-message discussed in the previous chapter so contest has a broader meaning here than in Cook's model. Therefore, there are many different types of contest and predicting the outcome can be difficult.

There is a substantial amount of research on conflict or incongruency from the different disciplines of psychology, education, film and journalism. Research on media in news broadcasts suggests that incongruency reduces attention and understanding. Grimes reports that experiments indicate that when media are incongruent, attention to both the story and image is low. In these incongruency experiments, the subjects stated that they tried to listen to the narrative but found it difficult or impossible, but even with this reduced ability to focus on the speech, there was no increase in visual memory and understanding, as these were also reduced. This may be the result of information overload, which causes an overall loss of attention and memory. The incongruency resulted in high visual recognition but this did not translate into memory and understanding. These experiments indicate that attention to both the oral story and the images is low when they are incongruent (Grimes 1990: 15,22-3).

Film theory also highlights the interdependence between sound and vision and the problems that can occur as a result of this interdependence. In film, images can affect music and music can affect images, with the result that "when one cannot be 'squared' with the other, credibility itself is threatened" (Kalinak 1992: 29-30). When music and image contain a high degree of contradiction, they risk not being understood; puzzlement is a likely outcome and the effect may be unintentionally comic (Gorbman 2004: 20-2). In addition, these incongruent multimedia combinations, which are often used in film as contrast, can result in a

form of satire (Boltz, Schulkind & Kantra 1991: 594). Art films often create a conflict between music and image to produce an unusual or startling effect.

The uncertainty created by contradiction may also minimize seriousness and cause cognitive uneasiness or tension. This tension occurs from the unresolved conflict between subsystems because we expect sound and image to be consistent. This unresolved expectation causes the audience, either consciously or unconsciously, to question the incompatible meanings (Lipscomb & Tolchinsky 2005). For instance, a violent scene is expected to be accompanied by violent sounds. Based on our experience, expectations and emotions are generated depending on whether the expectations are violated or fulfilled. Therefore, the uneasiness created by conflict between subsystems may create doubt as to the validity of the information.

Conflict between subsystems creates more than just poor understanding of the news message. The visual dominance that occurs during a conflict with other sensory information often distorts the perception of the other senses and these other senses can become completely excluded during attention-demanding visual tasks (Posner, Nissen, & Klein 1976: 158-9,170). These are not the only reasons to avoid conflict between subsystems. Another issue is that conflict can cause the meaning of the image to be incorrectly perceived. Research shows that when sound and image diverge, one of the results is that audience judgement falls between the ratings for the visual and the audio, even if audiences are asked to focus on one particular medium. While image and music are processed separately by the brain, this result suggests that the final meaning is additive and the result is a combination of the total associations generated; this result is much like a compromise so that when music and image diverge neither are perceived accurately (Cohen 2000: 362-367).

Cognitive psychology experiments using various combinations of sound and video (Cohen 2000) suggest there can be three outcomes of conflict between subsystems. These outcomes have already been mentioned when discussing intermedial relationships but the

following three outcomes apply specifically to contest. The first outcome is a type of compromise or averaging of the meanings of the subsystem. The second is where one subsystem influences the meaning of another so that both subsystems appear to have the same meaning. The third is where the meaning of one subsystem dominates the news message and the meaning of the other is ignored, even though it is clearly different. But there is also a fourth outcome, that of surrealism or irony. The first and fourth outcomes are emergent, where the result is something new. However, it could also be claimed that the first outcome is not emergence and this is discussed in more detail in Chapter 8. These different types of contest can be overt or covert.

Overt versus covert contest

Figure 10-12 shows that there are two types of association between subsystems when there is contest between them and these are overt and covert.
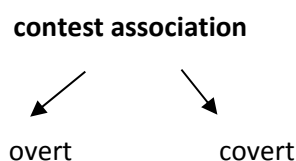
Figure 10-12 Overt and covert contest

Overt contest occurs when media are in conflict and this conflict is apparent. An example of overt contest between subsystems is hip-hop music accompanying images of antiques. This strange combination could seem wrong or it could create a surreal or ironic effect.

Covert contest occurs when one subsystem conflicts with another but at the same time influences the other without this influence being obvious. Covert combinations of media are made possible with technology that allows the mixing of unrelated media. Eisenstein's montage theory indentifies the ability to edit and mix sound and images in film in a way that often leads to unpredictable results (Eisenstein 1947: 17,125). An example of covert contest is quiet, ambient, dissonant music accompanying a discussion of a health treatment, as discussed

in Chapter 2, because such negative music undermines any positive statements about the treatment. This would not occur in a live situation with loud dissonant music, which would be overt, because it would be apparent to the speakers and to the audience that the statements were accompanied by strange music.

Basis of the association comparison

Cook suggests that the comparison between subsystems be based on a metaphor model (Cook 1998: 57-82). While his arguments are well-founded, in this thesis a comparison is suggested using the characteristics, such as mood and style, where the meanings of these characteristics are based on the cultural norms of the target group. This approach is suggested on the basis that it may be simpler to perform the comparison when a number of subsystems are occurring at the one time. In addition, these characteristics are somewhat independent of the medium. Regardless, any method can be used provided it determines whether there is conformance, complementation, compatibility or contest between the subsystems. This process will always be an art rather than a science because meanings change over time and place, and an understanding of the target audience is the key to accurate evaluation.

Figure 10-13 shows the proposed association characteristics to consider when determining the meanings are mood, style and themes.
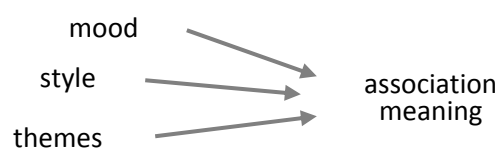
Figure 10-13 Association characteristics for comparison of subsystem

The mood is Eisenstein's "tone" which he uses to describe the emotional feel and emotional meaning (Eisenstein 1947: 80-6). The style is the artistic period such as baroque, classical, romantic, minimalist or abstract, or a category such as relaxing or racy. Themes are Eisenstein's "lines" which develop a thematic movement as they progress through the individual pieces of the montage (Eisenstein 1947: 75,81). For example, a theme could be a

particular colour that runs through the story connecting one scene to another or particular sounds and images can create a type of narrative such as a Christmas theme. These characteristics combine to create an association meaning for that subsystem. An example of music influencing image is the expressive meaning of the song Jingle Bells, which is associated with joy, Santa Claus and Christmas. If Jingle Bells was heard with an image of children playing with toys, the influence created would be that it was Christmas and the toys were Christmas presents.

In sum, all types of relationships result in intermedia perturbations, even conforming relationships because when subsystems conform it strengthens the news message. A downside of this strengthening from conformance is that it may result in a classroom-like message which has a low entertainment value. A complementary relationship, where the subsystems support each other, may not be as strong as the news message created by conforming subsystems but it is likely to be a great deal more entertaining. However, the relationship which is likely to cause a problem is contest caused by conflict. Conflict is often used for its entertainment value. This is also the case with news where a conflict is a standard presentation format.

Accent Relationships

Our "brain is constantly searching for patterns in the incoming stream of sensation" (Melcher & Zampini 2011: 276). The "point of synchronization can stage the meeting of elements of quite differing natures", and such sync points naturally signify content and provide audiovisual phrasing (Chion 1994:59). In other words, accents create salience and phrasing and both create meaning. The meaning created by accents in combination with the meaning created by associations forms the expressive meaning. The term "accents" refers to points of emphasis which are salient moments in sound and image (Lipscomb 2005: 38). Accents create meaning in different ways. An accent in a single system can create emphasis at that point in time and this results in increased vividness, but it does not create synchronization

or out-of-sync relationships. Accents become sync points when they occur in two or more subsystems at one time, such as a beat in music that coincides with a movement in image.

Synchronization appears to be almost solely a human motivation. While there are a few species such as fireflies and crickets that synchronize, it is primarily to attract females, whereas primates and mammals other than humans generally do not synchronize (Madison 2011: 332-3). Synchronization appears common to humans because in an audio-visual multisensory integration, the temporal window that allows sound and images to be perceived as synchronized is wide and flexible (Melcher & Zampini 2011: 268-9). This means that a wide range of audio-visual combinations can appear to be synchronized, but if measured would be found as out of sync. Given humans will perceive synchronization when it is not actually there, the mapping of accent structures is important for understanding meaning in multimedia.

A mapping of accent structures is the second judgement proposed in the model of film music perception, and this mapping of accent structures consists of matching emphasised points between subsystems for appropriateness (Lipscomb & Kendall 1994: 91: Lipscomb 2005: 39-42). Accent structures can be created by transitions. A transition occurs with an immediate and noticeable change in a subsystem. For sound, this could be the transition between sound and silence, or a change of dynamics. In a visual subsystem, it could be a change between action and stillness. In a video, noticeable cuts in scenes create transitions. For still images, a transition occurs with a change from one still image to another.

Accent points are frequently created by rhythm. Rhythm is a critical part of our day-to-day lives given that all spoken languages and all normal movements have some type of rhythm (Allen 1975: 75-9). There are two different types of rhythm that can be confused, and these are natural rhythms that occur in normal speech and body movements, and stylised rhythms that occur in metered poetry, music and dancing (van Leeuwen 1985: 216-9,222).

Figure 10-14 shows the two types of rhythm, natural and stylised with the regular repeating rhythms that occur with stylised rhythm.

Types of rhythm

natural
walking, speech

stylised
poetry, dancing, music

repeating rhythm	repeating rhythm	repeating rhythm
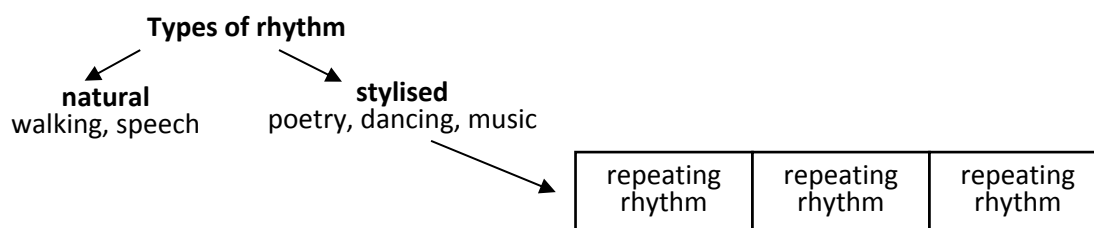
Figure 10-14 Different types of rhythm

The multimedia combination will always have multiple rhythms because music and image each have some type of rhythm, and within each there may be multiple rhythms; these multiple rhythms and their interactions form the rhythmic structure (Martinec 2000: 289). Because sound and image each have their own rhythm, one can undermine the qualities of the other or the opposite can occur; connections created between music and image through synchronization can be accentuated (Vernallis 2004: 14,190) with the combination having more emphasis than the separate subsystems. This accentuation directs the audience to pay attention at certain times and is a useful tool when creating a news story, but it can also create unwanted effects. Poorly matched accents can create problems in the audio-visual relationship such as an unintentional change of meaning.

Synchronization can create intermedia perturbations which can influence the meaning of the subsystems and has the potential to change the multimedia message. Perturbations caused by synchronization were a problem in the early days of silent film because of the poor synchronization of the music with the film (Lindgren 1963: 138-139). This was due in large part to the performance of stock music and was overcome when scores were specifically created to accompany the movie. Today, a similar problem with synchronization applies to the news story even though it may not be noticeable. With the rush to release news in an increasingly competitive environment, coordination of sound and images often suffers (Grimes 1990: 16). More time and expertise is needed to better co-ordinate the news montage.

While this co-ordination involves more than matching accents points, they are a part of the issue. For instance, in the rush to release news, the voice-over and video shots in a news item are frequently only roughly coordinated and this poor coordination, which results in a mismatch of information, can create information overload (Kozma 1991: 194-5; Grimes 1990: 16,23-24).

Many different types of synchronization can be used but if the sound and image are out of sync it will distract from the information. Just as synchronization can "glue" (to use Chion's term) sound, image and language together, an out of sync combination can degrade the relationship. However, too much synchronization can create a cartoonish effect. Therefore, accents play an important part in multimedia both from comprehension and entertainment aspects.

Accent relationships between subsystems

When accents occur in two or more subsystems at more or less the same time, the synchronization that results makes the subsystems particularly vivid at that time. Just as there are different ways to evaluate the association relationship, so also are there different ways of understanding the accent relationships. In the model proposed by Lipscomb and Kendall, they refer to the three types of rhythmic relationships as rhythmic consonance, rhythmic out-of-phase consonance and rhythmic dissonance (Lipscomb and Kendall 1994: 89). Here, the same relationship states as those used for the association judgement are suggested as being easier for non-musicians to understand. In addition, a number of sub-states are included.

The accent relationships can be in a number of different states including conforming synchronization, complementary synchronization and contesting synchronization. These are based on Cook's multimedia models of conformance, complementation and contest (Cook 1998: 98). As with the association relationship, an additional accent relationship is added, that of no synchronization or no accents. This would be unusual in any music-image combination, but not uncommon in a news story.

Figure 10-15 shows conforming accents can be further divided into actual, apparent, continuous, mickey-mousing and synchresis; complementary accents are syncopated; compatible have either no synchronization (there may be accents in one subsystem but not another) or no accents; and contesting accents are out-of-sync.

Accent relationship states

Conforming accents   **Complementary accents**   **Compatible accent state**   **Contesting accents**

actual
apparent
continuous   syncopated   no sync   no accents
mickey-mousing
synchresis   out-of-sync
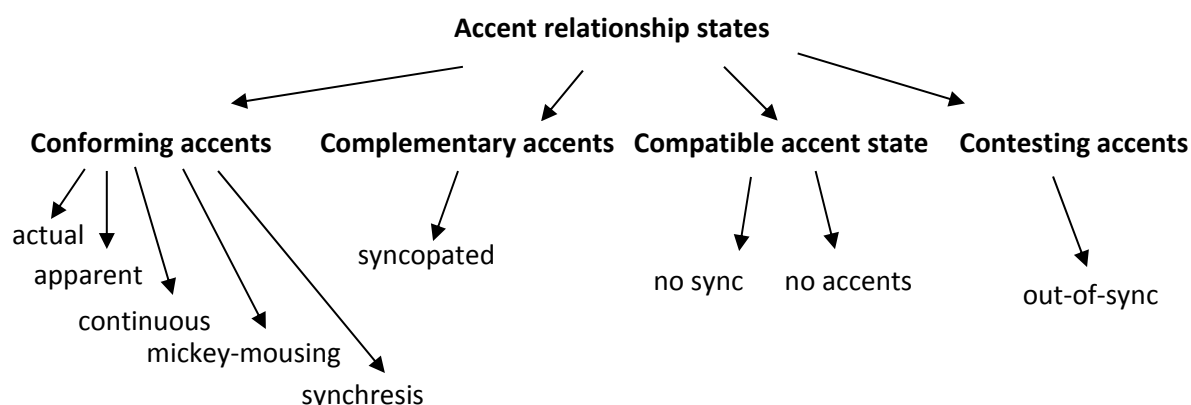
Figure 10-15 Relationship states and sub-states for accent relationships

The entire rhythmic structure should be taken into account when analysing synchronization because the music-image combination can at times create unexpected results. This is because the rhythmic structure is complex, and the fact that synchronization is perceived rather than being objectively experienced, so synchronization may be perceived when it is not present. Timing, rhythm and emphasis can change the meaning of spoken words. In the same way, the addition of music to image can change the meaning of the image. Congruency of meaning and synchronization go hand in hand in the role of gluing subsystems together to create a coherent combination that maintains the integrity of the information.

Conforming accents: in-sync

Conforming synchronization occurs when the emphasis points of two or more media coincide. Synchronization creates emphasis at the point of synchronization – the sync point – and this emphasis draws attention to the subsystems involved in the synchronization making them temporarily more dominant. There are various types of synchronization and a common

element that can be used to establish synchronization of music and image is movement

(Eisenstein 1947: 82).

Figure 10-16 shows the five different types of synchronization that can exist between

subsystems in multimedia for conforming accent state and these are: actual, apparent,

continuous, mickey-mousing and synchresis.

Conforming accents

actual sync

apparent sync

continuous sync

mickey-mousing

synchresis
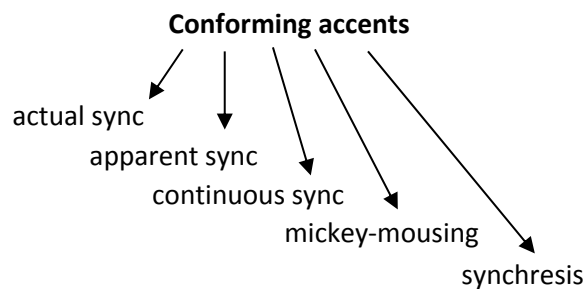
Figure 10-16 Types of synchronization for conforming accents

Actual synchronization

Actual synchronization occurs when there is synchronization and nothing is out of sync,

that is, when accents between multiple subsystems occur at the same time.

Apparent synchronization

Apparent synchronization occurs when subsystems appear to be synchronized but in

fact they are not. It can occur even where patterns are not intended because almost any

combination of music and images can, to some degree, create perceptible and apparently

intentional patterns (Cook 1998: 186). This occurs because rhythm dominates humans to the

extent that it is impossible to move without a degree of rhythm (Allen 1975: 75-9). In

apparent synchronization, many factors influence how we perceive rhythm and whether we

perceive it accurately. Some of these factors are obvious, such as musical training, musical

sensitivity, changes in rhythm and tempo, and inaccurate time perception within a window of

time. However, other influences on how we perceive rhythm are surprising such as semantic

congruency.

There is a window of time which allows the audience to compensate for audio and visual characteristics which are slightly out of sync; any events that occur within that window of time will appear to be synchronized (Bolivar, Cohen & Fentress 1994: 49). This results in natural rhythms, such as body movements, often being perceived as stylised rhythms if they occur within this window because the perception of rhythm is fluid rather than exact. Sound and image can appear synchronized but are not if measured precisely. In addition, if there is enough similarity between image and music it allows the pictures to absorb the rhythmic qualities of the music resulting in the image taking on those rhythmic qualities, much like ventriloquism (Cook 1998: 78).

There can be perception of rhythm in sound even when there is none. It is possible to perceive entire phrases of music as rhythmic when they are not. Perceived rhythm is also affected by differences in pitch and loudness. Time intervals that are approximate, but not exactly equal, will normally be heard as exactly equal. Any sequence of pulses that is not overly slow or overly fast, will appear to have a rhythm even if there is none. Less obvious factors include changes in musical pitch and volume. Changes in pitch may create one rhythm, while changes in volume may create another rhythm (Martinec 2000: 289). Monotony is another factor, and can reduce attention to rhythm and affect the accuracy of how we perceive rhythmic regularity (Sink 1983: 111-2; 1984: 177).

Another form of apparent synchronization occurs where a sound creates an apparent visual movement. The movement is perceived as coinciding with the sound, but in fact there is no movement. Chion refers to this as a sleight-of-hand effect by creating the impression of a rapid movement that is not actually present. This occurred in the George Lucas *Star Wars* film, *The Empire Strikes Back* (1980), where the automatic opening and closing doors are an illusion created by the sound. They are filmed closed and then filmed open, and it is imagination, prompted by sound that creates the impression that they move (Chion 1994: 11-12,15).

An additional factor that needs to be considered is whether the meanings of the different subsystems match because the perception of synchronization between subsystems is influenced by the semantic congruency of the subsystem combination. When the mood and meaning of music, image and language are congruent, the temporal aspects of the subsystem are more likely to appear congruent (Bolivar, Cohen & Fentress 1994: 44,49). Therefore, even if music and image are synchronized, if their mood and meaning do not match, they may appear out-of-sync. Semantic congruency may also cause subsystems that have neutral synchronization to appear synchronized. Therefore, semantic congruency is normally necessary to achieve apparent synchronization.

Continuous synchronization

Continuous synchronization is a form of synchronization that does not require a beat. It can be used to create congruency between media when the music, image and language occur in parallel, and where the music flows or waxes and wanes but does not have a steady beat. It has been described as "two parallel lines that have peaks and dips" (Chion 1994:207). While this is unlikely to be used in news, it may be applicable to documentaries.

Figure 10-17 shows music and image waxing and waning in parallel. This could occur with both sound and image starting from nothing to become louder and brighter then fading back to nothing.

Figure 10-17 Continuous synchronization with parallel waxing and waning

Mickey-mousing

Mickey-mousing refers to the close synchronization of music and image that is often seen in cartoons when sound and image have a large number of sync points. Mickey-mousing refers to a very close synchronization of subsystems and this close synchronization can easily

and unintentionally slip into humour (Chion 1994: 54). It can also refer to the duplication of action by music or dialogue. This duplication is considered a weakness in film but is used in education to reinforce meanings as occurs when a lecturer reads slides. Mickey-mousing is unlikely to be appropriate for news as it can easily become unintentionally humorous or boring.

Synchresis

Synchresis is a special form of synchronization discussed in more detail in Chapter 4. Synchresis is defined by Chion as occurring when synchronization glues together unlikely combinations of sound and image. Random combinations of music and image can result in synchresis but it may not always be obvious why this has occurred. Synchresis does not always occur and a variety of factors determine whether synchresis of a particular sound and image is achieved (Chion 1994: 54,63,115). An example is a video with a series of beeps synchronized to an image where beams shoot out of the broadcasting antenna to imitate radio waves pulsing. Most people know that radio waves cannot be seen and they do not beep but the beeps are heard as signalling that a radio transmission is occurring. The next time the beeps are heard during the video, even if there is no image of the shooting beams at the time, it will be assumed that a radio transmission is occurring. Therefore, synchresis creates both synchronization and specific meaning.

Complementary accents: syncopated

Accents can by syncopated to be more entertaining and syncopation creates a complementary relationship. Syncopated combinations provide variety (Eisenstein 1947: 83). In addition, nothing should appear wrong or grating with complementary-sync. A syncopated rhythm is when an accent is shifted away from the main beat. It does not create synchronization but is not out-of-sync.

Figure 10-18 shows that syncopated rhythms are categorised as complementary.

Complementary accents
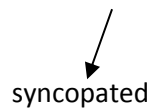
syncopated

Figure 10-18 Complementary accents have different forms of syncopation

Compatible accents: no sync or no accents

Figure 10-19 shows that there can be two sub-states with compatible accents: no sync and no accents. The first is when there is no synchronization or no apparent synchronization. One subsystem may have accents but there are no accents at the same point in any of the other subsystems, therefore synchronization cannot exist. The second is when there are no accents or no apparent accents in any of the subsystems. If there is no synchronization, nor are there any accents, and this can occur in a talking-heads video, there will be no misinterpretation or information overload but there is a risk the news story will be monotonous.

Compatible accent state

no sync   no accents

Figure 10-19 Compatible accent states have no sync or no accents

Contesting accents: Out-of-sync

Figure 10-20 shows that contesting accents are out-of-sync. Out-of-sync can be identified because the combination of subsystems seems wrong. An example of out-of-sync is poorly synchronized voice and lip movements that can occur with poor dubbing or poor recordings.

Contesting accents

out-of-sync
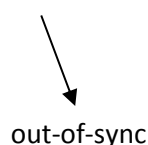
Figure 10-20 Contesting accents

These problems with contest appear to extend further than only the meaning. Research suggests that musicians to some extent, but especially non-musicians, will have difficulty remembering rhythms that are out of phase (Monahan, Kendall & Carterette 1987: 599-600). Rhythms that are out of phase will seem wrong. This suggests that, particularly for non-musicians, out-of-phase rhythms create a form of contest that leads to information overload, and this happens because the combination sounds wrong.

Concluding remarks

The expressive meanings created by associations and accents are a vital part of the message. A prerequisite for understanding how these expressive meanings are formed and their role in creating the story message is to define the configuration of each multimedia text by selecting the subsystems that are to be evaluated. The next step is to establish the expressive meanings of the individual subsystems. This is a relatively simple and straightforward task because the expressive meanings of each subsystem are created in a straightforward way by the associations and accents of that subsystem. Unravelling the expressive meaning of the multimedia is more complex because it involves intermedial relationships. The meaning of the multimedia message involves an additional level of complication. It can only be established by understanding the expressive meaning in conjunction with differentiation because one subsystem may dominate at one time and a different subsystem at another, even in apparently similar circumstances. The dominance of a subsystem depends on the differentiation between the subsystems. Systems differentiation was discussed in Chapter 6 and the following chapter discusses how differentiation affects the expressive meaning.

Chapter 11 Influence of Differentiation on Meaning

Introduction

The influence of journalism comes from its ability to influence its audience, but as with all types of influence, it should be exerted in a way in which its audience understands how that influence is being used. In other words, the stance taken and the impression given by the news story should be obvious to the audience. The ability of the audience to understand the view being presented depends to a large extent on whether the subsystem that appears to influence the news message is the one creating the meaning of the news message. That is, the news message can be influenced overtly, where the meaning is obvious, or it can be influenced covertly using liminal and subliminal techniques and editing cuts. Given that audiences are suspicious of sensationalist techniques, as described in Chapter 2, it is important that overt rather than covert techniques be used. The concept of differentiation, described in Chapter 6, and how it applies to multimedia, must be understood to determine whether the influence between subsystems is overt or covert and whether the covert influence changes the news message.

This chapter aims to describe how differentiation between subsystems is part of the process that creates the multimedia news message. It explains how differentiation is determined by vividness, and why vividness does not necessarily equate with salience. Audio-visual research from various disciplines, including cognitive psychology and education, is drawn on to explain why and when subsystems influence each other and how they change the meaning of the news message.

Forms of differentiation

The differentiation that occurs between subsystems determines how much and what kind of influence the subsystem has on the other subsystems and the multimedia news message. Differentiation between subsystems and the influences that arise from the relationships between the subsystems are the norm in multimedia. Differentiation creates

meaning through the interaction and interdependence of the subsystems in a multimedia text. These interactions and interdependencies can result in intermedia perturbations where a subsystem influences the meaning of another subsystem and the multimedia news message as described in Chapter 5 and Chapter 6.

The specific forms of differentiation and how they can be applied to multimedia are described in Chapter 6. In sum, centre/periphery, where the centre subsystem dominates the periphery, is the most common form of differentiation in multimedia. Segmentary differentiation occurs when all subsystems are of equal vividness but this is difficult to achieve for any length of time. Stratified differentiation occurs when the subsystems maintain the same level of dominance over the entire period of the multimedia as such and could be claimed as not being multimedia. Functional differentiation occurs when all subsystems are involved in the same function. Within a function, all subsystems must be carrying out exactly the same function at the same time. In addition, these subsystems within a function system can be in any of the first three types of differentiation: centre/periphery, segmentation or stratified.

Subsystems that occur before and after each other may influence each other even though the level of influence will be less than when they occur more or less simultaneously. This is the effect of forward and backward primes discussed in Chapter 2 (Tan, Spackman & Bezdek 2007: 135-8,146-8). This before/after effect also applies to function systems. A function system may influence the meaning of another function system when it occurs before or after the other.

Figure 11-1 shows all four forms of differentiation: i) centre/periphery is shown with oral language at the centre, video images at the midground-periphery, and photos at the background-periphery with the arrows between the midground and background indicating that subsystems in both peripheries influence each other; ii) segmentary differentiation is shown with four subsystems active, all of equal vividness and therefore equal dominance; iii)

stratified differentiation is shown with one subsystem remaining dominant over the other two for the entire multimedia text; iv) three functions are shown occurring one following the other.

midground-
periphery: video

centre: oral
language

two-way
relationships

background-
periphery: photos

i) centre/periphery

equal
dominance

ii) segmentary

permanent
dominance

function 1   function 2   function 3

iii) stratified

iv) functional
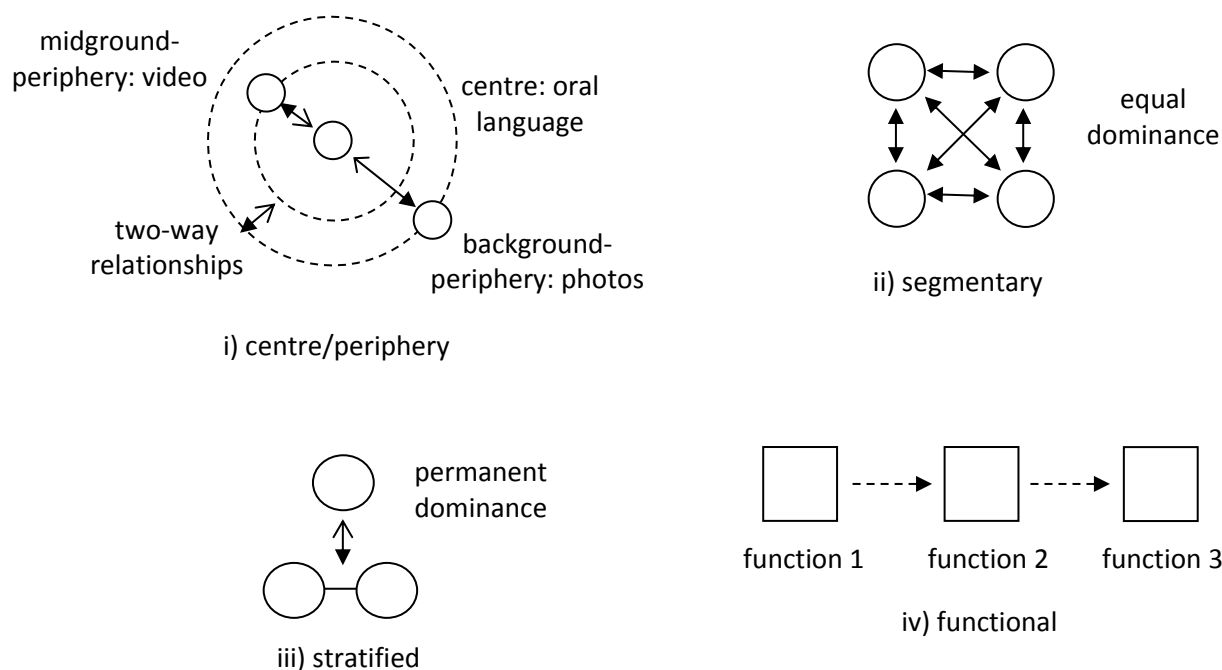
Figure 11-1 Forms of differentiation in multimedia

In all four forms of differentiation, every subsystem will influence every other subsystem but the level of influence will vary from one form of differentiation to another. For centre/periphery, segmentation and stratified differentiation, the form of differentiation and the level of influence of each subsystem vary according to the level of vividness.

Differentiation and vividness

Centre/periphery, segmentary and stratified differentiation are determined by vividness, and as previously stated, vividness is the production of a "sensorially rich mediated environment" (Steuer 1992: 80). In Chapter 5, it was stated that vividness is created by the properties of a subsystem, properties such as brightness and density of colours for image. This is a good working guide but there is another consideration that may be relevant. In decisions that involve spatial judgements, vision will dominate hearing, whereas in decisions that

involve temporal resolution hearing will dominate vision (Melcher & Zampini 2011:268). However, it is unlikely that temporal or spatial judgments would arise in a news message given the focus is on the meaning.

The level of vividness determines the level of influence that a subsystem exerts on the other subsystems in a multimedia text. The higher the level of vividness of the subsystem, the more it will influence the meaning of the other subsystems and the message. However, vividness is comparative in that it is not the absolute level of vividness that determines the differentiation but the comparison of the level of vividness of one subsystem to another.

It is this comparative relationship of vividness which determines which of the four forms of systems differentiation applies at a particular time. Therefore, determining the type of differentiation between the subsystems involves evaluating their vividness levels in each multimedia event. This determination is essential because one type of differentiation may result in a change of meaning whereas another may not.

Figure 11-2 shows that vividness is created by properties, associations, accents and narrative. This means that associations and accents must also be evaluated for their vividness as well as their expressiveness, as discussed in the previous chapter.

Properties

Associations   Vividness of
                                      subsystems
Accents

Narrative
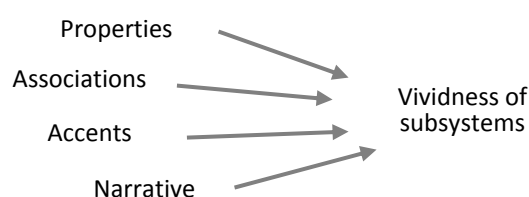
Figure 11-2 Ways vividness is created

Vividness created by properties

The level of vividness of a subsystem is influenced by the properties of its elements because different properties have different levels of vividness. For instance, with the colour element of an image, the vividness is higher with strongly pigmented colours than pastel colours. For the music element of melody, the vividness created by dissonance is greater than

the vividness created by consonance. The vividness levels are not necessarily obvious. For instance, dissonant music is often quiet and in the background but this does not reduce its influence. Dissonant music has a long history of association with fear and evil, which has been reinforced by its use in horror and thriller movies. Quiet music may have more influence than loud music because quiet music is often not consciously heard, so its appropriateness is not consciously questioned. For instance, in the episode *Chiropractors*, described in Chapter 2, quiet dissonant music was played behind a chiropractor speaking positively about treatment (ABC 2013a: 3'47 – 3'59), but while there were many complaints posted on the ABC website about the episode, and some required extensive knowledge of the condition and/or chiropractic treatment, none mentioned the dissonant music that was undermining the positive statements. This music included a high pitch but quiet shrill sound, but neither music nor shrill sound would have been consciously heard.

Vividness created by associations

Any prior associations that make the meaning of a subsystem more specific will normally increase the level of vividness. For instance, people will hear their name in a conversation across a room even if they do not hear the rest of the conversation (Cherry 1953). Even though association is an individual judgment (Lipscomb & Kendall 1994: 90-1), a more general association judgment can be made for a target audience. An example of a general association is colour as occurs with the different interpretations between Western and Eastern cultures of the colour white as stated in Chapter 10. Advertisements literally capitalise on association to make their products more desirable.

Association through either education or experience is more specific with language than other sounds and images because each word has defined meaning. In addition, but normally to a lesser extent and in a more general way, this will occur with almost any audio or visual stimuli. It is common for sound effects, music and images to take on general or specific meanings through association. Any music or image that has been previously heard or seen is

likely to have an association due to the meaning engendered by that experience. When music is heard that is similar to a style previously heard, it is likely to evoke a similar association. An example of a specific association is the *Bridal Chorus* (1850) by Richard Wagner, better known as *Here Comes the Bride*, which for most of the Western world, immediately brings to mind the image of a bride walking down the aisle. *Here Comes the Bride* is an example of a specific association, whereas a previously unheard tune that is consonant, bright, fast and melodic has a general association such as happiness.

Vividness created by narrative

While vividness has been defined as a rich sensory environment, here it is expanded to include the richness of narrative. A narrative is a story that is created by a series of events. This claim, that the senses are enriched by narrative, can be justified on the basis of studies showing that if we read the action words "run" or "kick", the parts of the brain that are involved in moving the feet are activated (Pulvermüller 2005). This type of brain activity also applies when reading narratives. Neuroimaging shows that areas of the brain used to process the senses are activated in a similar way to actually using that sense (Speer, Reynolds, Swallow & Zacks 2009). Therefore, the sensory processing by the brain is stimulated by narrative even if the actual senses are not. In addition, our consciousness is created by an understanding of ourselves and our world through narrative because narrative is at the very basis of human consciousness (Young & Saver 2001: 73), given that narrative is an important part of all cultures, past and present. It can be claimed that narrative creates a sensorially rich mediated environment. A multimedia system normally has some type of narrative, and different forms of narrative range from almost no narrative through to a strong narrative. For instance, a story about the hardships faced by a family due to financial problems in the economy would be classified as a strong narrative whereas a stock market report would have a weak, almost nonexistent narrative. In addition, a narrative can evoke vividness in that one news story may be more vivid than another because the story raises emotional levels.

However, this type of evaluation is moving towards an individual response so may not be appropriate for a target group.

Vividness created by accents

Accents can be created in a number of ways, such as a rhythmic beat, a loud sound, or a fast movement. These accents can create salient points which can temporarily create high levels of vividness. In addition, rhythms, movements and beats that create synchronization should also be considered when evaluating the vividness of subsystems. When one subsystem is synchronized with another, depending on the effect created, it can result in increased vividness of one or both subsystems.

Influences and meaning

Influences created by vividness, and the differentiation it creates, to a large extent determine the meaning of the news message but how these influences determine the meaning is frequently not obvious. Research is essential to understand and predict many aspects of influence. The prediction of which subsystem will influence the news message involves, as Cook states, predicting which subsystem will be able to impose its characteristics upon the others. This prediction can be done provided it is for a target audience with defined characteristics and preferences.

In some multimedia texts, the vividness and the influences created are obvious and logical. For instance, a sudden loud sound such as an explosion will influence the meaning of the news message. However, in many forms of multimedia, the influences are not so obvious. For instance, fast movements normally dominate the meaning of a message but a high-pitched sound can grab attention and make the sound dominant (Sloboda 1985: 172-4).

Even with the assistance of research, predicting the results of subsystem combinations can be tricky because while various research describes the influences of one subsystem over another, there are conflicting results which can be confusing. A closer examination of these

conflicting results indicates that they are compatible when the differentiation between subsystems is taken into account.

As a general rule, in segmentary differentiation there should be no contest between any subsystems and all subsystems should be equally vivid. All subsystems should work together in segmentary differentiation with attention more or less balanced over the multimedia configuration. This is an ideal situation but one rarely achieved for any length of time. An example is a musical where frequently there is a combination of instrumental music, singing and dancing all working together equally to create the story message.

In centre/periphery differentiation, the subsystem at the centre should carry the news message and there should be no contest between the system at the centre and those at the periphery, although there may be contest between the systems at the periphery. For instance, contest between two peripheral subsystems, when neither peripheral subsystem contests with the centre, will not normally change the multimedia news message. However, achieving such a contest would be difficult but not impossible. In stratified differentiation, the subsystem at the highest strata should carry the news message, and there should be no contest with subsystems at the strata below, but there may be contest between those at lower levels. In functional differentiation, only one function should occur at a time. The subsystem carrying out a specific function should agree with or complement the news message, and there should be no contest between the active subsystems.

These are general guidelines only and changing the properties of a subsystem and placing it in a different context or environment can change its level and type of influence so each situation should be evaluated separately. In addition, these principles may seem straightforward but can be undermined by covert influences.

Overt versus covert influences

Apparent influences between subsystems can be misleading in that the subsystem that the audience believes is influencing the meaning of the news message may not be the one

doing so. This occurs because a subsystem can appear to be the most vivid and appear to influence the other subsystems even though it is not. In this situation, the influence is coming from a very different subsystem. Therefore, vividness, as the term is used here, is not necessarily salience as it is normally thought of because the most vivid subsystem is the subsystem with the most influence on the meaning of the news message. For instance, video images often appear to be dominant because movement grabs attention but they may not be the dominant influence. If the images are polysemic, and most are, the accompanying subsystems will determine the meaning of the images and so will determine the news message. This occurred in the movie, Goodbye Lenin, discussed earlier. The level of vividness creates the level of influence of a subsystem and the meaning of the video will be interpreted according to the influence of the sounds that accompany it.

When the influence is obvious it is referred to as overt, whereas covert refers to influences that are not obvious. Overt influences occur when we are consciously aware of the influence of a subsystem; for instance, if language is carrying the news message, we consciously interpret the words and are aware that they are influencing what we think and feel. Another example is music with a loud, strong beat which is likely to induce us to tap in time to the beat; we are aware that the music is creating this effect.

There are many different covert techniques but not all techniques that covertly change the news message are created by the covert influence of one subsystem on another. For instance, cuts can covertly change the news message as described in the *Catalyst* episode in Chapter 2, where an interview used cuts to go between the speakers. The cuts were obvious but what was not obvious was that the answer to one question was substituted with the answer to a different question. Cuts allowed statements to be taken out of context, which can result in the meaning being changed. These cuts are a covert technique but this is not the covert influence of one subsystem on another.

Covert influence occurs when we believe we are being influenced by one subsystem whereas our understanding and emotional response is determined without us realizing that the news message is influenced by a different subsystem. Liminal and subliminal influences are covert influences, and occur where a particular subsystem appears to carry the news message but a different subsystem influences how the audience interprets the news message. The most common situation this occurs in is with background music, particularly in horror or thriller movies where a scene with little light and movement is made tense by the addition of ambient dissonant music.

The same news item could be presented with either overt or covert influences depending on the subsystems that accompany the images. For instance, video images of asylum seekers arriving on boats could be influenced to make the scenes appear dangerous or benign and this could be done with language, music, sound effects or camera techniques such as the types and angles of camera shots. If the voice-over stated that asylum seekers were a potential danger because of their cultural or religious background, the influence would be overt because it would be consciously heard. However, if dissonant music and sounds were used in the background, it would create an atmosphere of fear, and the effect would be covert because background music and sounds are liminal. If the music was neutral and did not evoke a particular emotion, any influence would not change the news message. Therefore, the problem is not that background music can covertly influence the news message but that background music with a different meaning to images or language it accompanies can covertly change their meaning without the audience realising they are being manipulated.

Covert contest

If the meaning of a subsystem is supported by the subsystems in its environment, the news message is clear and decisive. However, the level of influence of a subsystem can be changed by contest from its environment. Conflict can create a very different meaning and news message, but not all types of conflict create the contest that changes the meanings of

subsystems and the news message, as discussed in the previous chapter. Contest can be physical or conceptual.

Physical contest can be created by the sound level of competing subsystems such as a loud background noise interfering with the clarity of a voice-over. Opera is specifically composed so that this type of contest does not occur and when the orchestra is accompanying a singer, the orchestral part will normally be less complex and quieter than when it alone is performing. Another form of physical contest comes from competing rhythm accents between subsystems. This can occur with poor lip-syncing when lip movements and speech are badly synchronized. Physical contest could also occur between images if a visual montage was created which had too many images with too many movements, and too high a level change creating information overload.

Conceptual contest (contest between meanings) is created in a number of different ways. Meaning can be created by the narrative in each subsystem and if each subsystem had a different narrative, the contest between them would create confusion. If each subsystem were experienced alternately, the news message of each could be understood but if experienced together the news message would be confused. Other forms of contest are the differences between expressive qualities (such as positive language with dissonant music) or a clash of different genres (such as adding pop music as the background to a discussion of antiques). Understanding covert contest is important given that it can change the news message without the audience realising.

Outcomes of covert influences

Covert influences are normally created by liminal or subliminal effects so language is not normally covert. Even when the meaning of facial expressions or the tone of voice differs in meaning from that of the words, this is normally recognised by the audience so is not covert. An example is sarcasm.

Covert influence of visuals

When two or more subsystems act in unison the influence of both the subsystems is increased, such as when we both see and hear a speaker. The language and facial expressions are working in unison to create meaning and each reinforces the other provided their meanings match. On the other hand, when music and visuals do not match, each can change the meaning of the other, so that both subsystems are perceived incorrectly. This is supported by research which shows that audio can affect visual time perception and visuals can affect audio time perception (Roach, Heron & McGraw 2006: 2164-5).

The covert influence of one subsystem on another can be seen in cognitive psychology experiments using a bouncing ball and music, described in more detail in Chapter 4. The results showed that when music and image were experienced separately, judgement was accurate and as predicted. When congruent music and image were combined, judgement also accurately reflected the music and image. In contrast, when incongruent media were shown together, creating contest, neither media was judged accurately and the result was more like a compromise, even when subjects were asked to focus on a specific medium. The results were consistent over various combinations of music and image. Where there was no contest between subsystems, the result was an accurate interpretation but when there was contest, the contesting media resulted in inaccurate interpretation (Cohen 1993: 168-170; 2000: 360-2).

These experiments and the theory of added value (Chion 1994: 5,21-2) indicate that both music and image may be perceived differently when they are combined. Contest is likely to cause incorrect interpretation of all subsystems involved and regardless of which subsystem becomes dominant, contest can result in inaccurate perception of the news message. The exact outcome will depend on the form of differentiation. If the contest is between the centre and periphery, then change is likely. If the contest is between the peripheral subsystems, then the change of meaning might be at the periphery but will not change the meaning of the news message. When the meaning, emotions and structure of

sound supports image and vice versa, the message is strengthened; when they are in contest, the message is weakened (Johnson 1985: 7,9). In other words, conformance supports the accuracy of the news message and conflict undermines it.

Covert influence of sound

Visual media can be influenced by sound and language and their meaning can be easily altered by music. The ability of music to change the meaning of visuals occurs because, as previously stated, "image is always polysemic, or ambiguous" (Penn 2000: 229). In other words, visuals are always open to alternative interpretations because the context may not be clear and the image can be interpreted in several ways, or because the image is difficult to interpret. Even though music and sounds may be in the background and barely heard, they can change the meaning of the image. This applies to all background music and sounds where the term 'background' misleads us into thinking the effects are also backgrounded.

The influence of music on visuals can be seen in cognitive psychology experiments, described in more detail in Chapter 4. Researchers used two video excerpts with one showing a woman chased by a man, and the other showing two men fighting. As stated previously, depending on whether the music had been evaluated as representing love or conflict the male-female chase was interpreted as either loving or violent respectively. However, when the contrasting (love) music was used with the fight between the two males, it had little effect on the interpretation. The results indicate that the level of ambiguity in the image is key to whether the music is used to interpret the meaning of the image. (Cohen 1993: 173; 2000: 363,366-8,373-4).

Therefore, whether the music is used to interpret the image and if so, how much it is used depends, to a substantial degree, on the level of ambiguity in the image and the amount of illusory redundancy this creates. When ambiguity in image occurs, the music is unconsciously drawn upon to interpret and understand the narrative in the visuals. The music may become "transparent" in that the music may influence the perception of the multimedia

without the perceiver being consciously aware of the music (Cohen 1993: 173; 2000: 363,366-8,373-4; Bolivar, Cohen & Fentress 1994: 48; Marks 1996: 112).

Silence is an important part of sound. It is not neutral but is the opposite of sound that has just been heard and it creates contrast (Chion 1994: 57). Silence is one of the most dramatic effects used in movies, where it can be expressive, such as in film where a soundless facial movement may explain the plot or add tension (Balazs 1985: 117,119). If badly handled, the contrast created by silence can create contest, so silence should be used intentionally to create specific results. To address the issue of an unnatural silence being created when music stops to allow speech in movies, a background sound is used so that the sound remains constant but more indistinct (Chion 1994: 54). The same should be done in multimedia.

Concluding remarks

Differentiation is a vital part of the creating the message because the meaning of a particular subsystem may dominate the message at one time but not another, and for much of the time the differentiation process is transparent. In addition, the dominance may be covert, in that the subsystem may not appear to be influencing the message even though it may be the main influence. Vividness determines the level of influence, but vividness is not always apparent, particularly the vividness of background music which occurs, to a large extent, unconsciously.

Covert combinations of media are made possible with technologies that allow the mixing of unrelated media. Given the experience of directors in film and advertising in the use of montage techniques, especially the liminal technique of background music and subliminal images, these results are predictable to those in the film industry but not understood by the news industry or its audience.

The ethical problem is not that background music is covert, in that it is not consciously heard, but that background music that differs in meaning to the images or language it

accompanies, can covertly change the meaning of the news message without the audience realising they are being manipulated. Given that all images are at least to some extent polysemic or ambiguous, music will almost always influence the meaning and emotional level of the image unless it has the same meaning and emotional level as the image.

If people do not realise they are being manipulated by liminal and subliminal techniques, it is likely they will not consciously consider whether the point of view being presented is valid. Liminal and subliminal influences will always be covert because unless a person is actively listening and watching for such techniques they will not be heard or seen. Even with active watching, most subliminal techniques are likely to be missed.

Even though the use of subliminal techniques in broadcasting is banned in Australian broadcasting, other than by the Government owned ABC, there is no regulation of liminal techniques. Given we are now in a multimedia dominated culture, banning the use of liminal techniques with factual information should be considered given that liminal techniques can be just as misleading and unethical as subliminal techniques. Alternatively, audiences could be taught to deconstruct the meanings created by multimedia combinations.

Chapter 12   The Proposed Model of Multimedia

Introduction

The aim of this chapter is to review and integrate a number of key concepts discussed earlier. It brings together the concepts of the proposed theory of multimedia into a model, and creates a way of navigating through an analysis of multimedia. The proposed model of multimedia is based on Maturana's autopoietic theory and expands on Cook's multimedia models. In addition, it incorporates Luhmann's system differentiation, Chion's added value and synchresis, and concepts from Lipscomb and Kendall's model of film music perception. This is not to suggest that the proposed theory and model are only a combination of the models and theories they integrate. A number of concepts are used in ways they have not been previously used, and new concepts have been introduced that have not been previously applied to an audio-visual text.

Research has shown that multimedia can create as many problems as it solves. For instance, multimedia can be overwhelming and harmful to learning (Ainsworth 2008: 250). This occurs because even though multimedia is normally more entertaining it may use too many attentional resources, making it confusing and difficult to understand. The proposed model assists in understanding how the news message is formed and the problems that can result, including the emergence of something new and unexpected. Note that the model refers to the news message specifically, but the same principles apply to any multimedia text, such as educational material where the meaning of the information is of primary importance.

The complete model of the news message structure, with its various possible relationships is shown in Figure 12-1. A description of the model follows. While the model shows each part of the structure and implies a distinct and sequential analysis, the sequence of analysis will normally vary depending on the properties of a specific multimedia text and the salience of particular processes and properties.
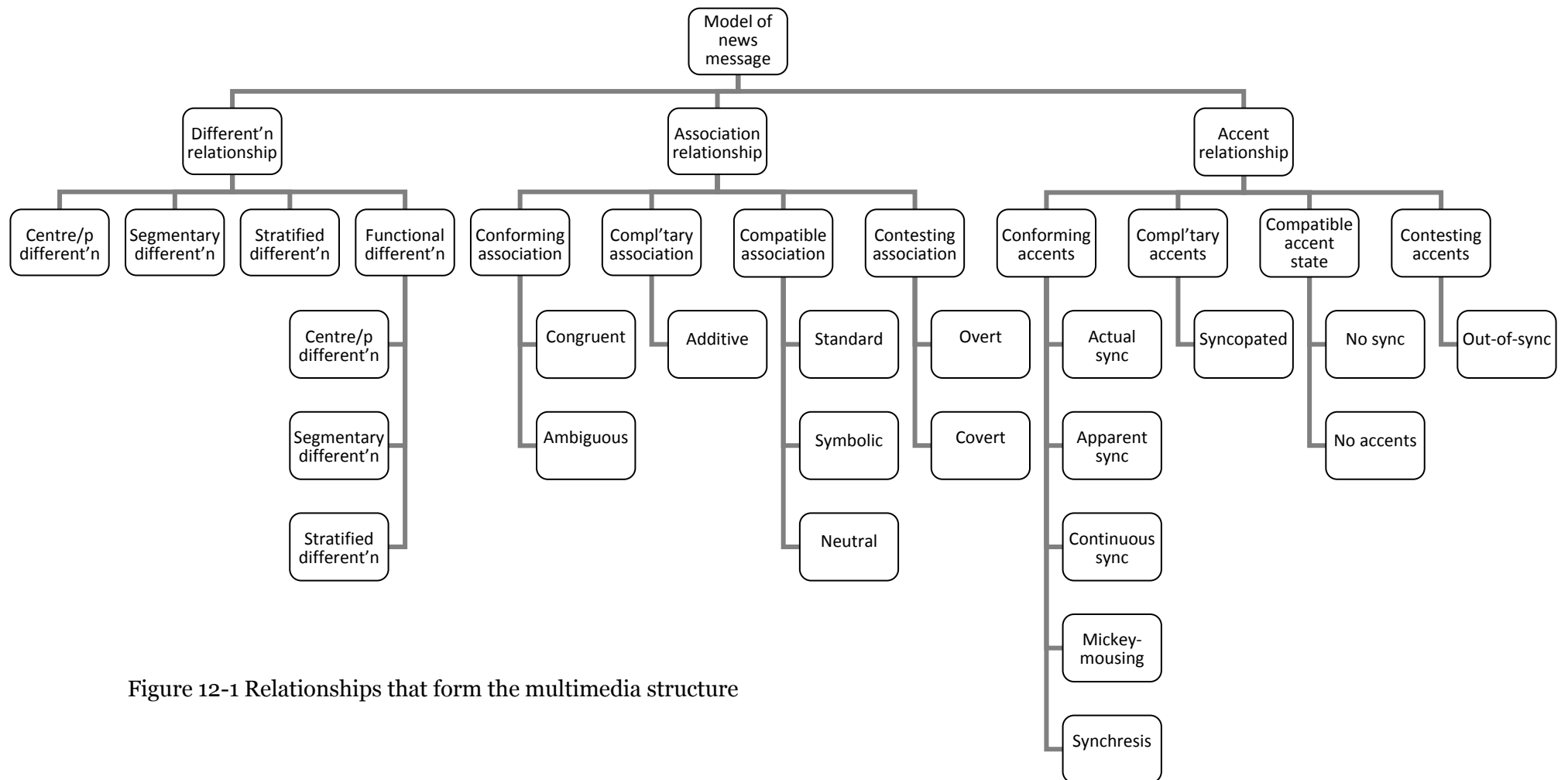
Figure 12-1 Relationships that form the multimedia structure

News message structure

A multimedia text is a structure mediated system and the news message is structurally coupled to the multimedia, so the structure of the message is the same structure as the multimedia. In other words, the internal/conceptual structure, which forms the news message, is dictated by the external/physical structure of the subsystems.

Figure 12-2 shows that the structure is created by the interaction of different types of intermedia relationships that influence the message. These relationships are differentiation and the two expressive relationships: association and accents.

```
                    ┌─────────────────┐
                    │  News Message   │
                    └─────────────────┘
            ┌────────────────┼────────────────┐
  ┌──────────────┐  ┌──────────────┐  ┌──────────────┐
  │ Differentiation │  │  Association  │  │    Accents    │
  │  relationship   │  │ relationship  │  │ relationship  │
  └──────────────┘  └──────────────┘  └──────────────┘
```
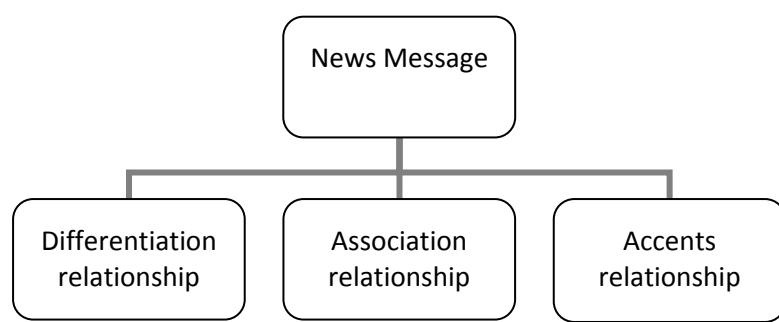
Figure 12-2 The three relationships between the subsystems

The differentiation between subsystems is determined by the levels of vividness of each subsystem compared to the other subsystems. The association relationships are created by comparison of the associated meaning of a subsystem to the meanings of the other subsystems. The accent relationships are created by the various types of synchronization formed by the salient points in each subsystem. This approach is different to other multimedia/audio-visual theories in that the proposed model links the association and accent judgements with differentiation relationships to determine the dominant influence.

Differentiation relationships

The subsystems of a multimedia system do not necessarily have equal influence on the message. Depending on the properties of each subsystem, and the vividness these properties create, one subsystem may dominate or be dominated. Systems theory provides a way of looking at subsystems using differentiation as discussed in Chapter 6. However,

differentiation is specified and applied differently in the proposed model compared to how

Luhmann applies it to social systems, including the mass media system.

Figure 12-3 shows the four types of systems differentiation in multimedia which are:

centre/periphery, segmentary, stratified and functional differentiation and the three types of

differentiation that can occur within functional differentiation.

```
                    ┌──────────────────────┐
                    │    Differentiation   │
                    │    relationships     │
                    └──────────────────────┘
      ┌───────────────┬──────────────┬───────────────┐
┌──────────────┐ ┌──────────────┐ ┌──────────────┐ ┌──────────────┐
│ Centre/periph'y│ │  Segmentary  │ │  Stratified  │ │  Functional  │
│differentiation │ │differentiation│ │differentiation│ │differentiation│
└──────────────┘ └──────────────┘ └──────────────┘ └──────────────┘
                                        ┌──────────────────┐
                                        │ Centre/periph'ry │
                                        │  differentiation │
                                        └──────────────────┘
                                        ┌──────────────────┐
                                        │    Segmentary    │
                                        │  differentiation │
                                        └──────────────────┘
                                        ┌──────────────────┐
                                        │    Stratified    │
                                        │  differentiation │
                                        └──────────────────┘
```
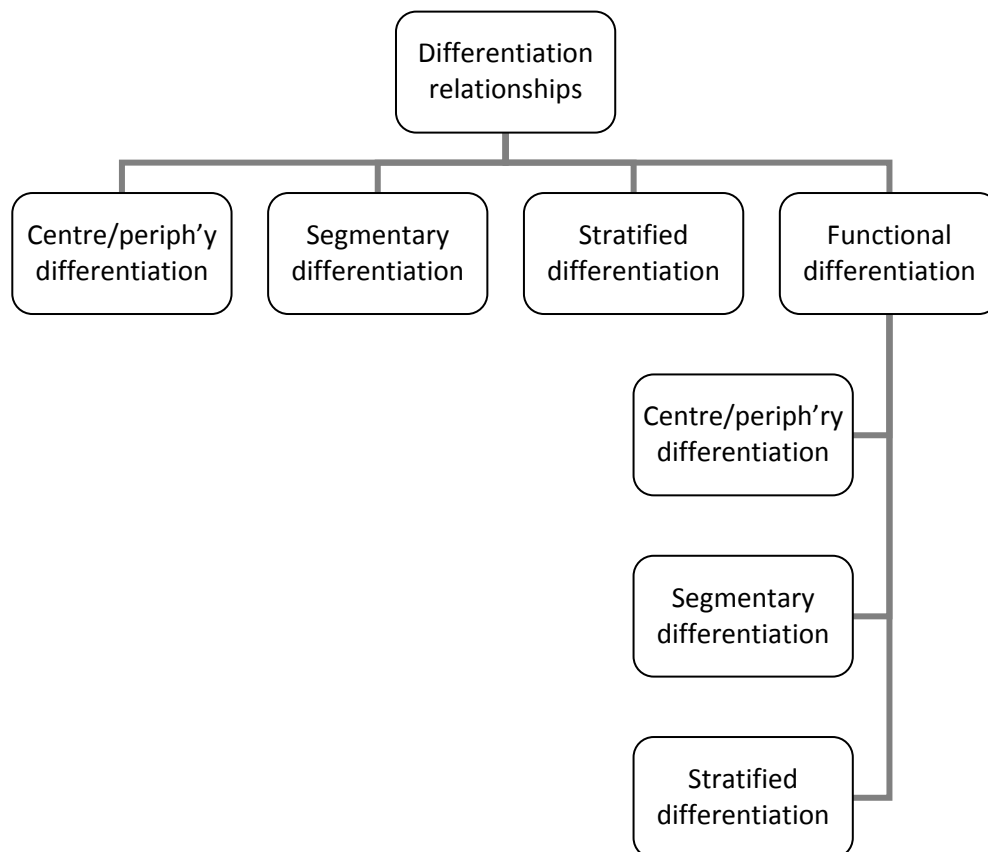
Figure 12-3 Types of systems differentiation

In sum, centre/periphery differentiation occurs where the subsystem at the centre

dominates those at the periphery, that is, the subsystem at the centre is more vivid than those

at the periphery. There can be two levels at the periphery; these can be described as

midground-periphery and background-periphery. In art theory, this type of relationship is

described as foreground/background or foreground/midground/background. In a multimedia

text, the combination of centre, midground-periphery and background-periphery is likely to be

the most common differentiation relationship.

Figure 12-4 shows an example of a multimedia text with oral language at the centre telling the story, video image of the story at the midground-periphery and sound effects at the background-periphery.
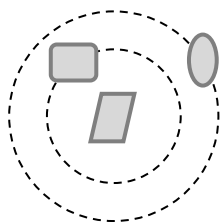
Figure 12-4 Centre/midground-periphery/background-periphery

Figure 12-5 shows segmentary differentiation which occurs when all subsystems are of equal dominance. Equal dominance is difficult to maintain for any length of time. An example is a multimedia event of a conversation between two people with close-ups of the faces. This type of event would normally give equal dominance to both the language and the facial expressions.
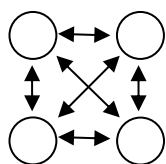
Figure 12-5 Segmentary differentiation

Figure 12-6 shows stratified differentiation which occurs in multimedia where subsystems remain at the same level of vividness over the entire multimedia system. This often occurs with an interview, but it is not generally considered multimedia. An example is a news item including a voice-over and accompanying images that are not vivid, such as a landscape and a distance shot of people without any fast cuts. In this multimedia event, the voice-over will have the highest level of vividness.
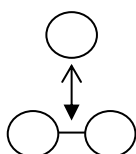
Figure 12-6 Stratified differentiation

Figure 12-7 shows three functions occurring one after the other. Functional differentiation occurs in multimedia with discrete information such as charts, graphs, diagrams, and step-by-step instructions where the specific function is dominant until it is understood and then loses its dominance because, even if it continues to be shown, it is of no further interest having achieved its function. This figure shows that within each function, the relationships between the active subsystems can be centre/periphery, segmentary or stratified. An example of functional centre/periphery differentiation is a multimedia event within a function with a still image of a graph and an explanation of the graph so that the voice-over dominates that particular event. The voice-over will remain at the centre for the entire event and the still-image, if it remains constant and doesn't involve any effects such as zooms, will remain at the periphery. An example of functional segmentary differentiation is a graph where as each point on the graph is explained, the graph is expanded to show more details. In this case, the explanation and the visuals play an equal part because the use of zoom-in focuses attention on the graph. Stratified differentiation within a function occurs if the voice-over remains dominant for the entire function and no camera or editing effects are used to make the image more vivid.
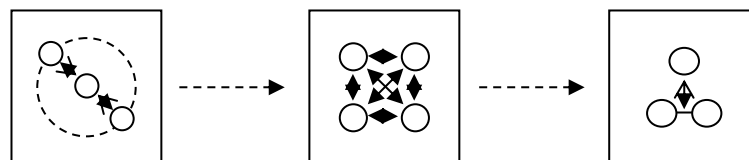
Figure 12-7 Three forms of functional differentiation

The differentiation between subsystems, except with stratified segmentation, will normally change many times within a function.

Association relationships

The association relationship is one of two types of relationships that create the expressive meaning (the other being the accent relationships) as described in Chapter 10 and summarised below. While the association judgement is proposed by Lipscomb and Kendall (1994) in their model of film music perception, the way this judgement is made is different in the theory and model proposed here. The association relationship can be in one of four states and these states include Cook's (1998) musical multimedia models (conformance, complementation and contest). In addition, the compatible state has been added to cover the standard images that are used in news. The three musical multimedia models are applied somewhat differently, in that Cook establishes the intermedia relationships based on a metaphor model, whereas here these relationships are based on several of the characteristics Eisenstein uses to describe film.

Figure 12-8 shows that three of these four relationship states can be further divided into sub-states and these are explained below.
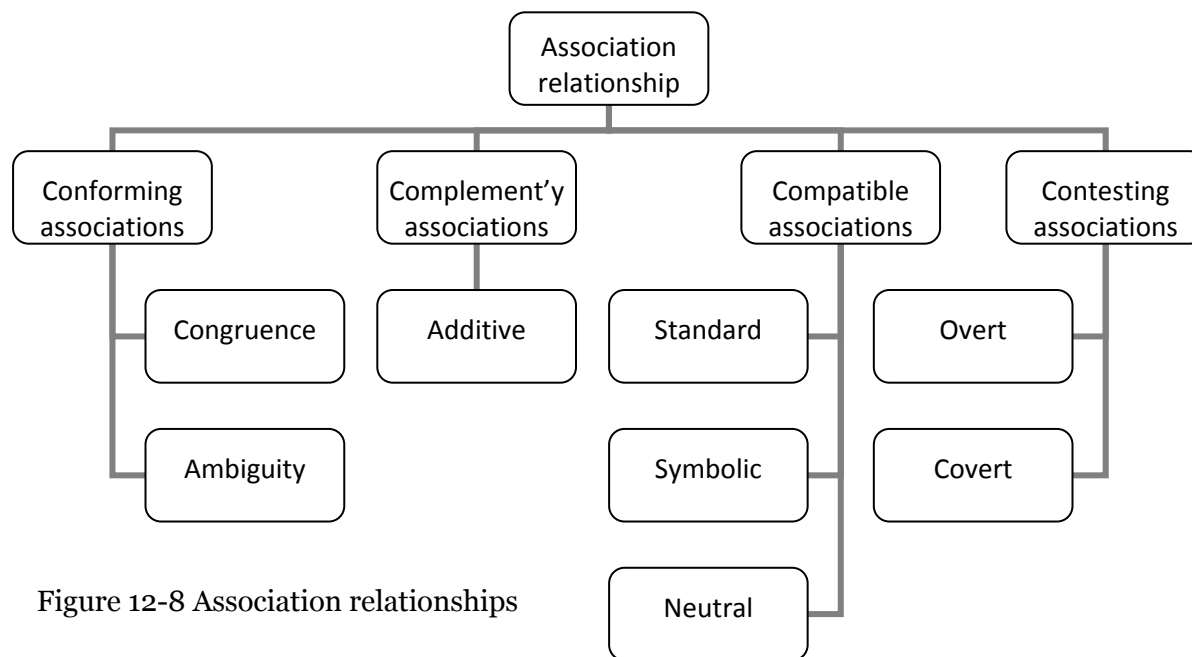
Figure 12-8 Association relationships

While Cook does not further categorise his three models, here several types of associations are further divided to allow a more nuanced analysis of a multimedia text. This is

necessary for multimedia with a primary function of communicating information.

Conformance occurs when there appears to be a close match between subsystems. This match

may be actual or it may be apparent. An apparent match may be caused by ambiguity. Cook

does not refer to ambiguity as being a condition for creating conformance, and it would not fit

within his criteria of a comparison using metaphor. However, here ambiguity is said to be part

of the conforming state. Therefore, the two forms of the conformance state are congruence

and ambiguity. The second state, complementation, is as defined by Cook and occurs when

the subsystems have an additive relationship. The third state is the compatible state which is

commonly used in news. The compatible state may be a standard, symbolic or neutral sub-

state. The fourth state, contest, occurs when the expressive meanings between subsystems

conflict. This contest may be either overt, where it is apparent, or covert such as a result of

liminal or subliminal effects which are not consciously perceived.

Accent Relationships

Accent relationships, in combination with association relationships, create expressive

meaning. The accent judgement is proposed by Lipscomb and Kendall (1994) in their model

of film music perception but this judgement is made differently in the proposed model. The

method of evaluating accents in the model of film music perception is more oriented to how a

musician would evaluate music rather than a multimedia creator evaluating sound as is

catered for here, with the adaptation of the relationships states (conforming, complementary,

compatible, and contesting) used for association. Accents relationships are discussed in

Chapter 10 and summarised here. Accents in a single subsystem can create vividness but not

synchronization. When accents occur in two or more subsystems at more or less the same

time, the synchronization that occurs makes the subsystems vivid at that particular time. Three

of the types of accent relationship states are based on Cook's multimedia models

(conformance, complementation and contest). As is done for association, Cook's three type of

relationships are expanded to include a compatible state, that of no synchronization or no

accents. It would be unusual in entertainment if there were no synchronization or no accents,

but likely in many news stories.
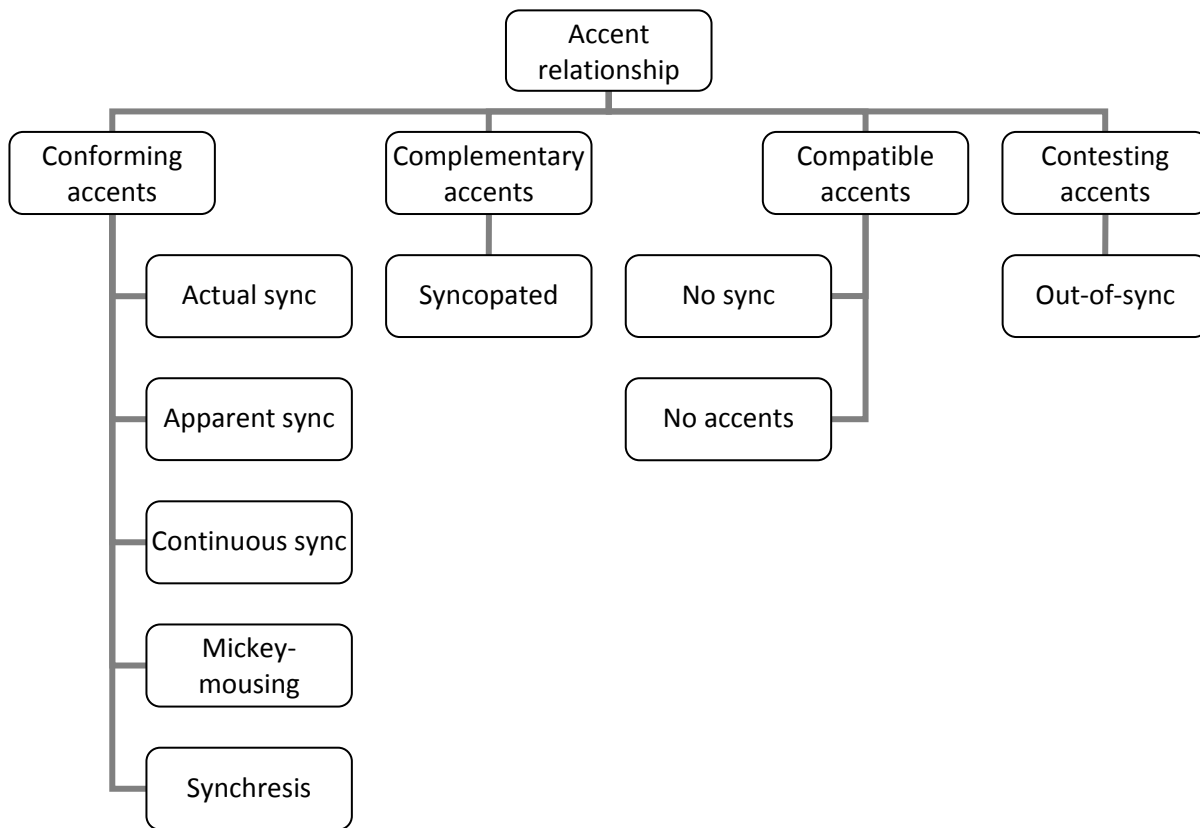
Figure 12-9 Accent relationships

Conforming synchronization occurs when the emphasis points of two or more media

coincide. There are five different ways synchronization can occur, or at least appear to occur:

actual, apparent, continuous, mickey-mousing and synchresis. Actual sync occurs when the

synchronization is actually present. Apparent sync occurs for a number of reasons as

discussed in Chapter 10 including when the subsystems are out-of sync by only a small time

difference and appear to be synchronized. Continuous sync occurs with gradual changes over

time where these changes are in parallel in the subsystems. Mickey-mousing occurs where the

synchronization is almost continuously close, as occurs in cartoons. Synchresis is when

synchronization causes an association between sound and image. Complementary

synchronization is syncopated, such as when the accents occur on the offbeat. Nothing should

seem wrong or grating with complementary-sync. Compatible relationships occur when there is no synchronization between subsystems or no accents in any subsystem. Contesting synchronization occurs with out-of-sync states and is easily identified because the combination of subsystems sounds wrong.

Concluding remarks

"The climate of technological change in the early 21st century forecasts a rise in multimedia, and our access to it", and that being the case, the relevance of multimedia analysis is not as yet fully understood or appreciated (Mailman 2002/2003: 226). This is especially pertinent given that "emergence is a defining attribute of multimedia" (Cook 1998: 71) and that meanings in multimedia are created from the many relationships in a multimedia text along with the intermedia perturbations generated from these relationships. Both the relationships and the intermedia perturbations are often complex and difficult to analyse and understand. In addition, the issues involved in multimedia news are more nuanced than in entertainment or advertising. In a multimedia text, there are many subsystems and each subsystem carries a meaning. These meanings have a temporal component that unfolds based on our experiences, education and culture, so meanings change over time. In addition, the subsystems in multimedia interact with varying results. Some meanings might be dominant at one point but not at another; some might be lost because there is too much to attend to or process; some might be misinterpreted; other meanings are unconsciously created; and some might be perfectly clear. Multimedia news can be used to perpetuate cultural norms, beliefs or potentially challenge them. Only if we are critically assessing and analysing each component for the meaning it conveys can we come to understand: i) what is being communicated, ii) what beliefs are implicit, and iii) what might be challenged. The proposed model addresses the problems of analysing multimedia by breaking down the analysis into more manageable

tasks that can be easily understood. In addition, the model outlines a systematic method of

examining multimedia.

Chapter 13 Application of the Model to Multimedia

Introduction

The aim of the following analyses is to provide examples of how the proposed theory of multimedia can be used to determine whether the meaning of the message is likely to be distorted by intermedia perturbations generated by subsystems. Both analyses are of science reports shown on the *Catalyst* television series of the Australian Government owned broadcaster, the ABC.

Analysis of news science report *Mt Ruapehu*

Mt Ruapehu (ABC 2010b) is a report about New Zealand's Mt Ruapehu volcano and its dangerous lahars (lava flows). The first few moments start with the sound of dramatic music that is similar to the theme music used in the movie *The Lord of the Rings*. Next, the presenter introduces locations that were filmed for the movie and states that he is standing in the plains of Mordor and the volcano in the distance is Mt Doom where the ring was taken to be destroyed. The next scene is of images of smoke and ash billowing from Mt Ruapehu accompanied by the sounds of a volcanic eruption. The remainder of the report explains lahars, their dangers and their warning systems, and discusses the people who live and holiday at the volcanic location. The reports end with the presenter commenting on the potential danger of another adjacent volcano. The report message is of lahars, their history, their danger to the people who live in and visit the area, and the beliefs about lahars of those people native to the area.

The proposed theory of multimedia can be applied to this report. The report starts with images of a volcano accompanied by the *Lord of the Rings* theme music. The music is at the centre of centre/periphery differentiation due to the vividness, created by it being loud with a strong beat and having a clear meaning due to it being easily recognisable as *Lord of the Rings*. The meaning of music is often not clear but in this case it is an obvious reference to the

movie, so there is no ambiguity of meaning with such widely known music. This is an example of a complementary state and centre/periphery differentiation, with music at the centre grabbing attention due to its vividness created by association, loudness and a strong beat. The images could be from many places and are not particularly vivid and do not command the same level of attention as the music so are at the periphery. Both music and image conform because they are about Mt Doom, they have the same meaning and there is nothing out of sync. The images of volcanoes support the music and its meaning about the dangerous journey undertaken to dispose of the ring. The *Lord of the Rings* music and the images of the volcano support the report message that lahars and the areas surrounding the volcano are dangerous, especially given that many people have been killed travelling through the area when lahars occurred.

In the next scene the presenter introduces locations from the *Lord of the Rings* movie. This is centre/periphery differentiation with language at the centre and the images at the periphery because there is nothing particularly outstanding or dramatic about the images. The subsystems conform because the images add no or little extra information and there is no conflict. The *Lord of the Rings* music and the information about the location of the movie has little relevance to the discussion on lahars that follows but it creates an interesting beginning.

The next scene is of smoke and ash billowing from Mt Ruapehu accompanied by the sounds of a volcanic eruption. The structure here is segmentary differentiation where both images and sounds are equally vivid and support the same message, that of danger. This is quickly followed by more explanations by the presenter. More benign images follow and the music volume is lowered, the voice moves to the centre and both images and music are at the periphery supporting the message carried by the voice. For much of the report that follows, voices take the centre position, especially during the talking-heads scenes. The remainder of the report explains lahars, their dangers and existing warning systems, as well as discussing the people who live and holiday at the volcanic location.

Normally the voice will remain dominant (that is, in the centre) but there is quite a lot of technical information provided and some of the audience might lose interest in the explanations and focus more on the images. With so much technical information, it would depend on the interests of the individual audience member as to whether or not the voice remained dominant. However, given that the target viewers of a health and science program are people who are interested in technical information, this may not be an issue. Functional differentiation occurs a number of times with various equipment being used to monitor the volcano. The purpose of the equipment is explained, accompanied by images of the specific equipment and at times specific parts of the equipment are pointed out. The presenter creates a dramatic ending with his comment that the problems of Mt Ruapehu are insignificant compared to an adjacent volcano because due to its large size, when this other volcano erupts, the world will know. This ending is not directly applicable to Mt Ruapehu but supports the report message; that of the danger of lahars created by volcanoes.

In *Mt Ruapehu,* all subsystems support the report message, either by conformance or complementation. There is no unintended synchronization and there is unlikely to be any ambiguity in this multimedia story. The only possibility of misunderstanding the report message is if the technical information is not understood or if the media combinations create information overload, but given the program is targeted at people with an interest in science, this seems unlikely. Even though some of the information is not particularly relevant and purely for entertainment, such as the references to *The Lord of the Rings*, all subsystems support the report message about lahars and their danger. While adding music and information from a fantasy movie could lead to conflict in a factual report, the mood of the movie, being about danger and power, and the relevance of the location to the movie, make this addition complementary rather than contesting. In *Mt Ruapehu,* there is no contest between the meaning of the subsystems. All subsystems support the report message and there

is no potential for a change in the meaning of the message. However, there is a change in the emotional level given that the addition of *Lord of the Rings* music is likely to make the story more exciting.

Analysis of news science report Animal Action

Animal Action: Cleaning Station for Sharks and Rays (ABC 2010a) is a science news report about sharks and rays going to a specific location to be cleaned by cleaner fish. The report is one minute forty-four seconds in length and the images are typical underwater shots of marine life. *Animal Action* is an example of multimedia where the use of synchronization results in a change of meaning of a subsystem, and the use of humour results in a change of the emotional type and level of the report message, but the overall meaning of the message remains unchanged.

The episode starts with three musical notes accompanying images of fish swimming. A voice-over using the phrase "fish folk" follows, then Hawaiian hula music starts. As the voice-over continues, there are more phrases that would not normally be used for marine life such as "successful businesses", "service station" and "beauty parlour", and it becomes apparent that these are meant to be humorous. This humour is reinforced by the hula music. There is no conflict or ambiguity in the first half of *Animal Action* but there is synchronization. Synchronization is often used to create and support humour. Apparent synchronization between music and image can occur with little and sometimes no specific editing, as is the case here because it appears that the fish are swimming in time with the music. When the video is watched without any sound, the fish movements lack the rhythm they appear to have when accompanied by the hula music.

The hula music is complementary to both the fish images and the message given that the underwater location and the music both have a relaxed, tropical atmosphere. The intermedia perturbations that are created by this music result in a change in the interpretation of the images of the fish because, due to the apparent (but not actual) rhythm in the images, the fish

appear to dance. This apparent rhythm occurs because rhythm dominates humans, and any sequence of pulses that is not overly slow or overly fast, will appear to have a rhythm even if there is none (Allen 1975: 75-9). The similarity of the rhythm between the hula music and images of fish swimming, and the fact that the similarity occurs within an acceptable window of time, allows the fish to absorb the rhythmic qualities of the music. Even though the music and images may not be exactly in sync, the time difference is within the acceptable window that allows apparent synchronization.

Figure 13-1 shows a multimedia event in the first half of *Animal Action* with centre-periphery differentiation with the images at the periphery and the voice-over at the centre. The images are at the periphery because they are slow moving. The voice-over is at the centre because of the vividness of the words which is further increased by the humorous and unusual descriptions of the event.
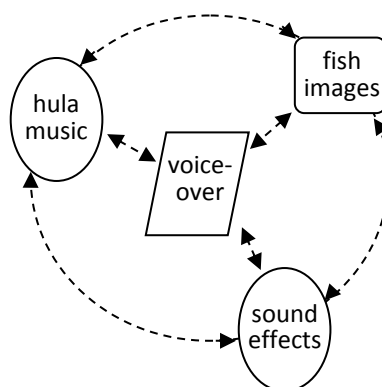
Figure 13-1 Centre-periphery differentiation in *Animal Action*

In the first half of Animal Action the music and images support the voice-over because they are either conforming or complementary. The intermedia perturbations generated by the music result in a change in the meaning of the images, but this change, where the fish appear to dance to the music, does not result in a change in the report message which is intended to present a humorous aspect to the cleaning habits of marine life.

In the second half of the story, the music is ambient and a little dissonant as it accompanies the slower, slightly more threatening movements of the large sharks and rays. This dissonance of the music, which is normally associated with fear, conforms to the images given that sharks and rays are normally considered dangerous. The music-image combination is now in contest with the humorous tone that continues in the voice-over. Because language is more precise than other media, it is not as easily influenced by intermedia perturbations as music and images. The meaning of the words is not changed but they now seem out of place and appear stilted because of this contest between humorous language and the slightly threatening music-image combination. This is centre/periphery differentiation with the voice-over continuing in the centre and the music and images at the periphery. The relationship state between the peripheral subsystems is conforming but the relationship state between the voice-over and the peripheral subsystems is contest.

For much of the report, the voice-over is at the centre of centre/periphery differentiation with music, images and sound effects at the periphery. Even so, these subsystems at the periphery do move to the centre for short periods. For example, in the first half when images of bubbles are shown, the voice-over stops momentarily and is replaced by the sounds of bubbles and these are briefly at the centre. The vividness of the bubbles is created by the synchronization of the sound and images and the gap created by the pause in the voice-over. In sum, in the first half, intermedia perturbations are created by the interaction of the hula music with the images and these perturbations result in the apparent synchronization of music and images. These intermedia perturbations change the meaning of the image, as occurs where the fish appear to dance, but they do not change the report message. However, these perturbations do result in a change of emotional level because the mood is more humorous. In the second half, intermedia perturbations generated by the music-image combination are in contest with the voice-over. The meaning of the voice-over is not changed, but the use of

humorous language in combination with dissonant music and images of dangerous marine life

is a little strange.

Concluding remarks

These two examples of the analysis of science news reports demonstrate how the

current model of multimedia can be used to describe interactions of media. At the time of

submission of the thesis, these episodes were still available on the ABC Catalyst website at

the addresses specified in the References section. In addition, a DVD with MP4 files of the

episodes accompanies the thesis.

Part IV Interactive Multimedia & News

Part IV Interactive Multimedia & News

Chapter 14 Survey of Online News

Introduction

The aim of this chapter is to present the findings of a survey of online news stories and their use of multimedia. The findings indicate that there are few examples of multimedia texts and limited content interactivity on those websites surveyed.

Online news

Online news has not been the commercial success that it was initially predicted to be, and the mass migration of readers of traditional news to online news has not occurred (Ahlers 2006: 29,48). In addition, there has not been a willingness to pay for online news (Chyi & Yang 2009: 594). It is often claimed that users expect content to be free on the Web and so expect news to be free. However, this is not necessarily the case. The low commercial success of online news contrasts dramatically with the popularity and success of online games and many of the most popular games are not free. This popularity of games can be measured by the number of users. For instance, a 2010 press release by the manufacturer stated that *World of Warcraft* players worldwide exceeded 12 million (Blizzard 2012). Originally, an initial payment and ongoing subscription was required for all levels. Today, due to competition, the lower levels can be played free of charge but the costs continue for the higher levels. It appears that users are happy to pay for quality games.

In contrast, attempts to charge any type of subscription for online news have generally been unsuccessful, and it is not clear why readers expect online news to be free while being willing to pay for the same information in printed newspapers (Chyi & Yang 2009: 594). The answer that the Web is expected to be free is inadequate, given that gamers are willing to pay for access to the higher levels of quality games, even though free games are available on the Web. In general, newspaper readers are apparently unwilling to pay for quality news on the Web.

Research in the USA shows that, from a microeconomics perspective, online news can be classified as "inferior goods" because as income increases, consumption of online news decreases; this is not the case with print newspapers where, with an increase in income, consumption increases (Chyi & Yang 2009: 595). It appears that readers have a lower opinion of online news compared to printed news and this is illogical given that many newspapers offer exactly the same material in both media (Chyi & Yang 2009: 596-8). While Chyi & Yang suggest a number of reasons for this discrepancy, no specific conclusion is reached. Additional issues for news organizations include the fact that even though readers appear willing to continue paying for print newspapers, they are not as popular as they once were, with the result that circulation is declining, and the majority of younger adults have given up following news completely (Chyi & Yang 2009: 594; Ahlers 2006: 29-30,48; Young 2010: 610-2). Such findings bode ill for the future of news organizations.

The Web as a new medium offers news organizations the opportunity to revive interest in news; however, this survey indicates that other than the use of hyperlinks there has been little in the way of new forms of online news stories that have resulted from the hybrid of newspapers, magazines and television. For instance, a common form of media on the Web is the video, but the same format of news video is common on television. In addition, research shows that online news videos are of little interest to young adults (Sturgill, Pierce & Wang 2010: 1,8,11,14). An interactive form of video with transcript has been developed, where the video and transcript are linked so that clicking on the transcript shows that part of the video and clicking on the video shows that part of the transcript (Jacobson 2012). However, none of the videos in the survey had this interactive facility.

Hypotheses

Hypothesis 1: News organisations are under utilizing the facilities of the Web, specifically, interactivity, for news story content, even though these facilities are utilized for other aspects of news websites.

Hypothesis 2: Online news stories are created using media from newspapers, radio and television which remain much the same as their original form and generally there is little innovation creating new forms of news for the Web.

The study

This study was conducted in the first half of 2012 on news stories and their webpages on six news websites (ABC, BBC, DW, F24, CNN and AJ [14]). These sites were chosen for a number of reasons including that they do not produce newspapers as their main activity. In 2004, it was stated that the development of multimedia in traditional news organizations, where newspapers are their main business has proceeded more slowly than in other organizations where newspapers were not the main business (Boczkowski 2004: 173). The chosen sites are not newspaper based and produce content for television. Given they are already producing a form of multimedia, it was predicted they would experiment with new and different forms of multimedia on the Web. Other reasons for selecting these sites included the fact that they are large, respected organizations and represent a range of cultures, as far as can be achieved given the requirement of the use of English, and so provide an indication of whether there are different approaches to communicating news over the Web in different cultures. All are government owned except CNN.

The focus of this study was on the individual news story webpage and the news story itself. It did not look at the website as a whole nor did it evaluate any pages other than the selected story pages. Other surveys (such as Barnhurst 2012) that refer to high level of content interactivity on news websites normally include evaluation of the home-page, customisation facilities and personalization features of the site. However, these were not included in this study.

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[14] Australian Broadcasting Corporation online news (ABC), British Broadcasting Corporation online news (BBC), Cable News Network online news (CNN), France 24 online news in English (F24), Deutsche Wella online news in English (DW), and Al Jazeera online news in English (AJ).

News stories with the highest prominence on the homepage were selected for evaluation. Ten news stories and their webpages from one of the news sites were evaluated every second or third day, with a total of one hundred and twenty stories examined. The stories evaluated were chosen for their apparent importance based on the title's positioning on the home page, the size of the title, whether it was accompanied by an image, and the size of the image. Lead stories on the website of a newspaper can vary significantly to the lead stories published in print by the same organization (Mensing & Greer 2006: 297). Therefore, it was assumed that the stories selected for analysis were not necessarily the top stories printed in newspapers, but that the online stories were selected by news organizations for access from their home page, at least in part, because they were considered suitable for the Web.

The website of each organization used different formats and layouts, and this made gathering comparative information somewhat difficult. Therefore, due to these inconsistencies, pages and stories were categorised based on specified criteria rather than the categories allocated by the news organization. For instance, a story was categorised as a special report if it contained at least five files such as videos, slideshows or audio files, and was a topic that had a longer life than a typical news story.

Almost all of the news story pages were available for many months and this made it easy to check any inconsistencies and to add additional information. However, the dynamic nature of the Web caused some difficulties. One example occurred with a story that initially used photos to accompany the written text but these photos were later replaced with videos. It appeared that the story had been put up as soon as it was written but there was a delay in preparing the videos so they followed later. This dynamic nature also meant that some aspects, such as the number of hyperlinks, could change over time. The data gathered included details of the type, number and size of the media (written text, video, photo, graphic, slideshow, audio), story and page word counts, and the details of hyperlinks. The page word count was a straightforward count of all the visible words on webpage. In addition, the

information collected included the type and level of interactivity, such as whether users could post comments, whether there were links to social networks, and whether the story consisted of grouped multimedia (separate multiple media), integrated multimedia (such as slideshows) or aggregated media (such as video), and to what extent users could control files such as videos.

A basic level of analysis was required to categorise many of the variables at the time they were collected. Even though this analysis was based on specified criteria, it made the information gathering somewhat slow and complex. Consistency was not an issue because the information was collected by a single researcher. Unless otherwise specified, all percentages are based on the total number of stories surveyed, and are rounded to the nearest whole number, except when the value is under ten percent when the percentage is shown with a decimal point if applicable.

Findings

Interpersonal multimedia

Almost all news story pages had access to one or more forms of interpersonal multimedia as shown in Figure 14-1. This access was in the form of a symbol with a hyperlink, such as the Facebook symbol "f" and Twitter bird symbol. Hyperlinks to access Facebook were present in almost all stories (99%) with Twitter running a close second (94%). Over two thirds (72%) had links to other social networks such as LinkedIn (categorised as "other" on the graph). However, these are hyperlinks which take the user away from the news organisation's website.

A facility for entering comments at the end of the story was available in a third of stories. A large majority (89%) had the facility to send an email from the page. There were fewer facilities to send feedback to the news organization (40%). This facility for feedback was available on all DW pages, most AJ pages, some F24 and some CNN pages. A third of

the pages had facilities to post a comment, which is surprising given the work involved in

vetting comments.
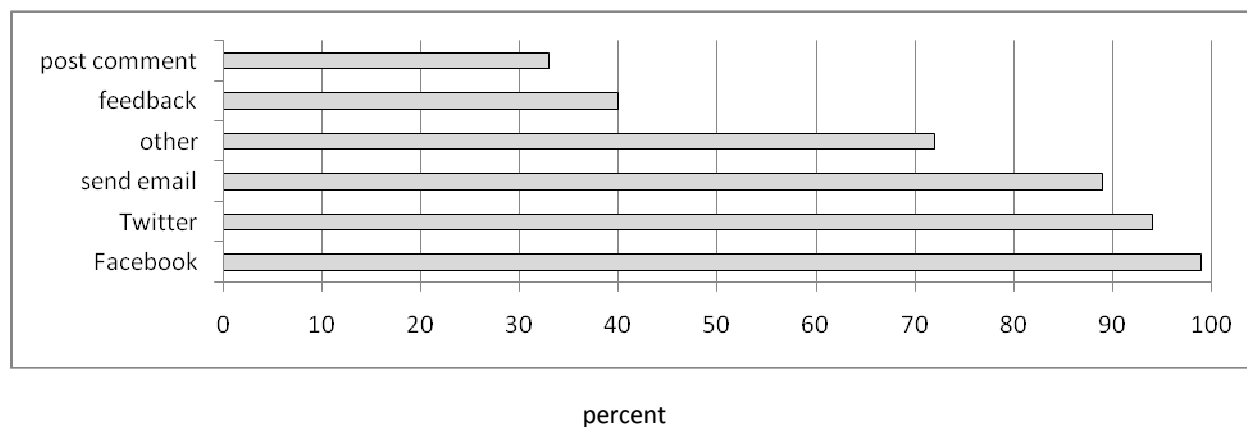
percent

Figure 14-1 Percentage of new story pages with interpersonal multimedia

Story content multimedia

Newspaper versus multimedia format

Figure 14-2 shows that less than a third of stories (29%) offered the same facilities as

newspapers (various combinations of written text and still images), while more than two

thirds (71%) offered some form of participation and control that could not have been

produced in a newspaper, such as with audio files, videos, slideshows, hyperlinks or in one

case, a search/menu facility.

percent
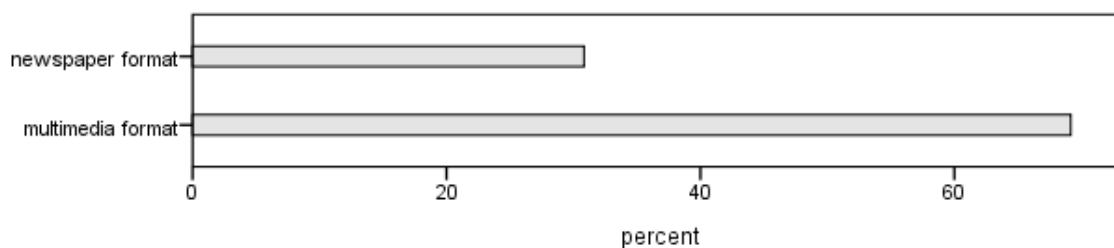
Figure 14-2 Newspaper format versus multimedia

Breakdown of story content

Figure 14-3 shows a table with the breakdown of the media within stories. Just over

two-thirds of stories contained still images (68%) and slightly more than half contained

videos (53%). Less than a third (29%) contained hyperlinks to subpages. Less than a quarter

of stories contained hyperlinks within the story text (22%), few contained either slideshows (5.8%) or audio files (4.2%), and only one story (.83%) had a search/or menu facility. This was a BBC story about Spain's financial crises containing a terminology lookup called a "jargon buster".
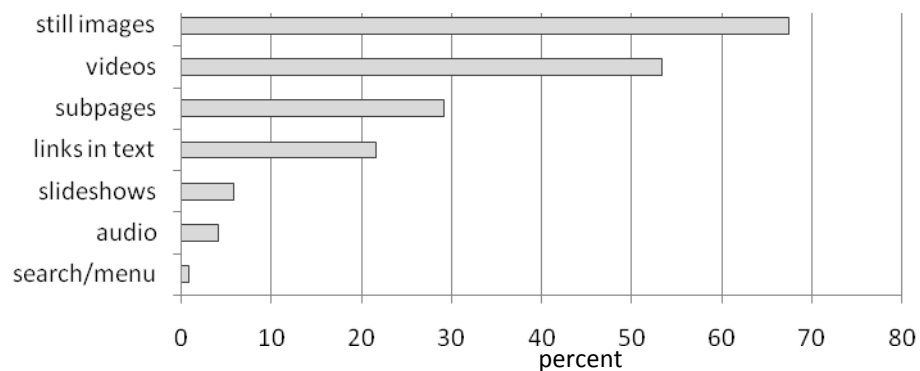
Figure 14-3 Table of breakdown of added media

Combinations of media in stories

Well over half of the stories (58%) contained no new forms of media for the Web, that is, they contained no hyperlinks in the text or hyperlinks to subpages, no slideshows and no search/menu facilities. Note that in this thesis, video and audio files are not considered as new forms of media. The various combinations of media are shown in Figure 14-4. The most common group was a mix of various media (42.5%) followed by the combination of still image(s) and written text (26%). The third most common combination was video(s) and written text (2.5%). All other combinations made up 9% of the stories. The combination of hyperlinks, still images and text occurred in 5.8% of stories. The last four groups shown in Figure 14-4 occurred in only a single story (0.83). These were slideshow and text only, hyperlinks within the text only, video only and text only. Other than the hyperlinks in the text only, hyperlinks refers to both hyperlinks in subpages and hyperlinks in the text.
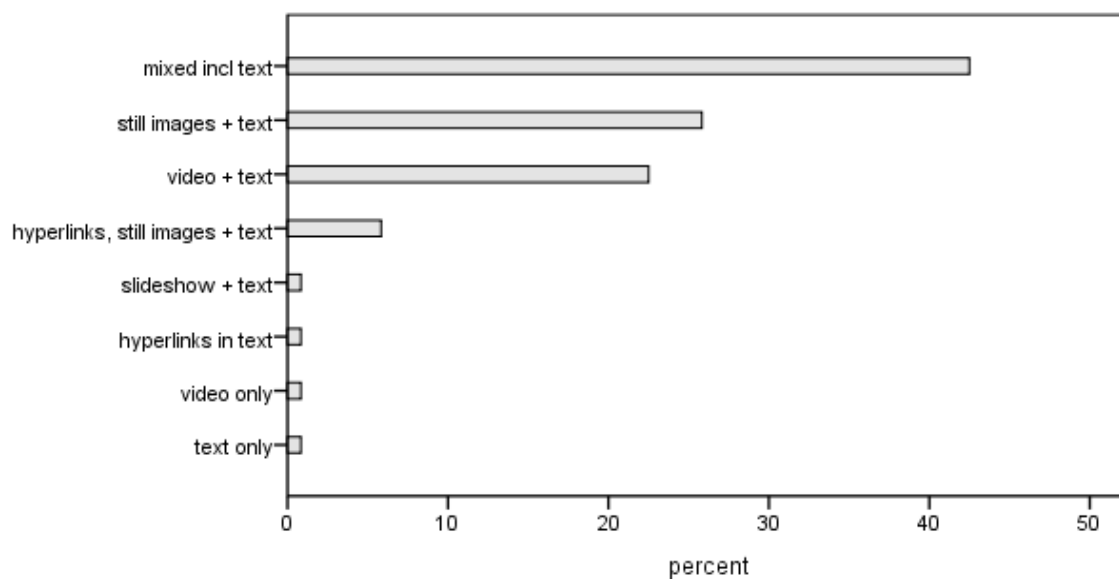
Figure 14-4. Percentage of stories by type of media

Videos

Number of videos: Over half (54%) of the stories had one or more videos, with most of these having only one as shown in Figure 14-5 but one story, the Queen's Diamond Jubilee, had 15 videos. On CNN sometimes a single video appeared in multiple stories, giving the impression of more videos than were actually available. None of the videos had an interactive transcript.
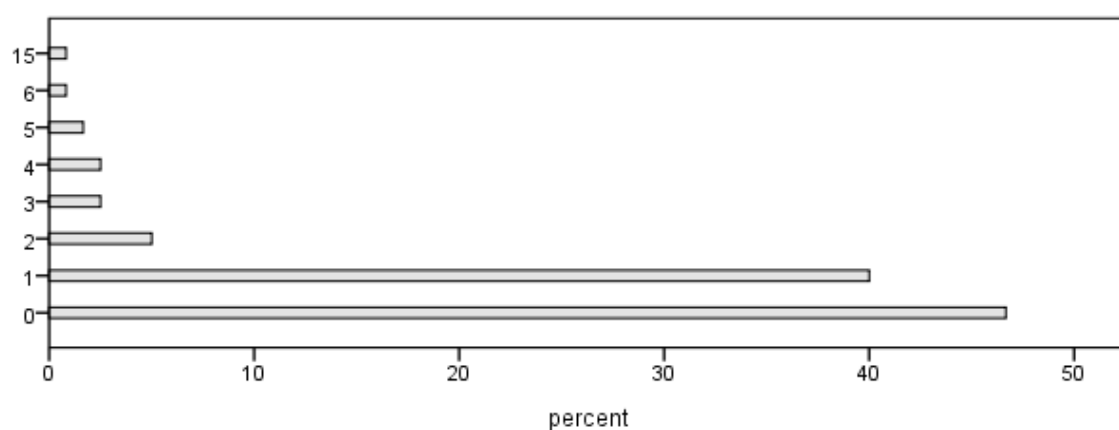
Figure 14-5 Number of videos for percentage of related stories

Length of videos: The average length of a video was 3'39". (Note that this form refers to minutes and seconds). When five very long videos (the longest 4.2%) were removed, this average dropped to 2'50" as shown in the table in Figure 14-6.

	Minimum	Maximum	Median	Mean
all videos	27"	25'13"	2'24"	3'39"
most videos (96%)	27"	9'50"	2'19"	2'50"

Figure 14-6 Summary of video lengths

Figure 14-7 shows the percentage of videos ranging from less than a minute to over 14 minutes. Only 8% of videos were less than a minute, 29% were between one and two minutes, and 28% were between two and three minutes, and 35% were three minutes or longer.
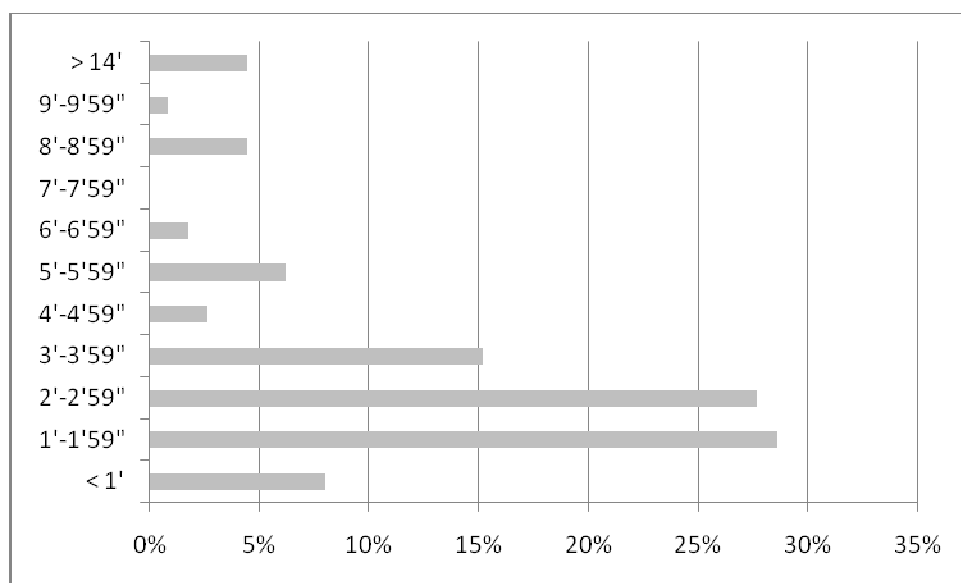
Figure 14-7 Ranges of video lengths from 1 second to 10 minutes

Video start mode: When looking specifically at stories with videos, Figure 14-8 shows that in slightly in over three quarters of stories that had videos (77%), the user had control of whether or not the video started, but in almost a quarter of the stories which had videos (23%) the video started automatically.
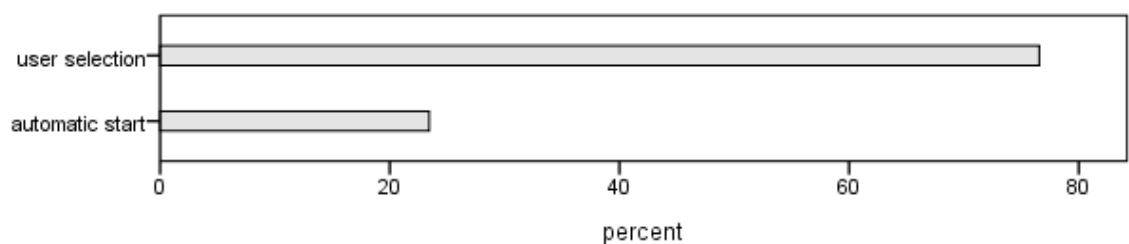
Figure 14-8 Video start mode

Advertisement precedes video: Figure 14-9 shows that of the stories that had videos, over a third (36%) had a video advertisement before at least the first news video. Of these stories that had an advertisement, just over half (52%) started automatically. This would have been particularly annoying for the users who did not want to watch the news video.
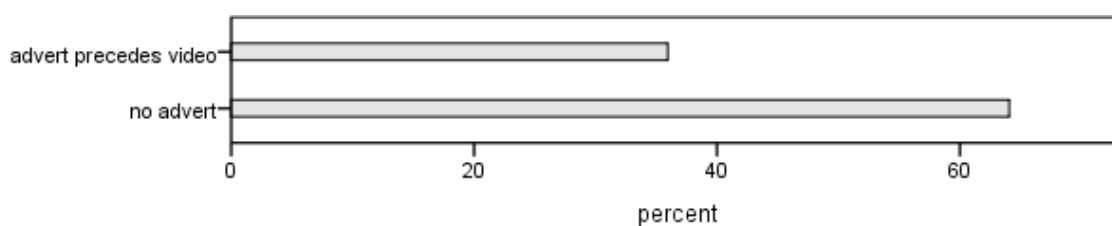
Figure 14-9 Advertisements preceding videos

Slideshows

There were few news stories with slideshows as is shown in Figure 14-10. Of the seven stories (5.8%) which had slideshows, one (0.83%) was a special report by F24 about the Cannes Film Festival. This report had twelve slideshows. The story with three slideshows was a special report by the ABC about the Queen's Diamond Jubilee. Of the other stories with slideshows, one story (0.83%) had two slideshows and four stories (3.3%) had a single slideshow.
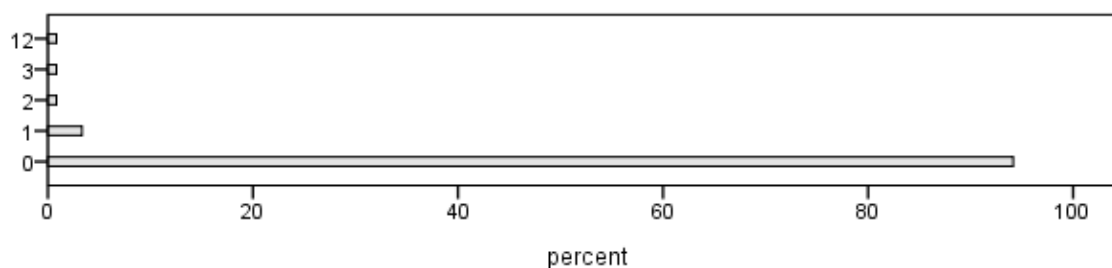
Figure 14-10 Number of slideshows per story

The slideshow format varied across news organizations but there was a level of consistency within a news site. All of the slideshows had thumbnails and all photographs were accompanied by written text. The presentation of the text varied across sites with CNN offering the highest level of story content interactivity. For instance, one of the CNN

slideshows, which reported on the United Nations Earth Summit, had a timeline that allowed photos accompanied by text to be selected based on the time period. Others had a text window which could be turned on or off with one slideshow having a story about each photograph where the text window scrolled. The F24 slideshows displayed the text automatically below the photograph, while the ABC slideshows displayed the written text only when the top of the photograph was rolled over with the curser. This was cumbersome because if the cursor was accidently rolled off the text, the text disappeared prematurely. None of the slideshows in this survey included audio.

Audio files

Figure 14-11 shows that most stories (96%) did not contain an audio file and for the five stories (4%) that did contain audio, the length of the files ranged between 2'43" and 6'10".
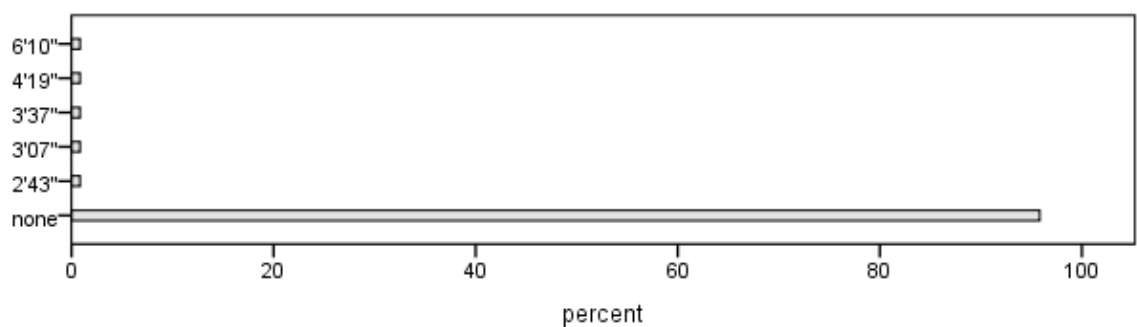
Figure 14-11 Audio files per story

Hyperlinks

Navigational multimedia in the form of hyperlinks were used in both interpersonal and story content multimedia. Hyperlinks can be used to accompany stories and to be part of the content of the story. Hyperlinks used in news stories can include links to subpages to different pages about the same story, links to pages with related but different stories, links to pages of unrelated stories, links to pages with details and stories of the journalist, and links to another section within the same story. Data on three categories of hyperlinks were collected and these were hyperlinks within the story, subpage hyperlinks and related story hyperlinks. Story

hyperlinks were defined as words within the story with a hyperlink. Subpage hyperlinks were defined as title of a subpage with a hyperlink. Related story hyperlinks were defined as a title of a related story with a hyperlink. Note that at times it was difficult to decide whether a page was a subpage or a related story. This was normally judged by the placement of the hyperlink. If the hyperlink was within the story, it was normally categorised as being a subpage. If it was at the end, it was normally categorised as a related story.

Hyperlinks within story text

Figure 14-12 shows the number of hyperlinks within the written text by percentage of stories, with 77% of stories having no hyperlinks within the text. This was in contrast to the normally large number of hyperlinks on the page that were for other purposes including for advertising, social media, related stories and other stories which might have been of interest. Of the stories that had hyperlinks, 13% had one or two hyperlinks, and 10% of stories had three or more hyperlinks with a few having large numbers of hyperlinks. For instance, one story, a special report on CNN, had eighteen hyperlinks.
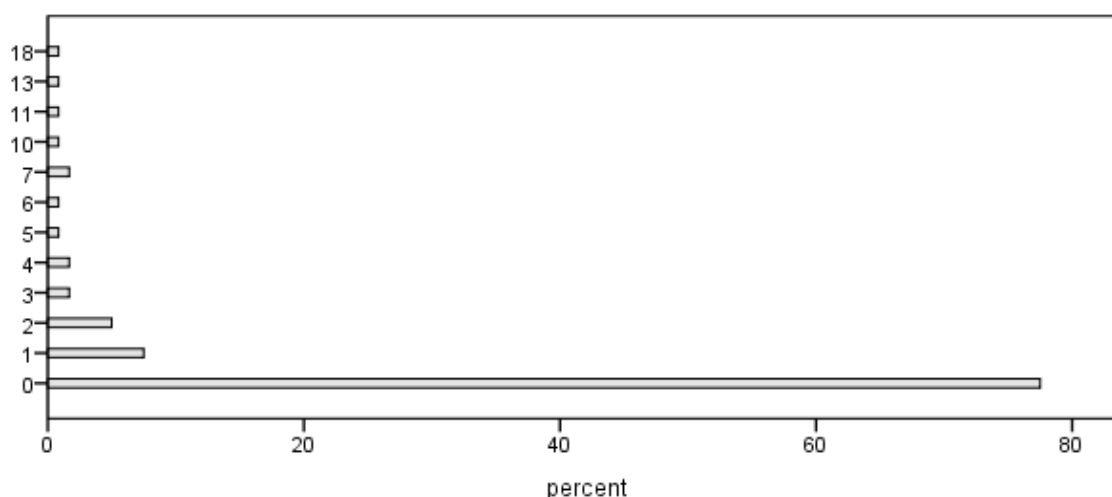
Figure 14-12 Number of hyperlinks in story text

A common hyperlink within the story was that of the reporter's name. Some hyperlinks served little purpose. A hyperlink that was irrelevant and possibly misleading was a story on the ABC about an Australian athlete that had a link to a Google map of Australia which

showed little more than the country surrounded by ocean. Anyone reading a story about an

Australian athlete on an Australian website would be likely to be familiar with the location of

Australia. Much worse was that it could be claimed the map was misleading because the

Google locator was placed in the centre of Australia. Australians know that the very centre of

Australia is uninhabited desert but a person from another country might think it indicated the

athlete's home.

Subpage hyperlinks

Under a third of stories (29%) had hyperlinks to subpages. Figure 14-13 shows the

number of subpage hyperlinks in a story by the percentage of news stories. Two thirds of

stories had no subpages but some had very high numbers of subpages such as a CNN story

about the Middle East which had 29 subpages, and a BBC story on political topic, which had

26 subpages. Many of the stories which included subpages were special reports which

covered topics that had a long life such as the Cannes Film Festival, the Queens Jubilee and

the financial crises in Europe and the effect on the Euro. However, many others were reports

that did not have a long life but attracted a great deal of attention such as Middle East

conflicts. Particularly CNN, France24 and the BBC made substantial use of special reports

with large numbers of subpages, but DW had no special reports and only two of its news

stories had a single subpage.
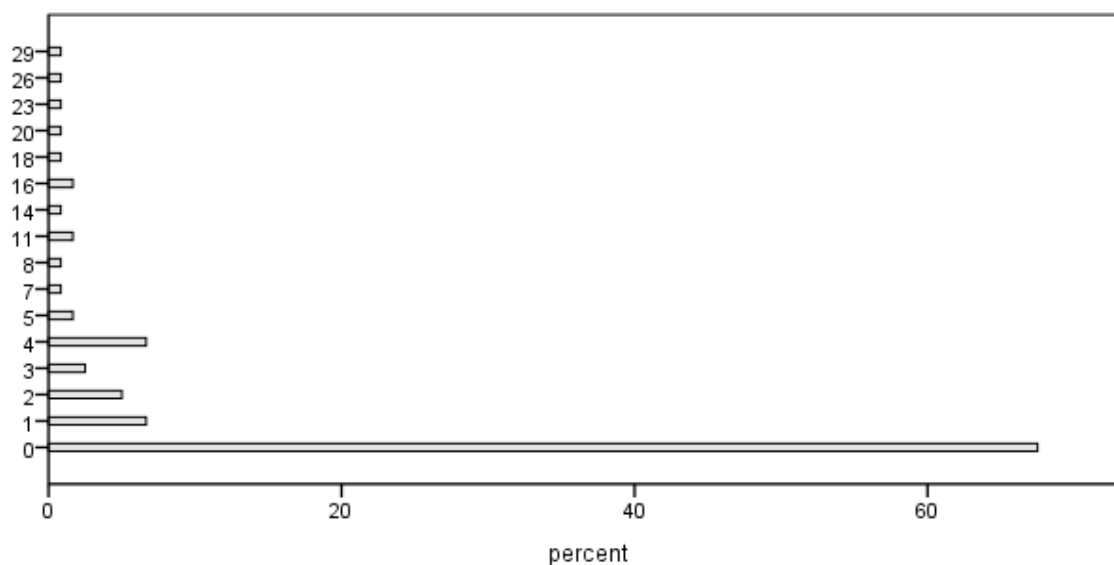
Figure 14-13 Number of hyperlinks of subpages by percentage of stories

Related story hyperlinks

Almost two thirds (62%) of the stories surveyed had hyperlinks to related stories. As shown in Figure 14-14, several stories had very large numbers of related hyperlinks. For instance, two BBC stories (1.66%) had 32 hyperlinks each; one story (0.83%) was of Breivik, the Swedish mass murderer and the other was on politics in Egypt. In addition, one BBC story on Syria had 28 links, and a CNN story on soccer had 26 links.
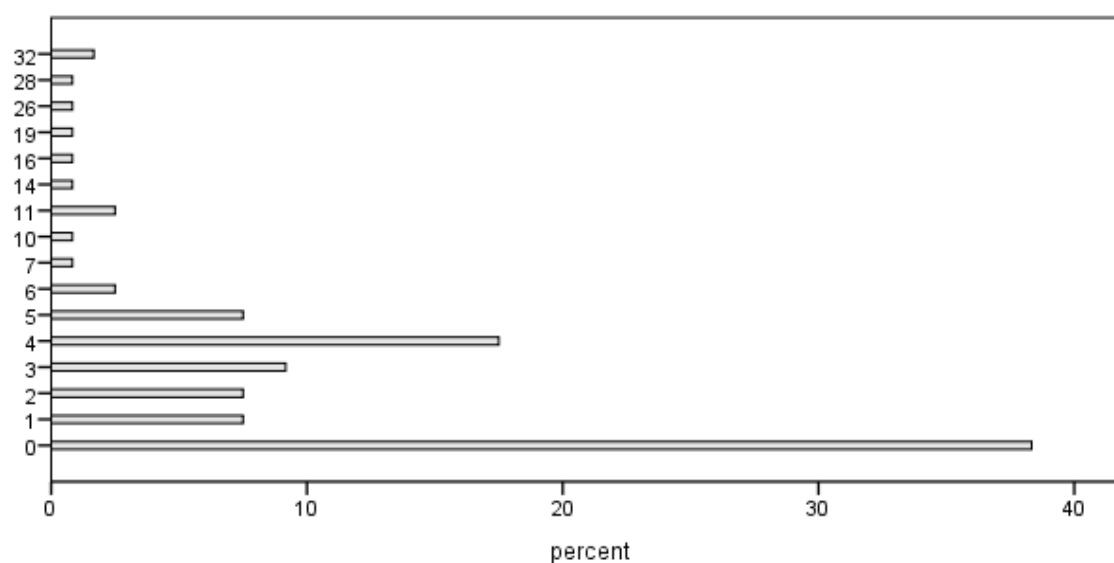
Figure 14-14 Number of hyperlinks of related stories by percentage of stories

Story content interactivity

The interactivity level of the story content was measured. Facilities such as interactivity that allowed customization and personalization of the website and home page interactivity were not evaluated. Audio files were not included for two reasons. The first was that all audio files had only a stop-start facility. The second was that each of the five stories that had audio files had only one audio file, so no interactivity was provided from choice of audio files and few details about the content of the file was provided. In addition, there is little interest in audio files (Sturgill, Pierce & Wang 2010: 12).

A low level of story interactivity was defined as 1-2 hyperlinks and/or the ability to stop/start a single video. A medium level was defined as 3-9 hyperlinks and/or 2 videos that could be accessed individually so the interactivity comes from the choice of videos. Medium+ level was defined as 10+ hyperlinks and/or 3+ videos. A high level was defined as slideshows or interactive facilities such as a search option or menu.

In just over 80% of stories, there was no or a low level story content interactivity. Figure 14-15 shows that there were few medium (2.5%) and medium+ (11%) stories. Other than the control bar on the video player, which gives an extremely limited level of control and is not considered interactive, there was no facility that provided interactive control of video content. Only the slideshows and the BBC story with a "jargon buster" search facility were classified as high interactivity (6.7%).
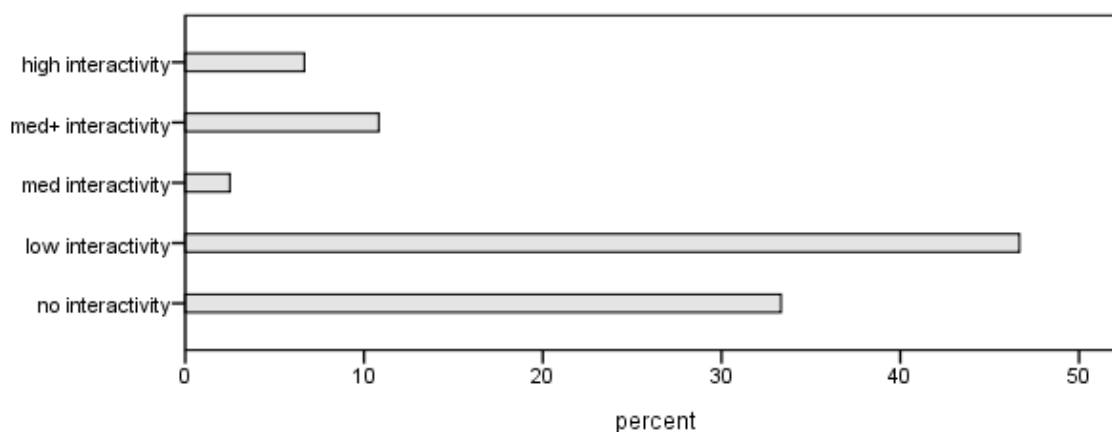
Figure 14-15 Story content interactivity level

Discussion

Interactivity

Hypothesis 1: News organisations are under utilizing the facilities of the Web, specifically interactivity, for news story content, even though they are utilized for other aspects of news websites.

A number of research studies in the late 1990s indicated that online journalism lacked interactive facilities (Quandt 2008: 718) and in some aspects this continues today, even though in many respects there is a large amount of interactivity.

The news stories surveyed indicate that there is substantial interactivity available with interpersonal multimedia from facilities such as hyperlinks to social networks, emails and comments at the end of a story. This is very different to earlier studies. For example, a 1999 study of one hundred U.S.A. newspapers found that online newspapers provided only "token interactive options" for audience communication with the news organisation, the journalist and other readers (Schultz 1999). This is not unexpected given that social networks such as Facebook and Twitter were not established until the 2000s and today social networks provide the majority of news audience interaction, Even though social networks take the user away from the news website, their use is promoted by the news organisations.

The current survey showed that today there are substantial opportunities for interpersonal interactivity but the level of interactivity is considerably lower for story content. A large majority of stories offer either no or low story content interactivity, and the interactivity that was offered was mainly through hyperlinks.

Hyperlinks

Four types of hyperlinks were surveyed: hyperlinks to social networks, hyperlinks within the text, hyperlinks to subpages, and hyperlinks to related pages. Hyperlinks to social networks were classified as interpersonal multimedia while the other three were classified as content multimedia. Almost all pages had some form of interpersonal hyperlinks such as links to Facebook and a third of stories had facilities for user comments at the end of the story. However, hyperlinks to social media take the user away from the site and so seem to be of limited value to news organizations, whereas comments at the end of a story keep the user on the news site but require maintenance, since news organizations are expected to vet content posted on their site.

Less than a quarter of the stories contained hyperlinks within the written text. It was surprising this number was not greater given that they are easy for news organizations to include. However, there is the issue of maintenance if the linked page is deleted or moved. Hyperlinks to subpages were present in just under a third of stories, while hyperlinks to related stories were present in almost two thirds of stories. Even though related story links are classified as content multimedia, they are not part of the story content.

Hyperlinks provided interactivity in both interpersonal and content multimedia. However, the use of hyperlinks to provide more information to an already complete story may not have met the needs of most users. One of the important purposes of hyperlinks is to expand from a more condensed starting point, but news stories normally do not use this structure since each news story is normally complete in itself.

Slideshows

Slideshows were one of two forms of integrated multimedia that provided interactivity, but they occurred in only a small number of stories (5.8%). All slideshows consisted of a series of photos with each photo accompanied by text that was displayed either automatically or by the user. All had thumbnails that provided a preview facility allowing the photos to be viewed in a random sequence. One CNN slideshow on the U.N. Earth Summit had a timeline that allowed selection of photos for a specified time period, and this was an interesting and useful addition. However, there were few slideshows and they were visual only with no audio. The low use of slideshows is surprising given their popularity shown in other research (Sturgill, Pierce & Wang 2010: 12; Bergland, Crawford, Noe & Ellsworth 2008). In addition, the current results are very different to the results of Jacobson's 2007 survey of multimedia on the New York Times website which showed that slideshows used in stories far outnumbered videos in a ratio of around 8: 5 (Jacobson 2010: 68). One reason for this difference could be that the New York Times was originally newspaper based and so is more photograph oriented, whereas organizations which produce television content, as are those in this survey, are more video oriented. Another significant difference is that large numbers of US newspapers produce audio slideshows, which are photo slideshows with audio (Bergland, Crawford, Noe & Ellsworth 2008; Hermida 2008), but none of the slideshows in the current survey contained audio.

Search or menu facilities

Less than 1% of stories (a single story) offered interactivity in the form of a search/menu facility. This was a BBC story on Spain's financial crisis and included a "jargon buster". This facility allowed users to look up the meaning of a financial term and provided a useful and interesting form of interactivity. This type of interactivity was underutilized by the news organizations surveyed.

Audio

There were few audio files (4.2% of stories), but this is not surprising given that previous research has found users show little interest in audio (Sturgill, Pierce & Wang 2010: 12) and a study found that the New York Times used only one audio file on its website in 2007 (Jacobson 2010: 68).

Videos

Videos were present in slightly more than half of all stories and 92% were longer than one minute. This was surprising given that research discussed in Chapter 1 found that young adults complained of lack of control with videos, that they took too long to load, they contained too little information for the time spent watching them, and they were "generally less informative than articles" (Sturgill, Pierce & Wang 2010: 11-2).

The current survey found that video interactivity was limited to using a timing control bar that does little more than allow the user to stop and start the video. This is barely interactive and is much the same as turning a radio or television on and off. While a timing bar allows the user to skip the video forward there is no control of what information is missed or viewed. This control bar is less sophisticated than a CD player, which uses tracks to allow the user to select a particular song. However, a video on the Web can allow the user to choose when to watch it. However, the level of interactivity was further reduced when videos started automatically, which occurred in almost a quarter of the stories with videos. This automatic start would be likely to annoy those users who did not want to watch videos.

The BBC and CNN had video advertisements before many of their news videos. It was surprising that the BBC had advertisements given that it is government owned and none of the other government owned news organizations used advertisements. The information value for time spent is particularly low if one must first watch advertising. This is especially the case when the video, and therefore the advertising, starts automatically, which occurred in slightly

more than half of the stories that used pre-video advertisements. Research of young adults showed they "deplored" advertisements preceding a video story, feeling this advertising "violated their sense of control" (Sturgill, Pierce & Wang 2010: 11-2).

The restricted interactivity of the current form of videos will not meet the expectations of users who have become accustomed to being in control of their Web access. Similar videos might be acceptable on television news because television encourages a "couch-potato" approach but Web users are used to active involvement with content.

A preference in news stories for written text over video on the Web (Sturgill, Pierce & Wang 2010: 12) can be explained from the perspective that current news videos provide less interactivity than written text because text can be visually scanned, whereas a video must be watched the entire way through to determine the content. DW's low use of videos may give the impression that it underutilizes the Web's capacity for multimedia and interactivity but it may well be closer to satisfying user needs than the other news sites surveyed that contained high levels of videos.

Interactivity level for stories

Most stories (80%) had either no interactivity or a low level of interactivity, and most of the content within the story was much the same as in newspapers or on television. While sideshows and a single search-menu facility offered medium to high levels of interactivity, they were few and none were audio-visual.

Conclusion for hypothesis 1

The organizations surveyed have utilized substantial amounts of interactivity in interpersonal multimedia but this has been done to a lesser extent with story content multimedia. In story content multimedia, news organizations have taken non-participatory television and radio content and put it on the Web without regard to the facilities which make the Web popular, interactivity, which provides participation, control and non-sequential access. Other than the stories with slideshows, the "jargon buster" search facility, and stories

that had large numbers of videos or subpages, choice was mostly limited to whether to read all of the written text and, if there was a video, whether to watch it. However, in the stories that contained a video that started automatically even this limited control was removed. Thus hypothesis 1 was found to be correct. Even so, it was surprising just how little control of story content users were given.

Re-use of media

Hypothesis 2: Online news stories are created using media from newspapers, radio and television which remain much the same as their original form, and generally there is little innovation creating new forms of news for the Web.

Media

The prediction that the surveyed news organizations would experiment with new and different forms of multimedia on the Web because they were already producing a form of multimedia (videos for television) was not correct. New forms of media have been introduced onto webpages for interpersonal multimedia but for the most part, story content media has been used in its previous form. The only new forms of story content media were slideshows, a search/menu facility, and hyperlinks, but over half of the stories (58%) did not contain any of these, and the most common addition to stories was videos which were in the same format as on television. The news organizations surveyed, with the exception of DW, appear to have taken large amounts of television content in the form of non-participatory videos, and reused them on the Web. While slideshows and a search/menu facility were new forms, they were under utilized by the news organizations surveyed.

Integration of media to create new media

Integration of content was limited. There were no fully integrated audio-visual stories, with most stories consisting of multiple separate media that were not integrated other than being on the same webpage. It appears that little has changed since MacGregor's comment

that "integration of content is progressing only slowly" and there is little evidence of interwoven multimedia narrative (MacGregor 2003: 9). This lack of integration was especially noticeable in stories that presented large quantities of information.

McLuhan stated that in the past, news proceeded slowly, giving time to "provide perspectives, background and interrelations" thus providing a "consumer package", but the speed of news today means this is not possible and the reader is provided with a "do-it-yourself kit" (McLuhan 2005: 8). In other words, news in the past was presented within a context created by the journalist and included analysis, but with the fast pace of life today, and particularly the rush to release news, users must perform these activities themselves. This "do-it-yourself kit" has been created in on-line news by providing large numbers of videos and subpages.

An example of a do-it-yourself kit was a special report on the ABC about the Queen's Diamond Jubilee which had fifteen videos on the same page. These would have been easy to assemble given they were initially for television coverage. This large number of files leaves the user with much to do but little control because it is similar to having multiple radio and television stations to select from and this is not considered as interactive as the term is used with the Web. For information be considered as interactive, a search or menu facility is necessary. Search engines provide this on the Web and without them the large quantities of information available would be almost useless.

Conclusion for hypothesis 2

Content has been taken from newspapers, television and radio and included in news stories without adapting it for the Web. There has been some integration of content such slideshows and the jargon buster search/menu facility but these were in a minority of stories, and normally these stories contained other media that were not integrated. While videos were unified, they were the same as used on television so were not suitable for the Web. Therefore, hypothesis 2 was found to be correct.

Weaknesses in the study

It could be claimed that the study of one hundred and twenty stories was inadequate and that a higher number is necessary to draw conclusions; but the results are far from marginal and would need to change dramatically before a different conclusion could be reached. Some results would be somewhat different if either DW or CNN were removed, given that DW used fewer videos than average and CNN used more, but when both are included they tend to cancel out each other and the results are in line with the other four news organizations' websites. In addition, DW also had no special reports while CNN had the largest number, but the results from other organizations were spread between the two. Therefore, DW and CNN tended to cancel each other out. While a larger number of stories would be unlikely to change the conclusions, different types of websites, such as those of newspaper based organizations, would be likely to yield different results and different conclusions.

Comparison to other surveys

Story content multimedia in this survey was found to be significantly higher than in a survey conducted in 2010 of the online sites of four Swedish newspapers where on average only a quarter of stories had story content multimedia (Karlsson & Clerwall 2012: 557), but it would be wrong to assume that story content multimedia has increased since that study. This current survey, conducted in the first half of 2012, found more than two thirds (69%) of stories had story content multimedia (hyperlinks, audio files, slideshows and videos). While it is possible this difference has occurred due to an increase in multimedia over the last couple of years, this reason is considered unlikely given the majority of stories included videos and there were few with slideshows. As previously stated, on the New York Times site, slideshows substantially outnumbered videos (Jacobson 2010: 68). It is more likely that this dramatic difference can be attributed to the earlier survey being conducted on websites of traditional newspapers, as opposed to the current survey which covered news organizations

that produce videos for television news and do not produce newspapers. Another difference between the sites in the current study and previous studies was that the current survey found no videos with interactive transcripts. Interactive videos are offered by many news websites including that of the New York Times; however, the New York Times is extremely innovative and has won many awards for their innovative multimedia so may not be a typical news site (Jacobson 2012).

Concluding remarks

The Web is a participatory audio-visual medium which can provide users with a high level of control over content. However, the vast majority of news stories evaluated in this survey cannot be categorised as multimedia texts nor can they be considered as interactive given today's user expectations of interactivity. Therefore, at least on the websites canvassed, news stories on the Web have not yet reached their full potential.

Chapter 15 Interactivity & News

Introduction

The aim of this chapter is to argue that the message of the Internet and the Web is interactivity, and that the three attributes that create interactivity are control, participation and multiple sensory modes. It is claimed that one of the main reasons that online news is not as popular as has been predicted is that news organisations underutilize interactive multimedia in news story content, and that creating interactive stories can raise interest levels in online news. The current low levels of interactivity in news stories limit the ability of users to be in control and to meet their requirements by accessing less but more specific information. The concept of less-is-more is one of the key expectations of Web users and is currently not met by online news. In addition, the playfulness and user created content that users expect from online access is not normally available within news stories, and this can be remedied through various means including the use of menus, choices and gamification of content as opposed to newsgames.

The Internet and "participatism"

The Internet has been described as "the most postmodern thing on the planet" and even though it has been claimed that the era of postmodernism finished several decades ago, the Internet is thriving and continues to be characterized by a number of postmodern attributes (Docx 2011). For instance, key attributes of postmodernism include playfulness, construction, bricolage, complexity, speed, disjointedness and disorder (Firat & Dholakia 2006:127-9; Docx 2011) and these remain key attributes of the Internet and the Web. However, given the variety, flexibility, influence and extensiveness of the Internet and Web it might be possible to claim they have just about any attributes.

While many agree that the era of postmodernism has passed, there are different opinions of what has replaced it. Its successor has been stated variously as the "me generation" (Capilla

2012), "alter-modernism" (Sun 2009), and "pseudo-modernism" (Kirby 2006). The term "participatism" is suggested then discarded because it is too much of a mouthful and "trans-modernism" is proposed in its place (Basulto 2009). However, given research showing the current generation of young adults have an "overriding desire for control" (Sturgill, Pierce & Wang 2010: 7-11), and given the outstanding success of websites such as Facebook, Twitter and YouTube, "participatism" is the most appropriate successor. This desire for control, which comes from young adults, indicates there is a substantial difference between older and younger consumers. Older consumers tend to be passive, silent, predictable and follow the rules whereas younger consumers are normally active, migratory, noisy and public (Jenkins 2006: 18-9), and younger consumers are voting with their feet to insist that they be given greater participation by showing little interest in news and using social networks as their main source of information.

Participation is a characteristic of democracy, but one which has been eroded as freedom is taken away by governments in the name of fighting terrorism. In addition, democracy has been undermined surreptitiously by marketers using liminal and subliminal techniques to create unneeded needs. This situation – a reduction of democracy – is less likely to continue to the same extent given that currently there is evidence of the demand for increased participation in many aspects of society via the Internet. An example of the influence of this participation is the web-based political lobby group GetUp, who claim that the Australian Clean Energy Bill legislation (2011) was in part due to their efforts. Most of GetUp's communication with members and the majority of its pressure on governments and organisations is conducted via the Internet.

The Internet and the Web have become a critical part of modern life, and organisations that "fail to make their peace with this new participatory culture will face declining goodwill and diminished revenues" (Jenkins 2006: 24).This trend can be seen with the falling revenues of the news industry (Pew 2011).

The message of the Internet and Web: Interactivity

It is clear that McLuhan understood that future technologies would provide a type and level of interactivity not previously experienced. In his oft-quoted prediction, he described what was later called the Web, as the medium that would follow television. In 1962, he stated a future medium would, "include television as its content, not as its environment", "transform television into an art form", and use a "computer as a research and communication instrument" which "could enhance retrieval", "obsolesce mass library organization", "retrieve the individual's encyclopedic function", "flip into a private line", and deliver "speedily tailored data of a saleable kind" (Kerckhove 2014: 61)[15]. This statement predicts: the use of television content on news sites and YouTube; online encyclopaedias and dictionaries such as Wikipedia and The Free Dictionary; online blogs and social networks such as Facebook; the ability to locate specific information with a multitude of search engines including Google; the ability to communicate with email; and, the commercial success of advertising on the Web.

Interactivity and the Internet have become synonymous, but this was not always the case. The Internet was available worldwide in the 1980s but was used by few people other than academics and technical specialists; with searches of common topics at that time often returning little or nothing. There was a saying at the time that "a couple of hours on the Internet can save minutes in the library". It was only with a more mature Web and facilities such as Google (generally available late 1999/early 2000), Facebook (launched in 2004), YouTube (available to the public in 2005), and Twitter (launched in 2006), and the interactivity this maturity provided, that the average person became involved in accessing and creating content.

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[15] The reference Kerckhove gives for this quote (page 158 of the 1962 edition of *The Gutenberg Galaxy* published by University of Toronto Press) appears to be incorrect and I have been unable to confirm the original source even though the quote and reference appears extensively across the Web. However, this is not to doubt that McLuhan said this or something very close because the quote brings together various statements made throughout McLuhan's works and is consistent with terminology he generally uses.

Today, there is an expectation that the Web and the Internet should provide anything and everything that users ask of it. Such an expectation is not unfounded given that technological developments have created "epochal changes in contemporary human history" (Firat & Dholakia 2006: 123). A high level of interactivity is a key part of that expectation. The Web, as a medium, normally enables users to access what they want, when they want it, in the format they want it, and within an acceptable response time. Facilities on the Web such as hyperlinks and search engines provide a level of control not available in previous media and at a speed which is extremely fast compared to previous media. It is not only the flow of information that has sped up with technology such as with broadband but as Logan points out, the ability to access specific information quickly is provided by tools such as search engines, and this form of access explains the "intensification" of McLuhan's concepts when applied to the Web (Logan 2010: 46-7).

There is another aspect to interactivity on the Web. The Web is different to all other media because the Web offers multiple forms of sensory perception while at the same time it is interactive offering users the ability to control their access. McLuhan's statement that "previous technologies were partial and fragmentary, and the electric is total and inclusive" (McLuhan 1994: 57) applies more so to the Web than the media he ascribed it to. McLuhan used the term electric media to refer to the telegraph, radio and television.

It has been claimed that the Internet has five different attributes that can be referred to as messages including: i) two-way communication, ii) ease of access to information and dissemination of information, iii) continuous learning, iv) alignment and integration, and v) community (Logan 2010: 48-9). It is argued here that the message of both the Internet and the Web as a medium, as in the McLuhan defined "the medium is the message", is control and participation using multiple sensory modes, in Web terminology: "interactivity". That is, the dominant feature of both the Internet and the Web is interactivity. Anything else which might be considered a message is a result of, and flows from, this interactivity. Thus, the key

characteristics on the Web that provide interactivity are the combination of control and participation using multiple sensory modes.

Figure 15-1 shows that there are three attributes that form the basis of interactivity and these are control, participation and multiple sensory modes.

```
┌─────────────────────────┐
│         control         │──┐
└─────────────────────────┘  ↘
┌─────────────────────────┐     ┌──────────────────────┐
│      participation      │───→ │     interactivity     │
└─────────────────────────┘     └──────────────────────┘
┌─────────────────────────┐  ↗
│ multiple sensory modes  │──┘
└─────────────────────────┘
```
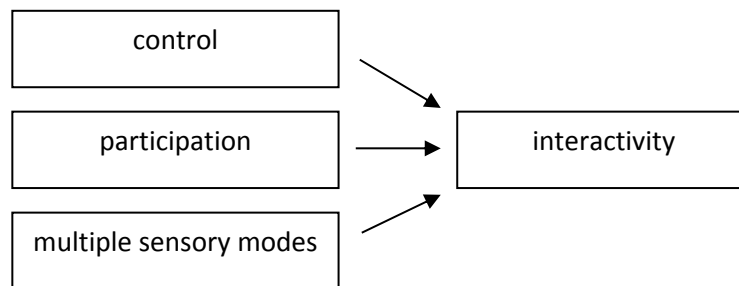
Figure 15-1 Characteristics and outcomes of interactivity

The popularity of user controlled websites such as Facebook, Twitter and YouTube indicates that users want control of content as well as participation in its creation. Research supports the claim that the message of the Web is control and participation with multiple sensory modes, with findings showing that young adults had "an overriding desire for control" when accessing news websites (Sturgill, Pierce & Wang 2010: 7). The Internet is a medium for interactivity but interactivity involves medium within medium. The medium of interactivity is the user interface which, as stated in Chapter 9, is the interface in the user's computer that allows the user to access the Internet and Web. This user interface is a type of system composed of hardware, software and firmware which should be intuitive to use, and would normally include icons and windows which display on a screen and can be controlled through a keyboard or keypad.

Figure 15-2 shows that the interface system is the user's portal to the Internet and the Web and it is this interface which determines the user's experience of interactivity.
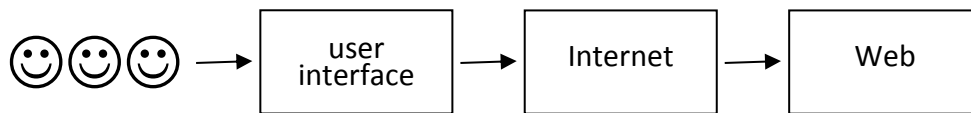
Figure 15-2 User interface as portal to the Web

Benefits and negatives of interactivity

Interactivity is normally seen as a positive and desirable characteristic and this is not surprising given that "[i]nteraction itself is a well-documented human need", and research indicates that computerization itself as well as interactivity can provide "increased satisfaction and [a] sense of efficacy" (Rafaeli 1988: 123-4). However, there are negatives as well as positives to interactivity in news.

The negatives of interactivity include the fact that the use of interactivity increases the time involved in performing an activity, and it can be cumbersome and clumsy when compared to traditional modes of communicating, given that research indicates that a "fully interactive version yielded the greatest recall but took longer to complete than any of the other presentations" (Schaffer & Hannafin 1986:89). Other unexpected results are that experienced users only benefit from online features with difficult news content and inexperienced users do not benefit at all (Opgenhaffen & d'Haenens 2011: 8). In addition, users do not necessarily take advantage of online features (Chung & Yoo 2008). Regardless, users believe they will be more satisfied by such features than by traditional media (Dimmick, Chen, & Li 2004). Given these attitudes, it can be assumed that online features in news create more motivation and a more positive attitude to news (Opgenhaffen & d'Haenens 2011: 9). In other words, users want and expect online content to be interactive and whether it is useful or not seems to some extent irrelevant.

Reuse of TV and newspaper content on the Web

As hardcopy newspapers and news on television have no interactivity, reusing their content in its original form is the wrong approach for the Web. The content of a medium

"blinds us to the character of the medium" (McLuhan 1994: 7-8) and on news websites, the ability of the websites to offer content which can also be used in newspapers and on radio and television appears to have blinded news organizations to the fact that the Web has a very different character to other mass media. The Web is predominately an interactive medium regardless of whether the user is accessing interpersonal or content multimedia. In taking non participatory content such as newspaper texts and videos, and putting them on an interactive medium, news organization have ignored McLuhan's the-medium-is-the-message. Watching television and reading newspapers are associated with passive leisure, while the Internet is associated with active participation. The reuse of television content on the Web is just as inappropriate as the reuse of radio content on television. Television news videos are designed for viewers not users, and stories prepared for other media and reused on the Web are referred to as "shovelware", a term used in academic literature to refer to online news stories which are duplicates of the print version (Spyridou & Veglis 2008).

In McLuhan's media theory, new media contain the forms of past media and an example is that a movie has a novel as content (McLuhan 1994: 18). However, as discussed in Chapter 9, this does not mean that the content is exactly the same in new media because, as McLuhan states, a hybrid is the new form which is born from this process (McLuhan 1994: 55) and this hybrid occurred with cinema. In the early days of cinema, when movies were silent, and audio was not integrated, the movie was accompanied by a live pianist who provided the sound. This music ensured there would not be sensory gaps created by noticeable omissions of sound. In addition, the music also helped to clarify the meaning of the images. The early movie was not one medium but two separate media: film images and music. The second stage, the hybridization, occurred when images and sound were merged into a single medium and only then was the full potential of the movie realised. As McLuhan stated, the "effect of a medium is made strong and intensive" when the content is another medium

(McLuhan 1994: 18), but the movie did not gain its full strength and intensity until images
and sound were aggregated into a single system.

The same two-stage process is occurring with the Web. The Web contains the content of
many media including newspapers, telephone, letters, books, movies, radio and television in
their original form. From these many media there needs to be more hybrids created
specifically for the Web. There have been few hybrids created for news with the main ones to
date being the interactive video and various forms of the slideshow.

The Web's success as a cultural phenomenon depends upon it being different from
television and film because of its ability to create new types of content (Burnett & Marshall
2003: 198). The Web is different to previous media in that it is interactive and this
interactivity includes the facility for multiple sensory modes. While the telephone is
participatory, it is a single sensory mode, and while television and film have multiple modes
they lack participation except for those television shows that display text messages from
viewers as subtitles on the screen. But there is an additional difference. The Web offers
facilities to engage more sensory modes than other media. As well as sight and sound, if the
ability to select and manipulate content with a mouse and other purpose built accessories used
in games is included, then the sensory modes offered by the Web include proprioception. The
proprioceptive sense, sometimes referred to as the kinaesthetic sense, is the sense of self and
tools, where a tool provides an extension of self.

Proprioception is the sense of where our body is in the world around us and what our
physical actions will achieve, such as knowing where our hand will end up when we move it
from right to left. The body and sense of self are extended by tools. The computer mouse and
purpose built game accessories provide a way of knowing where we are in Cyberspace. This
is not touch, which occurs with sensations such as softness and hardness. A book doesn't
provide proprioception unless you use it as a weapon to hit someone, in which case it is a very
cumbersome and primitive tool and not as effective as a rock. A tool such as a stick might use

the sense of proprioception because it adds to the length of the arm but it is not interactive. Your stick doesn't change depending on circumstances, such as turning into a sword (except in science fiction), whereas the mouse or purpose built computer tool can become almost anything in Cyberspace. While it might be claimed that proprioception can be changed with something like stereo sound and the integration of images to change our sense of space or where we are, these are not extensions of human abilities in the same way in that we are not directly controlling them at the time, as we do a tool.

In his book *Understanding Media: The Extensions of Man,* first published in 1964, McLuhan classified new technology as "extensions of ourselves" and he stated that media "by altering the environment, evoke in us unique ratios of sense perceptions. The extension of any one sense alters the way we think and act—the way we perceive the world. When these ratios change, men change" (McLuhan 1967:41). In other words, technology that provides tools for extending our abilities, changes us and our understanding of our environment as discussed in Chapter 9.

McLuhan predicted the Web without having experienced it and his predictions are remarkably accurate. This accuracy is in part due to the somewhat generalized nature of the predictions, but this does not detract from his insight. It might be claimed that generalized predictions are more likely to be correct than specific ones but the fact that they are generalized might only become apparent at a much later time. The Web is currently the ultimate extension of man but it could be superseded by another form of media, similar to virtual reality but which incorporates the Web. The USA and Australian militaries are currently using tools such as a camera at the back of soldiers' heads so they can see behind them, but a direct link from the brain to an Intranet (an internal Internet which is available only within an organization) would be infinitely better. A virtual reality that includes being inside the Web through a direct connection to the brain has already been predicted in the

movie *The Matrix* (1999) and is common in science fiction. For instance, in the Canadian television series *Continuum* (2012), the police in 2077 have both a computer and a network connection placed within their brain.

The sense of proprioception on the Web is important because it offers an increase in user control of content and the ability to play in Cyberspace. The Web is currently unique. No other medium offers sound, visuals and proprioception combined with vast amounts of data that can be accessed in a random sequence and, in addition, with two-way communication. A defining characteristic of the Web is its ability to present different types of multimedia. One type is a multimedia text, where the media are aggregated into a whole. Another type is the combination of interactive multiple separate media into a multimedia group, where the media are accessed separately but are about the same topic. The combination of interactivity and multiple sensory modes (audio, visual and proprioceptive) provides developers of Web material with the opportunity to create new forms of content for the Web that are not available on other media. It is with the meeting of multimedia and interactivity that the Web gains its full strength. This strength is not achieved by online news sites using "shovelware".

Three features of new technology are normally considered as impacting online news and these are hypertext (hyperlinked texts), multimedia and interactivity; even so, frequently, the only difference between a print story and an online story is the use of hyperlinks and while such use is increasing, they are underutilized and it appears that the most common hyperlinks on news sites are links to other stories on the same site (Steensen 2011: 312,314-5). This is understandable given that links to other stories are the most easily created and being on the same site, are the most easily maintained. A hyperlinked title and image can be easily pasted into many stories and the linked webpage can be maintained indefinitely to avoid broken links. However, the addition of hyperlinks which link to more news stories does not meet an important criteria of interactivity on the Web, that of less-is-more.

Less-is-more

The concept of less-is-more is the key to effective communication over the Internet given research showing users read online material differently to how they read printed information. Research has found that reading online reduced comprehension, concentration and recall; skimming, scanning and browsing were the norm, and multitasking while reading online was common. In addition, people preferred to print out long documents and important information. Another important issue identified was that survey participants stated they enjoyed reading hardcopy more than online information. While these results apply to users who have been trained to read printed material and new methods for online reading may and should be developed in the future, it is this print oriented population who are the current online audience (Hooper & Herath 2014: 53,57-9). In addition, for younger generations, e-Readers, such as Kindle, and not the Web have replaced hardcopy books. Therefore, long documents of information are not what people want to read online when accessing the Web.

Interactive data retrieval on the Web is often associated with the concept of "more" but this is wrong. In 1972, McLuhan stated that in the "global theatre" of today, people are "disillusioned about the ideal of moreness" (McLuhan 2005: 196-7) and this is more applicable today than ever before. However, the much vaunted "information anxiety" that includes the feeling of being overwhelmed by the amount of information to understand, as proposed by Wurman in his book of the same name, did not come to pass, or at least there is some debate about whether or not information anxiety actually exists (Girard & Allison 2008). Note that information anxiety is very different to the information overload discussed in this thesis. Information anxiety is created by "the ever-widening gap between what we understand and what we think we should understand" and it occurs when "information doesn't tell us what we want or need to know" (Wurman 1989: 1). Whereas the information overload discussed here is the physiological condition identified by cognitive psychology and

education research that occurs when there is too much sensory information at one time for the brain to process without losing some of that information. The Google search engine, and similar engines to a lesser extent, are one of the main reasons information anxiety does not occur today. We can normally find the information we want in digestible chunks. The desire for less but more specific information from an ever-growing accumulation of data, and the ability of Google to deliver it, are a large part of the reason for the literally phenomenal success of Google.

The concept of less-is-more is supported by the success of the Summly app (application) which summarises information before downloading it onto computers and smartphones. This app was developed by Australian teenager Nick D'Aloisio whose company has been acquired by Yahoo for a reported $28.7 million (Grubb 2013). As can be seen by this success, users want less rather than more. Even so, the news websites of most newspaper based news organisations in the U.S. provide more content rather than less (Li 2006:65).

Users do not trawl the web looking through vast amounts of information; they have search engines return a list of possible matches. The control given to users, the ability to locate information from a simple keyword search comes from the sophistication of Google's search engine. To explain it simplistically, at the time a user enters keywords and phrases into the Google search engine, Google does not search the Web, it does the equivalent of an index lookup. This is much the same as checking the index at the end of a book. We do not search through a book looking for a keyword but get the page number from the already existing index and go straight to that page. Google uses a "spider" to continually crawl the Web to create this index and this crawling occurs independently of anyone using Google. To hold the index that allows Google to be the leader it has vast numbers of servers. While exact figures are not available, there are indications of the size of the Google server network. Microsoft have stated that they have over a million servers but this is less than Google even though it is more than Amazon (Anthony 2013).

Crawling the web is the easy part. There is a great deal of design involved in determining what sites will be listed and in what order based on the combination of keywords and phrases entered by the user. The accuracy of the results returned by searches makes Google the leader in its field. Google's aim is not to supply a long list of possibilities even though it does this, but to provide the information requested as the first item on the search list. To save the user more time, Google displays a small selection of the text, a snippet, from each site that appears to match the user's request. It is this ability to reduce a large amount of data to a small amount of relevant information that is the main facility that the Internet is now identified with and which has made Google so successful. For instance, Google has $54 billion in cash reserves (Downey 2014). Google to some extent controls the Web given that it is by far the most popular search engine and when all Google services (including Google Search, Gmail, YouTube, and Google Drive) went dark for two minutes on 16th August 2013, web traffic plunged by 40% (McAllister 2013).

Users want the specific details that answer their query, not a long list of information to search through. The majority of users look at only the first few positions on the list on the first page that a search engine returns, and the click through rates on Google for search result pages one through ten are 18.2%, 10.1%, 7.2%, 4.8%, 3.1%, 2.8%, 1.9%, 1.8%, 1.5%, 1%, respectively (SEOMOZ 2011). In other words, more than 80% of people never look past the first page. This issue of less-is-more is discussed in detail by psychologist Barry Schwartz in his book *The Paradox of Choice,* where he argues that reducing choice makes for happier and healthier people (Schwartz 2004).

Using software from the Summly app, Yahoo has developed News Digest, which provides a summary of top news stories. This is one of a number of apps that provide a summary of news content; others include Pulse and Zite. Companies have made a considerable investment in these because they understand the concept of less-is-more, but the

websites of news organisations continue to offer more and more, using hyperlinks to increase the amount of information rather than provide users with precise information that meets their interests and needs.

Current design of news websites

The present is defined by participatory technology which retribalises society, whereas the past was defined by non participatory media such as books which create a specialist and fragmentary environment (McLuhan 1994: 22-4). Retribalisation reduces the desire for privacy, individualism and nationalism and encourages the use of participatory media. This interest in participatory media can be seen by the number of comments posted on The Observer's news website which increased by two-thirds in 2012 to 500,000 a month (Pritchard 2012). Retribalisation is currently occurring on news sites with interpersonal multimedia, but interpersonal multimedia takes the user away from the news site or it requires the vetting of user comments. While content multimedia requires more upfront development, it keeps the user on the site and does not require further resources once published. When preparing news story content, the surveyed organizations have, to a large extent, ignored the interactive nature of the Web.

At the same time as the popularity of the Web is at an all time high, with more than three quarters of the population in the developed world being Web users in 2013 (ITU 2013), circulation levels of newspapers are declining with the majority of young adults showing little interest in news whether it be on the Web or otherwise, as discussed in Chapter 1. The newspaper industry is in trouble; in 2010 newspaper revenue deceased even though revenue increased in all other forms of news media including television, radio and magazine (Pew 2011). Although television was still the dominant provider of news in 2011, more people accessed the Web for news than read newspapers, and the Web is continually gaining ground; the news industry may no longer be the controller of its fate given the technical complexity of the Web, the services that dominate it such as Google, Facebook and Twitter, and the

expectations of the public that the Web should provide the facilities they want (Rosenstiel & Mitchell 2011). Journalism is stuck in the last century even though news publication and broadcasting are at a "transformational moment" (Adair 2012).

An example of overwhelming amounts of information on a single page is the home page of news organizations. Many news sites including those of the Australian Broadcasting Corporation, the Sydney Morning Herald and the New York Times have hyperlinks from their main page to well over a hundred stories, sometimes closer to two hundred hyperlinks if section links and advertising are included. An indication that this is the wrong approach is given by the editor of the Baltimore Sun, Monty Cook, who states that instead of starting from a homepage, users "pick and choose stories to come into Web sites through outside linking... I do think you're seeing the culture start to pivot in some way" (Gleason 2010).

If Google presented information to users in the same way as news sites, Google would decide what users wanted to find rather than letting them search. Google's search page would have hundreds of hyperlinks to detailed information about each of Google's own choices based on previous search habits and the page would be packed with the information that it decided users wanted to see. This is not what users want. Google has maintained a clean starting page that is mostly white space, to put the user in control. Google is popular because it acts on the user request to provide specific information that matches the request as closely as possible. For example, Stanford University, which uses Google as its official search engine, as do large numbers of sites, states that the top reason for using Google is "superior search relevancy" (Stanford 2014). Even the advertisements on Google are matched to the user's search. It could be argued that Google and news websites are completely different, in that Google is a tool used to find things whereas the news comes from events outside the control of a newspaper, but different people have different interests and different priorities.

Normally no one is interested in all news. Allowing users to match their exact needs so they access only what interests them is a characteristic of the Web.

An online news story should not be a body of linear text that requires the reader to start at the beginning and to read to the end. Adding a few hyperlinks does not create an interactive story. The differences in writing for print and online were discussed at least as early as the beginning of 1990s (Bolter 1991; Lanham 1993), and yet newspapers are still taking articles from print media, adding a few hyperlinks and putting them on a webpage. A document on the Web should have a clearly visible structure that allows direct access to the items within the structure.

Another major problem with news sites is that any interactivity appears to have been added as an afterthought. In a survey of the New York Times, which is known for its innovation, it was found that most of the interactive/multimedia facilities, such as audio, video and slideshows, were offered from sidebars that were add-ons to the original written text story rather than forming the primary story (Jacobson 2012). However, the New York Times survey was of multimedia from 2000 to 2008 so this may no longer be the case. Even so, this criticism, that the multimedia appears to be added as an afterthought, does apply to the almost all the stories in the current survey.

Appeal of interactivity as play and user-as-content

Interactivity leads to the user experiencing the Internet and the Web as play and user-as-content as these concepts were defined by McLuhan (1994: 346-9). Thus, the attributes of interactivity on the Web, control and participation using multiple sensory modes as previously stated, result in a form of play, a playfulness of the activities, and user-as-content, the ability of the user to create content both literally and through control of information accessed.

Figure 15-3 shows that there are three attributes that form the basis of interactivity on the Web and these are control, participation and multiple sensory modes, and that these attributes provide the user with playfulness and the ability to create content.
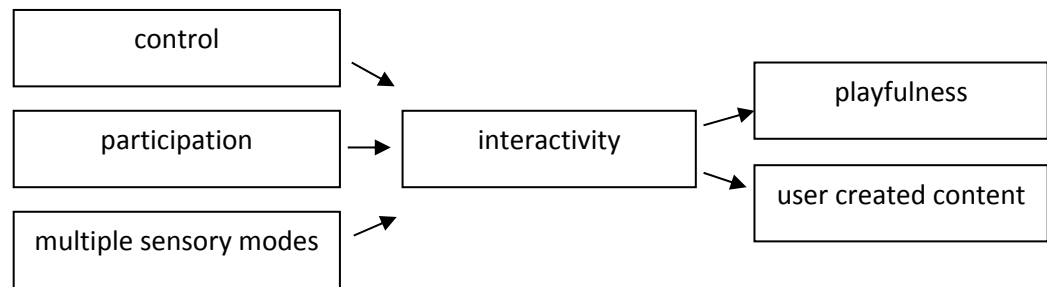
Figure 15-3 Playful and user-as-content

The concept of technology as play is a postmodern sentiment (Firat & Dholakia 2006: 127; Docx 2011) and using technology can be a form of play because, as McLuhan stated in 1972 in relation to the emerging technology, "we are moving into an age of play which will bring many new patterns of work and learning" (McLuhan 2005: 190). He further stated that electric technology "ends the old dichotomies between culture and technology, between art and commerce, between work and leisure", and "the age of information demands the simultaneous use of all our faculties [and] we discover that we are most at leisure when we are most intensely involved, very much as with the artists in all ages" (McLuhan 1994: 346-7). In other words, with the involvement of all the senses and the intellect, working with technology can be experienced as leisure, especially given the intense involvement that technology can mobilise.

The intense involvement referred to by McLuhan is a form of flow as described by psychology professor Mihaly Csikszentmihalyi, who states that flow is "[b]eing completely involved in an activity for its own sake. The ego falls away. Time flies. Every action, movement and thought follows inevitably from the previous one, like playing jazz. Your whole being is involved, and you're using your skills to the utmost" (Csikszentmihalyi 2014).

The concept of flow, if not the word, has long been part of yoga. While many people believe meditation is done by sitting motionless with eyes closed, and this is correct, it is less widely understood that the yoga postures including the setup of each one are meant to be a form of meditation. This desire to experience the pleasure and benefits of flow that comes from meditation can be seen with the ever increasing numbers of yoga practitioners. Hot yoga especially, even though extremely difficult, is popular and growing more so.

Continual meditation as the goal is clearly and frequently stated in Bikram (hot) yoga classes which are performed with eyes open and involve considerable movement, where each posture is performed through a series of precise stages with relaxation between postures. The relaxation involves lying down on the mat in the correct position, staying completely motionless with eyes open for 20 seconds and then moving into the next posture. The entire process, including the movements in and out of the postures, as well as holding the posture and lying in relaxation, are intended to be performed as meditation. Tai chi has a similar approach where the concept of flow has multiple meanings in that the body movements are meant to flow rather than stop and start, and also the mind is meant to go into the state of flow.

These new patterns of work and learning that McLuhan describes as a form of play, and which include the feeling of leisure from intense involvement, are occurring with the use of multimedia on the Internet, and millions of social network users expect nothing less from all activities on the Web including news. McLuhan's theories can be used to better understand the potential of the Web and understanding the Web is important because "[w]e shape our tools, and thereafter our tools shape us" (McLuhan 1994:xxi). McLuhan's claim, that using technology is play, can be applied to the Web because the personal computer has blurred the boundary between work and play and adds a "touch of play" to tasks carried out on it (Levinson 1999: 139). In addition, the Web allows sharing between people as can be seen with the extremely popular social networks of Facebook, Twitter and YouTube. This intensity

of involvement with technology created by play, which is referred to by McLuhan, can have serious negative effects which can be seen with the social and health problems associated with excessively long and intensive periods of interactive online gaming, and which have resulted in addiction to computer games.

Interactive gaming addiction is currently recognised as a serious problem, destroying families and careers. A health problem, which has not been previously seen, is that a number of young men have literally dropped dead after long periods of gaming. It appears that days of non-stop on-line gaming can create sudden and unexpected death. The reasons for health problems, including the deaths, are speculated as being cardiovascular problems created by long periods in a sedentary position, inadequate food and rest, and over stimulation (Young 2009; CNN 2012; The Australian 2012).

The claim that using technology creates a form of play is supported by education research showing that the control offered by interactivity has been found to be intrinsically motivating in educational environments, and it appears that this motivation occurs when the multimedia is interactive at a cognitive level (Kennedy 2004: 52). In other words, to be intrinsically motivating and achieve the sense of play, the interactivity cannot be only an action such as starting or stopping a video. To be intrinsically motivating, the interaction must involve meaningful cognitive activity.

Interactivity is not offered by television entertainment, except when text messages from the audience are displayed on the bottom of the screen of live programs. Watching television is very different to the Web because it is passive while the Web is identified with being active (MacGregor 2003: 11-12), and watching television is not considered as play. Even though watching television is passive, the viewer normally does not notice the passivity. The couch-potato becomes engrossed in the program and while advertisements may be annoying they continue to engage aural and visual senses. While many might consider accessing YouTube to

watch videos is much the same as watching television, the access involves users searching and

selecting the specific information, and using such a facility is a form play even if watching the

video may not be. In addition, when the video finishes, the user must actively select the next

video, whereas television continues automatically from one program or advertisement to the

next.

Achieving a sense of play requires a degree of control on the part of the user. User

control on the Web comes from the ability to access specific information how and when it is

wanted, that is, the access must be timely and non-linear. This control means it is easy to

terminate a video when it is not wanted, unlike the video advertisements on news websites

which often disable the stop button. In addition, this control includes user-created content

which McLuhan refers to as user-as-content; this occurs when the consumer becomes the

producer. User-as-content occurs with automation and is a reversal of the division of labour

which occurred in the industrial revolution (McLuhan 1994: 100,349).

The demand for user-as-content can be seen with the high level of popularity of social

networks on the Web. The most popular websites are those that provide for user-as-content,

with Google, Facebook and YouTube listed as the three top sites on the Web (Alexa 2014).

One form of user-as-content is where users provide comments and visual media on social

media. Another form is when an individual user is able to customize access to a web site. Yet

another form of user-as-content is through facilities for user choice and control of information

such as the ability to search information and access it in a variety of sequences (Logan 2010:

67). This ability to search is a way of refining and reducing information to only that which is

specifically wanted. Therefore, a key aspect of choice and control involves being able to

access specific information in random or non-linear sequence to obtain the maximum

knowledge from a minimum amount of data. In other words, choice and control are about

reducing the amount of data available to only that volume which contains exactly what is

required. This is the less-is-more concept previously described.

News organisations may perceive a problem with interactive news stories. The perception of users as being in control of the information and being able to specify the sequence in which it is accessed, conflicts with the role of the journalist as "master of ceremonies" (MacGregor 2003: 14). In other words, journalists spend time and effort using their skills to present a story with particular information and in a particular sequence, but the facility for non-linear access by users, with its ability to select information in a different sequence, puts the journalist's presentation at risk. However, this need not be an issue because the journalist's master-of-ceremony role could be transparent, as occurs in computer games. Computer games are a form of play but even though they follow strict rules, they empower the user to feel in control. The way games achieve this feeling of control is not by providing separate files as occurs with news stories, but by creating a multimedia system where the user accesses the game through an interactive interface which provides a wide, but not unlimited, range of choices.

Gamification of social media & games in news

McLuhan appears to be the only person who foresaw so early the extent to which technology introduced play into our everyday lives. While many saw the potential of creating and playing games with technology, only McLuhan, in the 1960s and 1970s, predicted the "gamification" of everyday activities even though the word did not exist at that time (McLuhan 1994: 346-7; 2005: 190). The word "gamification" was probably first used in 2008 and a definition is "the use of game design elements in non-game contexts" (Deterding, Dixon, Khaled & Nacke 2011: 9). While McLuhan's description of technology as a form of play would not meet the strict definitions of play or games by French philosopher Roger Caillois (2001: 9-10) or computer game designer Chris Crawford (2003: 8), it does meet the above definition of gamification. Gamification is literally changing the world and is now used in a variety of disciplines to influence behaviour. For instance, healthcare professionals use

gamification to positively influence health related behaviours (King, Greaves, Exeter, & Darzi 2013: 76).

English satirist and broadcaster, Charlie Brooker, and various gaming specialists including Games Editor of IGN Entertainment UK, Keza MacDonald, in the documentary *How video games changed the world* describe how social networks have, by accident, gamified whole aspects of our lives by applying the mechanics of video games to real life and this in part explains their popularity. For instance, even though we do not realise it, Twitter and Facebook function as games with massive numbers of players who follow the rules. These social network games supply a constant stream of incentives created by small achievements adding up to bigger achievements, with fun rewards such as more followers and more read tweets which encourage repeated actions (Brooker 2013; MacDonald 2013). Brooker jests that with Twitter, users choose interesting avatars and role-play persona loosely based on their own personalities, attempting to recruit followers by repeatedly pressing lettered buttons to form interesting sentences (Brooker 2013). Rob Florence, writer and comedian, observes that social networks such as Facebook are "real" Sims, which provide the top-down view into people's lives previously provided by Sims, and therefore Sims games are unlikely to ever regain the high level of popularity they once had (Florence 2013). Sims are video games that simulate activities, such as people living in their homes, or flying an aircraft.

Newsgames are used occasionally in news and are sometimes seen as a way to revive interest in news. However, there are many reasons why they are not widely used, including that they take more time to learn and play than reading an article, and they take a high level of resources to create. As Bogost and associates state, producing a computer game is not a technical challenge but a logistical one in that even though it is possible to produce some games in a day, normally, it takes much longer, and sophisticated games can take several months, which presents a challenge to the short news cycle. In addition, games are more appropriate for general rather than specific information. Even though information graphics

have been a regular addition to news since the late 1930s, news organisations struggle with

digital multimedia and are still playing catch-up (Bogost, Ferrari & Schweizer 2010: 15-

6,21,37,178-9). One reason that news organisations are playing catch-up on the Web is their

continued use of previous media instead of developing new approaches for online news.

This is not to suggest that news stories should use games. Newsgames are not

gamification of news. It is to suggest that news stories must have reasonable levels of

interactivity that put the user (not the advertiser) in control. Gamification concepts might

suggest how this can be done because there is a rich tradition of informing user interface

design by other design practices (Deterding et al. 2011: 10). The news story interface is just as

amenable as any other interface to innovation. Increasing user contributions is a method of

increasing user engagement in a news site. While news sites do this to some extent, it is more

frequently done with links to social networks such as Facebook and Twitter rather than user

comments on their own site as discussed in the previous chapter. Even so, gamification

concepts involve more than the addition of user comments, and if gamification can be used to

improve health initiatives, it is likely that it can also improve the popularity of news.

Redesigning news for the Web

Google has been involved in the design of a news story format, with Google labs,

working with The New York Times and The Washington Post. Together they have produced

a prototype for publishing news stories on the Web which allows the story to develop over

time. The entire story is accessed from a single stable webpage address which is expanded in

a way that allows the user to skip the information they have previously seen. A summary of

the entire story and regular updates provide depth and context (Google 2009) and a number of

stories have been created using the prototype (Google 2009). This tool is available to any

organisation but appears to have raised little interest. This lack of interest may be because the

stories do not meet the requirement of less-is-more. The designers have not applied the principles that make Google popular, that is, the clean page look.

One of the options for creating online news is that even though the Web may be geared to "instant" at the same time it provides the means of building a whole story over time. Doing this is not so much about making corrections as more and more accurate information becomes available, but about of updating and expanding the previous information. But adding more information is not necessarily what users want given that for many people, less-is-more.

Concluding remarks

"Once a new technology comes into a social milieu it cannot cease to permeate that milieu until every institution is saturated" (McLuhan 1994: 177), and this applies to the Internet more than to previous media. The Internet is not a fad. Internet usage by those born after 1993 is more frequent and for longer periods compared to those born after 1980 with both groups using it mainly for entertainment and social purposes (Joiner et al. 2013). While many would claim that we do not always need to be entertained and stimulated, and this may be true, the falling newspaper audience levels and revenues indicate otherwise. This trend, of increasing use of the Internet, will continue for the foreseeable future. The Internet will not be replaced by something very different as has occurred with previous media. Even though both the Web and the Internet and the devices that access them will develop, change and become more sophisticated, the concept will remain the same.

The Internet has created a major shift in the social character of younger generations, at least in the Western world, and this can be seen in Generation Y (GenY), born from 1984 to 2002, and also referred to as the Millennial generation. The new digital environment created by the Internet has resulted in GenY being very different to previous generations in many important ways (Holm 2012: 25). It has been claimed that for GenY, key career requirements include control, flexibility, and the ability to be self-determining (Telus 2013: 5).

GenYs are resistant to advertising, having been bombarded with advertisements tailored to their profile on social media sites; they have high expectations and expect their work and play to be special, different, stimulating and creative; they refuse to be treated as subordinates or micro managed; they want an active role with a share of the decision making and control; in addition, they expect instant feedback and responses (Holm 2012: 29,32-3,35). These characteristics have been catered to by the Internet and social media, and such expectations bode ill for online news which is in much the same format as printed newspapers. The fact that GenYs are more socially active, more demanding with their higher expectations of life in both work and pleasure, and that they show little interest in the fragmentary media that newspapers create, would be no surprise to McLuhan given his predictions of the retribalization that technology creates.

This generational change can also be seen with the concept of "new power". New power is a shift in the balance of world power from the few to the many and it has been described as a current versus currency, uploads versus downloads, transparency versus secrecy, and participation versus passivity (Heimans 2014). New power has set new records of involvement especially those of the Indian activist, Anna Hazare, who received support from thirty five million mobile phone users for his anticorruption and social justice campaign (Araki 2013). Neuroscientist, Susan Greenfield, confirms a generational change saying that screen technologies and social media are not only changing how we process information but are changing how our brains are wired (Greenfield 2014).

Given the Web's penetration into everyday life and the control it provides, along with the "overriding desire for control" expressed by young adults (Sturgill, Pierce & Wang 2010: 7), such control will not be easily given up. Younger generations do not have the passive rule-following behaviour of older generations (Jenkins 2006: 18-9) and younger generations have given up on news rather than give up the control that they have become accustomed to with

digital media. This new mindset is a paradigm shift, and if news media are to hold their own

with the "new vortices of power" that McLuhan predicted would unexpectedly appear

(McLuhan 1994: 99,137), they must make this paradigm shift in the presentation of news

stories and utilize the full potential of the Web to create the epochal changes that younger

adults expect.

Part V Conclusion & Back Matter

Chapter 16 Conclusion: The Reality of Multimedia

Introduction

In 1996, Niklas Luhmann applied his systems theory to the mass media and drew a number of conclusions about society and the mass media. Even though his theories and concepts have not changed, the environment has changed and several of the conclusions he drew at that time are very different to the conclusions that can be drawn today. Therefore, the aim of this chapter is to apply Luhmann's systems theory to this new environment that creates a new reality and to show how the theory of multimedia described in this thesis fits into this new reality.

Reality of the mass media

Systems theory and the mass media

Two decades ago Luhmann stated that we know about the world only through the mass media and even though we do not trust the mass media, this mistrust has few consequences because the mass media forms the basis of our beliefs and is the starting point for our knowledge of the world given that there are few other options (Luhmann 2000: 1).

When information is communicated, it becomes an event and each communication event changes the information into non-information. To recap, communication in systems theory occurs through a series of events where each multimedia scene or event is a communications event, and this process is referred to as messaging and describes the construction of the news message. The concept of communication events changing information into non-information is most easily understood with news. Once news is communicated to the public, it is no longer news, and a news story that was previously information becomes out of date and therefore non-information. There are a number of characteristics that cause information to be selected as news and important selectors are surprise and conflict; others are: quantities (such as statistics), local relevance, norm

violations (with dramatizations of these norm violations frequently created by simplification of details), moral judgements, topicality and opinion; in addition, reinforcement occurs with the use of multiple selectors (Luhmann 2000: 28-35).

Reality as it is perceived today

Mistrust and new structures

Our mistrust of mass media that Luhmann spoke of in the 1990s continues today with research showing that the mistrust of news has been increasing each year. This decrease of trust is with good reason. Important factors in the loss of credibility are: dishonesty through misrepresentation caused by irrelevant or incorrect introductions and headlines, errors that are often not corrected, and irresponsible reporting (Dunlop 2013: 233-235). However, the environment has changed because Luhmann's statement that traditional mass media forms the basis of what we know about the world is no longer applicable. New structures using the Internet, such as social media and special interest groups, have sprung up like Jack's bean stalks and their roots have undermined the once strong foundations of the traditional mass media. These social media are claimed to be the new mass media (Gelles 2013), but to claim that social media are mass media would be wrong.

The term "social media" is used loosely here and is defined as "websites and applications that enable users to create and share content or to participate in social networking" (Oxford Dictionaries 2014). Sites such as Facebook and MySpace are frequently categorised as social networks, but they can be included as social media along with sites such as YouTube and Flickr because, with the continual addition of new features, it becomes increasingly difficult to discriminate between the two categories (Kim, Jeong & Lee 2010: para. 2). In addition, social media have been referred to as "talk technologies" that assist in creating and exchanging culture and human interest based information and knowledge that

have a psychological and social impact, at least as substantial as its technical impact (Chan 2012: 3).

Mass media are stated by Luhmann as those institutions which use technology to distribute copies of information (Luhmann 2000: 2). However, it can be claimed that social media, such as Facebook, do not fit this definition. While individual posts are copied and distributed, each person's Facebook page is different to every other. To some extent news sites allow users to customize how and what information is displayed, but it is limited and cannot be compared to social media. In addition, social media, such as Facebook, are normally based around groups as well as individuals. As well as each individual being unique, each group is unique with its own unique members and content which are not necessarily accessible from another group. It could be claimed that a Facebook group is the ultimate source of local information.

Social media are popular precisely because they are not mass media; they are individually tailored media that meet individual user requests and requirements, and they provide users with the facility to form groups based on specific criteria. This combination of individuality and groupings combined with interactivity introduces personalisation into social media that is not part of mass media. Social media are replacing mass media but are not mass media.

News Audience

Luhmann states that technology is only a medium and a medium makes other forms possible. By this he is not denying McLuhan's medium-is-the-message, even though he is not affirming it. The concept he is explaining when he states this, is that the mass media is a closed function system with a barrier between the medium and its audience. For the most part, there is no interaction between a broadcaster and its audiences because, even though Luhmann acknowledges that there are exceptions, as a general rule the technology acts as a barrier between them. This barrier makes it possible, at least in the short term, for

broadcasters to transmit whatever they decide is appropriate. The limiting factors are whether a broadcaster is willing to transmit and whether audiences are willing to tune in. While in theory this barrier need no longer exist given the two-way nature of the Internet, comments posted by audiences are generally not responded to by journalists due to the amount of time and effort involved. Broadcasters create their target audience based on assumptions that there will be an audience and that audiences will have certain characteristics. (Luhmann 2000: 2-4)

Luhmann refers to "individuals" when discussing the mass media audience but these individuals do not have the characteristics normally associated with the word "individual". He states that with news, these individuals "only take note of things that are presented to them" (Luhmann 2000: 72). These individuals are irrelevant in the short term because the mass media function system is a closed autopoietic system, in that communication events continue to produce communication events without interruption. The production of the communication events, at least in the short term, does not rely on an audience understanding the communication, or even on there being an audience. An example is a series of communication events forming a news story on television or a website which will run regardless of whether it has an audience or not. Therefore, in this sense, the mass media creates its own reality; they do not distort it because the ability to distort reality presupposes that a reality to distort exists in the first place (Luhmann 2000: 3-4,7).

Construction and credibility

Truth and falsehood in news are not the issue because reality is a construction and this construction seems real if there is consistency of information and the information makes sense; the more complex the information becomes, the more inconsistencies it can tolerate while maintaining its reality, and it is only if the inconsistencies become apparent that in-depth news reporting would collapse (Luhmann 2000: 5-7,26). Today, the Web offers many sources and much information so that mistakes are quickly apparent and false reports cannot

easily be explained away. In addition, the transparency that results from many and different sources of conflicting information on the Web makes it clear to Internet users that news constructs its own reality. An example of exposed false reporting is the weapons of mass destruction propaganda, which created the reality for the Bush campaign for war where he stated that "[e]ither you are with us, or you are with the terrorists" (Bush 2001).

The type of two-sided right/wrong position created by the Bush campaign is typical of both news and politics and is used so that stories and situations can be turned into conflicts. An example of a simulation of two sides of a story to create a conflict was the *Catalyst* report which simulated a conflict between a chiropractor and a surgeon, using cuts from various interviews to construct what looked like a continuous argument. In response to the episode, large numbers of well-informed viewers responded with angry comments that included explanations and details of many of the medical points raised. Such a response is encouraged by the transparency created by the Web, the precedence established by social media to challenge the establishment, and discussions on social media including those about television programs.

Today, broadcasters are losing the credibility battle, put at risk by social media and blogs because people are more likely to believe their Facebook associates and non-aligned blog writers than broadcasters and their staff, as shown in research (Mackay & Lowrey 2011: 39).The result is that the news industry is showing the signs of the collapse that Luhmann predicted would occur if inconsistencies became apparent. Social media are not mass media but it can be claimed that social media have enabled the emergence of a new form of news and a new type of journalism. Social news is the new news, social media are the new news sites and ordinary people creating entries and blogs are the new journalists. While the information selected by social media as news is frequently very different to the information selected as news by news organizations, the issue is not what the news is, but whether the audience tunes-in. The audience is tuning in to social media rather than news media.

One of the selectors of information is surprise but given the amount of information on the Internet and the speed it travels around the Web there can be few surprises with traditional forms of news today. Conflict is easy to create and is a mainstay of news organizations but not all content can be presented honestly as conflict. Conflict is frequently created artificially by editing as was done by *Catalyst* where part of a statement was removed reversing the meaning, and this made it easy to attack the statement and create a conflict. In addition, if the conflict is between the subsystems as opposed to within the content, it is likely that the meaning or emotional level of the content will be changed. Further, the overuse of conflict, where the conflict is artificially created, may be part of the problem of diminishing news popularity because audiences are aware of these sensationalist techniques and attempted manipulations (Menell in McCombs 2011). In addition, research shows that social media editors, (who normally have a profile of being young, technically oriented and in touch with the Internet community), do not give conflict the prominence that it has been given in traditional news media (Wasike 2013: 6,19).

Social media editors drive readers from social media to their newspaper, as occurred during Hurricane Ike in 2008 when 300,000 visitors were sent from Twitter to the Austin American-Statesman newspaper (Gleason 2010: 7). However, the fact remains that Twitter is signing up 135,000 new accounts every day (Statistic Brain 2014) while news readership levels are generally falling. Selectors other than surprise and conflict dominate social media. While social media are not particularly oriented to quantities such as statistics, they are extremely oriented towards local relevance, norm violations, topicality, and opinions.

Public versus private information

Another reason why social media are not mass media is the issue of public versus private information. In the past, as Moeller states, mass information was general information and not private information (Moeller 2006: 126; Luhmann 2000: 19-20,30). This is not

necessarily the case with social media today. The problems of private information becoming public information on the Web continue to grow, with police warnings about putting personal information on social media seemingly ignored.

Moeller wrote that when using the Internet and Web we are not responding to real people in real time. In addition, he wrote that the mass media was one of the "rising stars of social systems" (Moeller 2006: 121,123). These statements were true at the time they were written, which was before Facebook and social media in general had become established. However, in the last ten years, the Internet and social media have created massive changes in society. Today when using social media, users are often online at the same time exchanging information in real time. In addition, social media may be public or private but even public information is presented from a private perspective. This private perspective of news presentation occurs at least to some extent even with social media editors who, being young and technically oriented, tend to focus on their own interests – science and technology (Wasike 2013: 6,19)

Merging of media strands

The three strands of the mass media (news, advertising and entertainment) are not as clear today as when Luhmann categorised them. While Luhmann did acknowledge the possibility of overlaps, he stated that there was enough difference between the strands for the purposes of structuring the mass media (Luhmann 2000: 24). This is not necessarily the case today. For instance, interactive media such as LinkedIn and YouTube often merge these strands. LinkedIn is a self promotional site for professional people who also provide information, and YouTube often has advertisements that have gone viral and become entertainment. The KLM Lost & Found service video, published on 23 September 2014, is an example of an advertisement that merged into entertainment with over eleven million views in thirteen days. This high popularity was at least in part because it is more deceptive than most advertising.

The KLM advertisement shows a cute, well trained Beagle dog delivering lost items to people who have left them on flights. KLM staff (or at least people who claim to be staff) discuss how helpful and cleaver the Beagle is and how they enjoy having him as part of their team. Many people, quite justifiably, were upset to find out that the dog was hired for the advertisement and not part of the KLM team (Waxman 2014), and one commentator described it as a hoax (Prakash 2014). Luhmann states that double deception dominates advertising because people understand they are being deceived but do not understand how they are being deceived (Luhmann 2000: 44-45), and this applies in multiple ways to the KLM advertisement, where until it was pointed out by journalists, the public did not realise how they were being deceived.

Just as advertising and entertainment are no longer clearly delineated in social media, news and entertainment have merged. This is a problem for broadcasters because on television, for instance, advertising must be clearly and easily identified and separated from entertainment programs and in the same way, news organisations are expected to report accurately. However, social media are not covered by such codes of practice.

Accumulation of non-information

Another problem for news organisations is that given the number of sites offering news, along with the ability of users to click from site to site, information becomes non-information in minutes and therefore news stops being news in minutes. In addition, in-depth reports are created from previously accumulated information (Luhmann 2000: 35-6); but today, in online news, many of these in-depth reports are created from multiple links to previous stories so they present nothing new and are non-information rather than information. This accumulation of non-information is one of the reasons news on the Web has not been as successful as predicted. Links to summaries might be more popular.

Environment for life

Anthropologist, Jadran Mimica, states that "human organismic existence is the origin and end of its own projection into the world", and from this perspective "the primary task of human praxis is self-creation"; therefore, "since humans exist in the world, being in the world is their primary existential project - their sole raison d'être. Thus the primary ontological project of humanness is the realisation of its own mode of being-in-the-world. It is self-creating (autopoetical)" (Mimica 1991: 35). In other words, the purpose of human life is to be in the world and continue humanness and humanity and therefore its nature is autopoietic. Thus, autopoiesis is inherent in society at multiple levels, including at an audience level as well as at the level of multimedia construction. In addition, autopoiesis always involves a medium.

In multimedia, the medium is obvious; it is composed of the audio-visual physical subsystems such as music and video images, whereas the medium for life itself is more complex because life involves medium within medium, environment within environment. If autopoiesis needs a medium within which to be self-creating, and it appears that it does for the human condition, then as Hansen states, media are an environment for life (Hansen 2006: 299). This can be applied to social media on the Web and to email on the Internet, which provide an environment for life that allows the user to be active in the world, as opposed to mass media which provide an environment that makes the user a passive spectator of the world.

While emails are normally stated as not being social media, some emails such as those to groups which anyone can subscribe to, and which form part of an ongoing campaign, are claimed here to be a form of social media. For instance, the reality created by users on the Internet and Web, and their perception of their ability to change the world can be seen in an email from Greenpeace to its subscribers titled "We did it! LEGO blocked Shell". The email stated that after receiving 25,000 emails from a Greenpeace campaign to protest the Shell oil

company's proposed drilling in the Arctic, LEGO announced it would not renew its contract with Shell. This email included the statement, "we know this is a battle [against Shell] we can win".[16] This email shows a reality that has been created using the Internet as an environment for life.

Illusion of reality

This is not to say that users can actually change the world through social media but that they believe they can because some people, through the use of social networks do have a major impact. For instance, every so often a video goes viral and results in some type of significant change. Believing this will occur is no more farfetched than believing in winning the lottery and many people buy lottery tickets. The power of social media may be more illusion than real but the illusion is real to its users.

It has been claimed, with some justification, that using social media is a form of "slacktivism"; talking rather than doing (Jutras 2009), and this is an appropriate term to describe "feel-good online activism" that has no social or political impact; however it gives users who are involved in these "slacktivist" campaigns the illusion that they are creating a meaningful impact even though their only commitment is being involved in a Facebook group (Morozov 2009). Nevertheless, even if illusion is the basis of reality for hundreds of millions of users, it is their chosen reality.

Reconnecting with humanness

Mimica continues: "[h]uman cultural activities (praxis) then, are constellated by the vital structures of humanness" and "any existence is always and only about existence; the structures of being in the world are about that particular being-in-the-world" (Mimica 1991: 35). Structures that enable people to be in the world they choose include social media. Social media are not dominated by world events, politics or traditional news. For instance, one of the

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[16] Email sent to all subscribers by Alexandra Harris, Arctic Campaigner, Greenpeace Australia Pacific on 13 Oct 2014.

standing jokes about YouTube is the number of cat videos that are uploaded, and these jokes have become a traditional inclusion when discussing YouTube, even though videos of cute children and humorous events are probably more prolific.

Writing has been used for propaganda for almost four thousand years (Robinson 1995: 8) and it appears people are tired of propaganda and the news that carries it – exposed once too often with the weapons of mass destruction scandal. Until news also offers a reconnection to each person's mode of being-in-the-world, it is likely its popularity will continue to fall. News creates its own reality and it seems that this reality is of little interest to many people when compared to the reality they themselves create with social media. While there are negatives about social media such as pornography, addiction by many users which adversely affects their work productivity, and websites which have been set up to promote suicide (Kim, Jeong & Lee 2010: para. 7.1.2), these are overshadowed by the user perceived benefits.

Just as McLuhan described technology as an "extension of man", social media can be described as "extensions of relationships" because communication is not meant for a target audience, where there is a one-way relationship as occurs with the mass media, but for a personal audience where a two-way relationship exists (Chan 2012: 17). McLuhan saw the early indications of this reaching out with technology. He believed that participatory technology retribalises society in that it moves society away from individualism and creates a global village (McLuhan 1994: 22-4; 34,93). As well as the world being connected as a single global village through Internet access, social media groups create large numbers of discourse-based villages that are nevertheless global in their reach.

Social media is a function system that is replacing mass media but it has a very different function to the mass media. It seems likely that Luhmann would have categorised social media with a different code to the mass media given that the code for mass media is the distinction between information and non-information. In an ongoing two-way or many-way social media conversation, the content is not information that becomes out-of-date (non-

information) because social media is about people reaching out, attempting to understand and be involved with other people. Due to the effect of this reaching out within a global village, for many people, this code of "information" has been has replaced by "sensibility" in that the humanness of news has become more important than its newness. Therefore, it is proposed here that the code of social media is sensibility/non-sensibility, sensibility of life, sensibility of people and sensibility of the world around us.

The term sensibility is normally understood as the ability to perceive, feel, or be emotionally responsive. Hansen states that digital devices result in a massive increase in sensibility and refers to sensibility as "worldly sensation" (Hansen 2011: overhead slide at 7'36"). In other words, technology has provided the setting for reaching out to others and this is a return to tribal activities. An example of reaching out using the Web are websites which are open to the community that assist people by allowing questions to be posted where others can respond to help. Another example of reaching out is information sites such as the online encyclopaedia, Wikipedia, which has thousands of contributors who volunteer their time and energy so that the information is free to everyone, everywhere.

Moral panic and media panic

Social media and the digital devices that access them are new mediated pleasures and as such tend to be regarded from two extreme positions; these are "inherently liberatory" or "inherently dubious" (Horning 2013). On the one hand, reaching out to others through posting content, responding to posted content, and providing online help to others can be seen as creating self-expression and self-satisfaction for large numbers of people using social networks (Kim, Jeong & Lee 2010: para. 6.1.5). On the other hand, some see the pleasure of social media as "dangerously narcissistic"; an attitude reminiscent of the moral panic of the eighteenth century (Horning 2013). In eighteenth century England, attitudes to the novel

divided into either compulsive reading or expressions of stern disapproval (Vogrinčič 2008: 103-4,118-9).

Social media today allow users a new experience of pleasure. One of the fears of online media and the moral panic that accompanies it is that, like novels, they pre-empt the need for the presence of others; in the eighteenth century it was claimed that the reading of novels was a form of masturbation (Horning 2013). An example of the moral panic from social media is the *Deleting Online Predators Act* brought before the House of Representatives in the USA in 2006 which stagnated in the Senate. If the bill had been enacted it would have restricted the use of social media by minors in libraries and schools (O'Hear 2007). Such disapproval of social networks is not only a form of moral panic but also a form of media panic and is associated with television and online games as well as the Internet (Vogrinčič 2008: 103-4,118-9).

There are more issues involved with moral panic than are at first obvious and there is an even darker side to moral panic. It is "solipsistic, inauthentic, inappropriate" and it hides the way these new forms of pleasure "ameliorate the ills of capitalism not by mitigating them but by intensifying commodification and turning more of everyday life into exploitable labor" (Horning 2013). In other words, this criticism of the pleasure that comes from self-expression and self-satisfaction from new media is distracting from the more important issue which is the exploitation of the majority of people by the capitalist system.

Moral panic is not uncommon with new forms of media. A recent example is the moral panic associated with reality television (Biltereyst 2004: 7). The moral panic around social media should be viewed as one of a series of moral panics that have not resulted in the downfall of society. The moral panic that has been generated as a result of the social networks is not warranted. Unlike the eighteenth century, we now understand that reading books, whether fact or fiction, is a worthwhile pursuit and reading as recreation is praised as being beneficial for the person and society with research showing that reading literary fiction

improves social skills (Kidd & Castano 2013: 377,380). Criticism today of the pursuit of

pleasure from the Web and social networks is little different to eighteenth century criticism of

reading novels. Our understanding of this new media and its impact is in its infancy and the

future may reveal many social and personal benefits of pleasurable online activities.

The reality of multimedia news

In our complex world, the reality created by the mass media is simplistic and inadequate

and does not connect with humanness. Social media provides multiple realities and until news

can offer a reality that meets user demands, the commercial success of news organisations

will continue to diminish. The days of surprise and conflict being the primary draw card of

news appear to be over, at least the traditional type of surprise offered by conventional news

formats. The surprise of a Beagle being a KLM staff member and helping to deliver lost items

is the type of surprise now in demand.

To older readers, journalism might look as if it has embraced digital technology, and for

them it has, but for generations who have grown up with interactive tools, journalism is still

"the same old thing" in a similar format that is meant to be read from start to finish. It is much

the same as was offered in hardcopy with added bells and whistles. Another problem is that

the addition of hyperlinks normally means much more information rather than less

information of a more specific nature. The fact that there is more "space" on a website than in

a printed newspaper, has misled newspapers into to putting long articles online even though

readers prefer to print long articles than read them on the Web. While adding more

information to a story on the Web might satisfy the journalist, it appears not to satisfy the

user. In other words, users want less quantity but more quality and for the bulk of users today,

quality means targeted information that is more relevant for them personally.

Social media offers a way of reconnecting with humanness and mimicking social media

might be one of the ways to entice users back to news. Even so, there is no simple, single

solution. Another method includes interactive multimedia that uses "gamification", as opposed to newsgames, provided such techniques are used carefully so as not to distort news. In addition, it would benefit news organisations to review the apps that provide summaries of news content to evaluate if any of the concepts could be used to improve the interactivity of news sites. News organisations must create interactive multimedia that is constructed specifically for the Web and not re-use television and newspaper content. Providing links to past stories is only providing links to non-information. In addition, news sites must include ways of personalising access so that the user can select the content they want, in the form they want, and especially so they can select only that part of the news or news story they are interested in without having to read through long articles and long lists of selections to find information.

In the last words of his analysis of the mass media, Luhmann asks "*how* is it possible to accept information about the world and about society as information about reality when one knows *how* it is produced?" (Luhmann 2000: 122). The answer to this question today is that for large numbers of people it is not possible to accept the reality of the mass media now that its inconsistencies are obvious given the transparency created by the Web. In the past, mass media news created its own reality that was by and large accepted by audiences. Today, large numbers of people have rejected that reality by turning away from news.

News organisations are no longer in control of their own fate (Rosenstiel & Mitchell 2011, and this is especially the case given that by linking to and promoting social media, they have handed control of their audiences over to social media. To regain audiences, news organisations must control their own form of social media. But that alone is not enough. Media companies must embrace new technologies and "reinvent their fundamental understanding of what it is they are doing and how they do it, while keeping in place the skills and attitudes that allow them to function as a fourth estate" (Dunlop 2013: 254-5). The

proposed theory of multimedia and the application of the proposed model of multimedia assist with this reinvention of news.

For users, less is more. Users want control, they demand participation, they want a reality that matches their perceptions of the world, and they want a way of connecting to the world and influencing it, or at least the perception that they are influencing it, even though this may be only through online campaigns that are not necessarily effective. Media panic about the Web is not justified on the basis of moral panic about the uses and pleasures of social media. However, it may be justified on the basis that even though social media are replacing the mass media, they are not taking over many of the important functions of news organisations such as investigative journalism. Joseph Pulitzer stated "[o]ur republic and its press will rise or fall together" (Pulitzer 1904 in Topping 2014), and whether the press will rise or fall, to a large extent depends on maintaining its readership, and this will only occur by giving consumers what they want, which today involves providing a reality that meets their expectations.

References

ABC (2007) 'Natural HRT – Magic Bullet or Clever Con' [video, transcript and production details], Reporter Dr Maryanne Demasi, Producer Paul Schneller, Researcher Maryanne Demasi, *Catalyst*, Australian Broadcasting Corporation, <http://www.abc.net.au/catalyst/stories/s2006092.htm> accessed 13 Aug 2013.

ABC (2010a) 'Animal Action: Cleaning Station for Sharks and Rays' [video, transcript and production details], Reporter Dr Paul Willis, Producer Dr Holly Trueman, Researcher Dr Holly Trueman, *Catalyst*, Australian Broadcasting Corporation, <http://www.abc.net.au/catalyst/stories/2929830.htm> accessed 29 Oct 2012.

ABC (2010b) 'Mt Ruapehu' [video, transcript and production details], Reporter Dr Paul Willis, Producer Dr Paul Willis, Researcher Louise Heywood, *Catalyst*, Australian Broadcasting Corporation, <http://www.abc.net.au/catalyst/stories/2911181.htm> accessed 29 Oct 2012.

ABC (2011) 'ABC Code of Practice 2011', <http://about.abc.net.au/wp-content/uploads/2012/06/CodeOfPractice2011.pdf> accessed 29 Oct 2012.

ABC (2013a) 'Chiropractors' [video, transcript, production details and viewer comments], Reporter Dr Maryanne Demasi, Producer Dr Maryanne Demasi, Researcher Dr Maryanne Demasi, *Catalyst*, Australian Broadcasting Corporation, <http://www.abc.net.au/catalyst/stories/3801081.htm> accessed 13 Aug 2013.

ABC (2013b) 'Heart of the Matter Part 1 - Dietary Villains' [video, transcript, production details and viewer comments], Reporter Dr Maryanne Demasi, Researcher Dr Maryanne Demasi, *Catalyst*, Australian Broadcasting Corporation, <http://www.abc.net.au/catalyst/stories/3876219.htm> accessed 30 Apr 2014. Note that this program is no longer available online because it was found to breach impartiality standards.

ACMA (2014) Investigation Report No. 3138, *Australian Communications and Media Authority*, < http://www.acma.gov.au/>.

Adair, Bill (2012) 'Let's Blow Up the News Story and Build New Forms of Journalism', *Poynter*, published 21 Jun 2012, <http://www.poynter.org/how-tos/newsgathering-storytelling/178038/lets-blow-up-the-news-story-and-build-new-forms-of-journalism/> accessed 20 Oct 2013.

Ahlers, Douglas (2006) 'News Consumption and the New Electronic Media', *The Harvard International Journal of Press/Politics* 11: 29-52.

Ainsworth, Shaaron (2008) 'How Should We Evaluate Complex Multimedia Environments?', in R. Lowe, J. Rouet & W. Schnotz (eds.), *Understanding Multimedia Documents*, Springer: 249-266.

Alexa (2014) 'The Top 500 Sites on the Web', *Alexa,* <http://www.alexa.com/topsites> accessed 9 Sep 2014.

Allen, George D. (1975) 'Speech Rhythm: Its Relation to Performance Universals and Articulartory Timing', *Journal of Phonetics* 3: 75-86.

Anderson, Tim (2000) 'Michael Chion: Voice in Cinema', *Echo* 2(1), <http://www.echo.ucla.edu/Volume2-Issue1/book-reviews/cinematic-voice.html> accessed 20 Jun 2014.

Anderson, Vicki (2011) 'Reading Signs Before a Quake: Christchurch Earthquake 2011', *The Press*, <http://www.stuff.co.nz/the-press/news/christchurch-earthquake-2011/5559043/Reading-signs-before-a-quake> accessed 11 Dec 2014.

Anthony, Sebastian (2013) 'Microsoft Now Has One Million Servers – Less Than Google, but More Than Amazon, Says Ballmer', *Extreme Tech*, published July 19 2013, <http://www.extremetech.com/extreme/161772-microsoft-now-has-one-million-servers-less-than-google-but-more-than-amazon-says-ballmer> accessed 28 Apr 2014.

Appelgren, Ester (2004) 'Convergence and Divergence in Media: Different Perspectives', *8th ICCC International Conference on Electronic Publishing,* 23-26 Jun 2004, Brasília - DF, Brazil.

Araki, Yumi (2013) 'This New Mobile Tool is Redefining the Power of Petitions', *Arts.Mic*, published Mar 15 <http://mic.com/articles/29910/this-new-mobile-tool-is-redefining-the-power-of-petitions> accessed 14 Nov 2014.

Aust, Charles F. & Zillmann, Dolf (1996) 'Effects of Victim Exemplification in Television News on Viewer Perception of Social Issues', *Journalism & Mass Communication Quarterly* 73(4): 787-803.

Bacci, Francesca & Melcher, David (2011) *Art and the Senses*, Oxford University Press.

Balazs, Bela (1985) 'Theory of the Film: Sound', in E. Weis & J. Belton (eds.), *Film Sound: Theory and Practice,* Columbia University Press: 116-125.

Bantz, Charles R. (1997) 'News Organisations: Conflict as a Crafted Cultural Norm', in D. Berkowitz (ed.), *Social Meanings of News: A Text-Reader*, California, Sage, Thousand Oaks: 123-137.

Barnhurst, Kevin G. (2012) 'The Form of Online News in the Mainstream U.S. Press, 2001–2010', *Journalism Studies* 13(5): 791-800.

Barthes, Roland (1986) *The Responsibility of Forms: Critical Essays on Music, Art and Representation*, translated from the French by Richard Howard, Oxford, Basil Blackwell.

Bar-Yam, Yaneer (1997) *Dynamics of Complex Systems*, Reading, Massachusetts, Addison-Wesley.

Basulto, Dominic (2009) 'On the Internet, What Comes After Post-Modernism?', <http://bigthink.com/endless-innovation/on-the-internet-what-comes-after-post-modernism> accessed 12 Apr 2014.

Beaujon, Andrew (2012) 'Gallup: Americans Mistrust Media More Than Ever', *Poynter*, published Sep. 21, 2012 <http://www.poynter.org/latest-news/mediawire/189225/gallup-americans-mistrust-media-more-than-ever/> accessed 29 Oct 2013.

Becker, Wolfgang (2003) 'Interview', *Good **B**ye Lenin* [DVD], W. Becker (director), B. Lichtenberg & W. Becker (writers), Sony.

Bedau, Mark A. (2002) 'Downward Causation and the Autonomy of Weak Emergence', *Principia* 6 (1): 5-50.

Bedau, Mark A. (2010) 'Weak Emergence and Context-Sensitive Reduction', in A. Corradini & T. O'Connor (eds.), *Emergence in Science and Philosophy,* New York, Routledge: 46-63.

Bedau, Mark A. (2013) 'Pluralism About How Wholes Emerge From Parts' [lecture], *ICI Berlin Institute*, <https://www.ici-berlin.org/no_cache/videos/bedau/?sword_list%5B0%5D=bedau> accessed 14 Nov 2013.

Bergland R, Crawford L, Noe S and Ellsworth M (2008) 'Multimedia Features and Newspaper Websites: A 2007 Content Analysis of Daily Newspapers', *Convergence and Society Conference*, October 2008, Columbia, SC.

Berkeley, George (2008) *A Treatise Concerning the Principles of Human Knowledge*, Forgotten Books, originally published in 1710.

Biltereyst, Daniel (2004) 'Media Audiences and the Game of Controversy: On Reality TV, Moral Panic and Controversial Media Stories', *Journal of Media Practice* 5(1) 7-24.

Blizzard (2012) 'Press Releases' *Blizzard*, <http://us.blizzard.com/en-us/company/press/pressreleases.html?id=2847881> accessed 13 Apr 2012.

Boczkowski, Pablo J. (2004) *Digitizing the News: Innovation In Online Newspapers*, Cambridge, Massachusetts, MIT Press.

Bogost, Ian, Ferrari, Simon & Schweizer, Bobby (2010) *Newsgames: Journalism at Play*, Cambridge, Massachusetts, MIT Press.

Bolivar, Valerie J., Cohen, Annabel J. & Fentress, John C. (1994) 'Semantic and Formal Congruency in Music and Motion', *Psychomusicology* 13: 28-59 Spring/Fall.

Bolter, Jay David (1991) *Writing space: The Computer, Hypertext, and the History of Writing*, Hillsdale, New Jersey, Lawrence Erlbaum.

Bolter, Jay David & Grusin, Richard (1999) *Remediation: Understanding New Media*, Cambridge, Massachusetts, MIT Press.

Boltz, Marilyn, Schulkind, Matthew & Kantra, Suzanne (1991) 'Effects of Background Music on the Remembering of Filmed Events', *Memory and Cognition* 19(6): 593-606.

Booth, Alan (1970) 'The Recall of News Items', *Public Opinion Quarterly* 34: 604-10.

Bordwell, David (2002) 'Intensified Continuity Visual Style in Contemporary American Film', *Film Quarterly* 55(3): 16-28.

Bordwell, David & Thompson, Kristin (2008) *Film Art: An Introduction, 8th ed.*, New York, McGraw Hill.

Boyd & McBride (2014) 'The Destablilizing Force of Fear', in K. McBride & T. Rosenstiel, *The New Ethics of Journalism: Principles for the 21st Century*, Los Angeles, Sage: 177-188.

Britannica (2013) 'Mind–body Dualism', *Encyclopædia Britannica* <http://www.britannica.com/EBchecked/topic/383566/mind-body-dualism> accessed 30 Aug 2013.

Brooker, Charlie (2103) 'How Videogames Changed the World', *Channel Four Television Corporation*, first aired 30 November, Britain.

Brosius, Hans-Bernd, Donsbach, Wolfgang, Birk, Monika (1996) 'How Do Text-Picture Relations Affect the Informational Effectiveness of Television Newscasts?' *Journal of Broadcasting & Electronic Media* 40(2): 180-195.

Brown, Stephen (2006) 'Recycling Postmodern Marketing', *The Marketing Review* 6: 211-230.

Burgers, Christian & de Graaf, Anneke (2013) 'Language intensity as a sensationalistic news feature: The influence of style on sensationalism perceptions and effects', *Communications* 38(2): 167-188.

Burnett, Robert & Marshall, P. David (2003) *Web Theory: An Introduction*, Abingdon, Oxon, Routledge.

Bush, George W. (2001) 'Address to a Joint Session of Congress and the American People', *The White House*, <http://georgewbush-whitehouse.archives.gov/news/releases/2001/09/20010920-8.html> accessed 12 Oct 2014.

Byrne, David (1998) *Complexity Theory and the Social Sciences: An Introduction*, Routledge, New York.

Caillois, Roger (2001) *Man, Play and Games*, translated from the French in 1961 by M. Barash, Chicago, IL, University of Illinois Press.

Capilla, Diego José García (2012) 'From Postmodern Ethics to the New Ethics of the Me Generation: The Transition from Mass Media to the Internet', *Communication & Society* 25(1): 165-190.

Carvajal, Miguel & Avilés, José A. García (2008) 'From Newspapers to Multimedia Groups: Business Growth Strategies of the Regional Press in Spain', *Journalism Practice* 2(3): 454-462.

Cassidy, J. David, Boyle, Eleanor, Côté, Pierre, He, Yaohua, Hogg-Johnson, Sheilah, Silver, Frank L. & Bondy, Susan J. (2008) 'Risk of Vertebrobasilar Stroke and Chiropractic Care: Results of a Population-Based Case-Control and Case-Crossover Study', *European Spine Journal* 17(Suppl 1): 176-183, <http://www.ncbi.nlm.nih.gov/pmc/articles/PMC2271108/> accessed 17 Dec 2014.

Chalmers, David J. (2006) 'Strong and Weak Emergence', in P. Clayton & P. Davies (eds.), *The Re-emergence of Emergence: The Emergentist Hypothesis from Science to Religion*, Oxford University Press, <http://consc.net/papers/emergence.pdf> accessed 20 Jun 2014.

Chan, Adrian (2012) *Introduction: Principles of Social Interaction Design: An Essay* <http://gravity7.com/SxD_Principles-AdrianChan-2012.pdf> accessed 26 Oct 2014.

Chandler, David (1995) *Processes of Mediation,* <http://www.aber.ac.uk/media/Documents/short/process.html> accessed 22/1/2014.

Cheng, Benjamin Ka Lun & Lo, Wai Han (2012) 'Can News Be Imaginative? An Experiment Testing the Perceived Credibility of Melodramatic Animated News, News Organizations, Media Use, and Media Dependency', *Electronic News* 6(3): 131-150.

Cherry, E. Colin (1953) 'Some Experiments on the Recognition of Speech, with One and with Two Ears', *The Journal of the Acoustical Society of America* 25(5): 975-9.

Chion, Michel (1994) *Audio-Vision: Sound on Screen*, New York, Columbia University Press.

Chion, Michel (2013a) 'The Audio-Logo-Visual and the Sound of Languages in Recent Film', in J. Richardson, C. Gorbman & C. Vernallis (eds.), *The Oxford Handbook of New Audiovisual Aesthetics*, Oxford University Press: 77-88.

Chion, Michel (2013b) 'Sensory Aspects of Contemporary Cinema', in J. Richardson, C. Gorbman & C. Vernallis (eds.), *The Oxford Handbook of New Audiovisual Aesthetics*, Oxford University Press: 326-330.

Chung, Deborah S. & Yoo, Chan Yun (2008) 'Audience Motivations for Using Interactive Features: Distinguishing Use of Different Types of Interactivity on an Online Newspaper', *Mass Communication and Society* 11(4): 375-397.

Chyi, Hsiang Iris & Yang, Mengchieh Jacie (2009) 'Is Online News an Inferior Good? Examining the Economic Nature of Online News Among Users', *Journalism & Mass Communication Quarterly* 86(3): 594-612.

Cilliers, Paul (1998) *Complexity and Postmodernism: Understanding Complex Systems*, London, Routledge.

Cilliers, Paul (2007) 'On the Importance of a Certain Slowness: Stability, Memory and Hysteresis in Complex Systems', in C. Gershenson, D. Aerts & B. Edmonds (eds.), *Worldviews, Science and Us: Philosophy and Complexity*, New Jersey, World Scientific: 53-64.

Cirucci, Angela M. (2013) 'First Person Paparazzi: Why Social Media Should Be Studied More Like Video Games', *Telematics & Informatics* 30(1): 47-59.

CNN (2012) 'Gaming Reality', <http://edition.cnn.com/interactive/2012/08/tech/gaming.series/korea.html> accessed 26 Aug 2012 .

Cohen, Annabel J. (1993) 'Associationsim and Musical Soundtrack Phenomena', *Contemporary Music Review* 9(1&2): 163-178.

Cohen, Annabel J. (2000) 'Film Music: Perspectives from Cognitive Psychology', in J. Buhler, C. Flinn & D. Neumeyer (eds.), *Music and Cinema*, Hanover, Wesleyan University Press: 360-377.

Cohen, Annabel J. (2013) 'Congruence -Association Model of Music and Multimedia: Origin and Evolution', in S. Tan, A.J. Cohen, S.D. Lipscomb & R.A.Kendall (eds.), *The Psychology of Music in Multimedia*, Oxford University Press: 17-47.

Colapinto, J. (1985) 'Maturana and the Ideology of Conformity'. *The Family Therapy Networker* (May/ June): 29-30.

Colavita, Francis B. & Weisberg, Daniel (1979) 'A Further Investigation of Visual Dominance', *Perception & Psychophysics* 25(4): 345-347.

Continuum (2012) [Canadian science fiction series,] created by Simon Barry, produced by Reunion Pictures Inc, first broadcast on 27 May 2012, <http://www.imdb.com/title/tt1954347/> accessed 1 Dec 2014.

Cook, Nicholas (1998) *Analysing Musical Multimedia*, New York: Oxford University Press.

Cranston, Richard (2014) Letter from senior lawyer at the ACMA dated 15 Jul 2014.

Crawford, Chris (2003) *Chris Crawford on Game Design*, USA, New Riders.

Csikszentmihalyi, Mihaly (2014) 'Living in "Flow" The Secret of Happiness', <http://www.centrocies.com.mx/wp-content/uploads/2014/03/Living-in-Flow.pdf > accessed 11 Nov 2014.

David, Prabu, Horton, Brian & German, Tom (2006) 'Unpacking Television Entertainment Through Experience Sampling: A Multilevel Analysis', *Paper presented at the Annual Meeting of the International Communication Association, Dresden International Congress Centre*, 16 Jun 2006, Dresden, Germany.

Davies, Paul C. (2006) 'The Physics of Downward Causation', in P. Davies & P. Clayton (eds.), *The Re-Emergence of Emergence : The Emergentist Hypothesis from Science to Religion*, Oxford University Press: 35-52.

Debette, Stéphanie & Leys, Didier (2009) 'Cervical-artery Dissections: Predisposing Factors, Diagnosis, and Outcome', *Lancet Neurol* 8: 668-78.

Deterding, Sebastian, Dixon, Dan, Khaled, Rilla & Nacke, Lennart (2011) 'From Game Design Elements to Gamefulness: Defining "Gamification"', *Proceedings of the 15th International Academic MindTrek Conference: Envisioning Future Media Environment*, Sep 28-30, Tampere, Finland: 9-15.

Devlin, Keith (2001) 'Claude Shannon, 1916–2001', *Focus: The Newsletter of the Mathematical Association of America* 21(5): 20–21. <https://www.maa.org/external_archive/devlin/devlin_3_01.html> accessed 29 Jul 2014.

Dimmick, John, Chen, Yan & Li, Zhan (2004) 'Competition Between the Internet and Traditional News Media: The Gratification-Opportunities Niche Dimension', *Journal of Media Economics* 17(1): 19-33.

Docx, Edward (2011) 'Postmodernism is Dead', *Prospect* [magazine] <https://www.prospectmagazine.co.uk/magazine/postmodernism-is-dead-va-exhibition-age-of-authenticism/#.U0jYrDhZqmQ> accessed 12 Apr 2014.

Downey, Michael (2014) 'Google Wants To Extend Your Life', *Life Extension* [magazine] April: 64-69.

Dunlop, Tim (2013) *The New Front Page: New Media and the Rise of the Audience*, Melbourne, Scribe.

Dunsby, Jonathan (2007) 'Performance', in L. Macy (ed.), *Grove Music Online*, <http://www.grovemusic.com> accessed 5 May 2008.

Eisenstein, Sergei M. (1947) *The Film Sense*, New York, Harcourt, Brace and World.

Eisenstein, Sergei M. (1949) 'A Dialectic Approach to Film Form', in *Film Form: Essays in Film Theory*, New York, Harcourt, Brace and World.

Eldar, Eran, Ganor, Ori, Admon, Roee, Bleich, Avraham & Hendler, Talma (2007) 'Feeling the Real World: Limbic Response to Music Depends on Related Content', *Cerebral Cortex* 17(12): 2828-2840.

Enriquez, Juan (2013) 'Your Online Life, Permanent as a Tattoo', *TED* [conference broadcast] <http://www.ted.com/talks/juan_enriquez_how_to_think_about_digital_tattoos#t-47511> accessed 4 Jun 2014.

Fehrman, Kenneth R. & Fehrman, Cherie (2004) *Colour: The Secret Influence*, Prentice Hall.

Feld, Steven (1984) 'Communication, Music, and Speech About Music', *Yearbook for Traditional Music* 16: 1-18.

Fell, Lloyd & Russell, David (1994a) 'An Introduction to "Maturana's Biology"', in L. Fell & A. Stewart (eds.), *Seized by Agreement, Swamped by Understanding: A Collection of Papers to Celebrate the Visit to Australia in August 1994 by Humberto Maturana*, University of Western Sydney.

Fell, Lloyd & Russell, David (1994b) 'The Dance of Understanding', in L. Fell & A. Stewart (eds.), *Seized by Agreement, Swamped by Understanding: A Collection of Papers to Celebrate the Visit to Australia in August 1994 by Humberto Maturana*, University of Western Sydney.

Firat, A. Fuat & Dholakia, Nikhilesh (2006) 'Theoretical and Philosophical Implications of Postmodern Debates: Some Challenges to Modern Marketing', *Marketing Theory* 6: 123-162.

Fleischaker, Gail Raney (1988) *Autopoiesis: System Logic and Origins of Life*, *Dissertation, Doctor of Philosophy*, Boston University.

Florence, Rob (2013) Interview in C. Brooker (presenter) 'How Videogames Changed the World', *Channel Four Television Corporation*, Britain, first aired in 30 Nov 2013.

Ford, Andrew (1997) *Illegal Harmonies: Music in the 20th Century*, Sydney, Hale & Iremonger.

Ford, Andrew (2005) *In Defence of Classical Music*, Sydney, ABC Books.

Francesco, Michele Di (2010) 'Two varieties of Causal Emergentism', in A. Corradini & T. O'Connor (eds.), *Emergence in Science and Philosophy,* New York, Routledge.

Friske, John (1990) *Introduction to Communication Studies*, 2nd ed., London, Routledge.

Frith, Simon (2002) 'Music and Everyday Life', *Critical Quarterly* 44(1): 35-48.

Free TV (2015) *Commercial Television Code of Practice*, <http://www.freetv.com.au/media/Code_of_Practice/2010_Commercial_Television_Industry_Code_of_Practice_July%202013.pdf> accessed 23 Feb 2015.

Fromm, Jochen (2005) 'Types and Forms of Emergence', *Cornell University Library* <http://arxiv.org/ftp/nlin/papers/0506/0506028.pdf > accessed 6 Dec 2013.

Garrett, Mario D. (2014) 'Complexity of Our Brain', *Psychology Today*, <http://www.psychologytoday.com/blog/iage/201402/complexity-our-brain> accessed 24 Jul 2014.

Gelles, Sean (2013) 'Social Media is Mass Media', *Econtent*, Mar 14, 2013 <http://www.econtentmag.com/Articles/Column/Social-Pulse/Social-Media-is-Mass-Media-88315.htm> accessed 5 Oct 2014.

Gentilucci, Maurizio & Cattaneo, Luigi (2005) 'Automatic Audiovisual Integration in Speech Perception', *Experimental Brain Research* 167(1): 66-75.

Gillmor, Alan M. (1988) *Erik Satie*, Boston, Twayne.

Girard, John & Allison, Michael (2008) 'Information Anxiety: Fact, Fiction, or Fallacy?', *Electronic Journal of Knowledge Management* 6(2): 111-124.

Glasersfeld, Ernst von (1991) 'Distinguishing the Observer: An Attempt at Interpreting Maturana', *Methodologia* 5(8): 57–68, <http://www.oikos.org/vonobserv.htm> accessed 2 Nov 2011.

Glasersfeld, Ernst von (1996) 'Cybernetics and the Art of Living', Plenary address, *13th European Meeting on Cybernetics and Systems Research*, Vienna, April 9-12, <http://www.oikos.org/Vonglas2oct.htm> accessed 22 Dec 2011.

Glass, Philip (2008) 'Book of Longing' [pre-concert talk] 12 Oct 2008, Sydney Opera House.

Gleason, Stephanie (2010) 'Harnessing Social Media', *American Journalism Review*, <http://ajrarchive.org/Article.asp?id=4860> accessed 1 Nov 2014.

Gombrich, E. H. (1982) *The Image and the Eye: Further Studies in the Psychology Of Pictorial Representation*, Phaidon.

Goneos-Malka, Amaleya, Grobler, Anské & Strasheim, Arien (2013) 'Suggesting New Communication Tactics Using Digital Media to Optimise Postmodern Traits in Marketing', *Communicatio: South African Journal for Communication Theory and Research* 39(1): 122-143.

Google (2009) 'Exploring a New, More Dynamic Way of Reading News With Living Stories', *Google Official Blog*, <http://googleblog.blogspot.com.au/2009/12/exploring-new-more-dynamic-way-of.html> accessed 15 Jun 2014.

Google (2014) 'How Search Works The Story: From Algorithms to Answers', *Google Inside Story*, <http://www.google.com/insidesearch/howsearchworks/thestory/> accessed 21 Jun 2014.

Gorbman, Claudia (1987) *Unheard Melodies: Narrative Film Music*. London: British Film Institute.

Gorbman, Claudia (2004) 'Aesthetics and Rhetoric', *American Music* 22(1): 20-2.

Gorbman, Claudia (2014) 'Chion is a Poet in Theoretician's Clothing', *FilmSound.org* <http://www.filmsound.org/chion/claudia.htm> accessed 15 Jan 2014.

Görke A. & Scholl A. (2006) 'Niklas Luhmann's Theory of Social Systems and Journalism Research', *Journalism Studies* 7(4): 644-655.

Grabe, Maria Elizabeth (2000) 'Packaging Television News: The Effects of Tabloid on Information Processing and Evaluative Responses', *Broadcasting & Electronic Media* 44(4): 581-598.

Grabe, Maria Elizabeth, Zhou, Shuhua, Barnett, Brooke (2001) 'Explicating Sensationalism in Television News: Content and the Bells and Whistles of Form', *Journal of Broadcasting & Electronic Media* 45(4): 635-655.

Graf, Peter & Schacter, Daniel L. (1989) 'Unitization and Grouping Mediate Dissociations in Memory for New Associations', *Learning, Memory, and Cognition* 15(5): 930-940.

Gratz, J. E. (1984) 'The Ethics of Subliminal Communication', *Journal of Business Ethics* 3: 181-184.

Green, Jessica (2010) 'Understanding the Score: Film Music Communicating to and Influencing the Audience', *Journal of Aesthetic Education* 44(4): 81-94.

Greenfield, Susan (2000) 'The Mind's Eye', part 6 of *Brain Story*, BBC Television, first broadcast on BBC2 in July 2000.

Greenfield, Susan (2001) *Brain Story: Unlocking Our Inner World of Emotions, Memories, Ideas and Desires*, London , BBC.

Greenfield, Susan (2014) 'Screen Technologies', <http://www.susangreenfield.com/science/screen-technologies/> accessed 15 Nov 2014.

Grimes, Tom (1990) 'Audio-video Correspondence and its Role in Attention and Memory'. *Educational Technology Research and Development* 38(3): 15-25.

Grubb, Ben (2013) 'Teen's Multimillion-dollar Yahoo Payday Before 18th Birthday', *Sydney Morning Herald*, <http://www.smh.com.au/digital-life/digital-life-news/teens-multimilliondollar-yahoo-payday-before-18th-birthday-20130326-2gqvg.html> accessed 26 Mar 2013.

Halley, Julianne. D. & Winkler, David A. (2008) 'Classification of Emergence and Its Relation to Self-Organization', *Complexity* 13(5): 10-15.

Hansen, Mark B. (2000) *Embodying Technesis: Technology Beyond Writing,* University of Michigan Press.

Hansen, Mark B. (2006) 'Media Theory', *Theory, Culture & Society* 23(2–3): 297-306.

Hansen, Mark B. (2011) 'Delimination of Life: Mark B. Hansen (US) About His New Work on Subjectivity and Experience in the Wake of Contemporary Media' [video lecture], *Transmediale festival for art and digital culture,* Berlin, <http://vimeo.com/20753681> accessed 5 Aug 2014.

Hassin, Ran R., Ferguson, Melissa J., Shidlovski, Daniella & Gross, Tamar (2007) 'Subliminal Exposure to National Flags Affects Political Thought and Behavior', *Proceedings of the National Academy of Sciences of the United States of America* 104(50): 19757-19761.

Hayles, N. Katherine (1999) *How We Became Posthuman: Virtual Bodies in Cybernetics, Literature, and Informatics*, University of Chicago Press.

Heimans, Jeremy (2004) 'What new power looks like', *TEDSalon*, Berlin, Jun 2014, http://www.ted.com/talks/jeremy_heimans_what_new_power_looks_like/transcript?language=en#t-891718 accessed 11 Nov 2014.

Hermida, Alfred (2008) 'US Newspapers Lag Behind in Use of Multimedia', *Journalism, Multimedia, Newspapers,* published 10 Oct 2008, <http://www.reportr.net/2008/10/10/us-newspapers-lag-behind-in-use-of-multimedia/> accessed 23 Jan 2015.

Heylighen, Francis (2008) 'Complexity and Self-organization', in M. J. Bates & M. N. Maack (eds.), *Encyclopedia of Library and Information Sciences*, Taylor & Francis, <http://pespmc1.vub.ac.be/Papers/ELIS-complexity.pdf> accessed 16 Sep 2013.

Hindess, Barry (1996) *Discourses of Power: From Hobbes to Foucault*, Oxford, Basil Blackwell.

Hoeckner, Berthold, Wyatt, Emma W., Decety, Jean & Nusbaum, Howard (2011) 'Film Music Influences How Viewers Relate to Movie Characters', *Psychology of Aesthetics, Creativity, and the Arts* 5(2): 146–153.

Holm, Todd T. (2012) 'Managing Millennials: Coaching the Next Generation', *The Forensic of Pi Kappa Delta* 97 (Summer): 25-38.

Hooper, Val & Herath, Channa (2014) 'Is Google Making Us Stupid? The Impact of the Internet on Reading Behaviour', *BLED 2014 Proceedings*, Paper 1, <http://aisel.aisnet.org/bled2014/1> accessed 13 Jul 2014.

Horning, Rob (2013) 'Social media and sensibility', *The New Inquiry*, published 15 Aug 2013, <http://thenewinquiry.com/blogs/marginal-utility/social-media-and-sensibility/> accessed 24 Oct 2014.

Hovda, Paul (2008) 'Quantifying Weak Emergence', *Minds & Machines* 18: 461–473.

Howard, Jeremy (2014) 'The Wonderful and Terrifying Implications of Computers That Can Learn', *TEDxBrussels*,

<www.ted.com/talks/jeremy_howard_the_wonderful_and_terrifying_implications_of_computers_that_can_learn> accessed 17 Nov 2014.

Howes, David (2011) 'Hearing Scents, Tasting Sights: Toward a Cross-Cultural Multi-Modal Theory of Aesthetics', in F. Bacci, & D. Melcher (eds.), *Art and the Senses*, Oxford University Press: 161-182.

Huang, Edgar, Davison, Karen, Shreve, Stephanie, Davis, Twila, Bettendorf, Elizabeth & Nair, Anita (2006) 'Facing the Challenges of Convergence: Media Professionals' Concerns of Working Across Media Platforms', *Convergence* 12: 83-98.

Huron, David, Kinney, Daryl, & Precoda, Kristin (2006) 'Influence of Pitch Height on the Perception of Submissiveness and Threat in Musical Passages', *Empirical Musicology Review* 1(3): 170-177.

Ingram, Brad (2009) 'A Judge's Thoughts from the BOP Television Contest, The Best of Photojournalism', *National Press Photographers Association,* <http://nppa.org/news_and_events/news/2009/03/contest_thoughts.html> accessed 20 Dec 2009.

ITU (2013) 'The World in 2013', *ICT Facts and Figures* <http://www.itu.int/en/ITU-D/Statistics/Documents/facts/ICTFactsFigures2013-e.pdf > accessed 31 Mar 2014.

Iyengar, Shanto & Kinder, Donald R. (1987) *News that Matters: Television and American Opinion*, University of Chicago Press.

Jacobson, Susan (2010) 'Emerging Models of Multimedia Journalism: A Content Analysis of Multimedia Packages Published on nytimes.com', *Atlantic Journal of Communication* 18(2): 63–78.

Jacobson, Susan (2012) 'Transcoding the News: An Investigation into Multimedia Journalism Published on nytimes.com 2000-2008', *New Media & Society*14: 867-885.

Jenkins, Henry (2006) *Convergence Culture: Where Old and New Media Collide*, New York University Press.

Johnson, George (2001) 'Claude Shannon, Mathematician, Dies at 84', *New York Times* published February 27 2001, <http://www.nytimes.com/2001/02/27/nyregion/claude-shannon-mathematician-dies-at-84.html> accessed 25 Jul 2014.

Johnson, Neil F. (2009) *Simply Complexity: A Clear Guide to Complexity Theory*, Oxford, Oneworld.

Johnson, William (1969) 'Face the Music', *Film Quarterly* 22(4): 3-19.

Johnson, William (1985) 'The Liberation of Echo: A New Hearing for Film Sound', *Film Quarterly* 38(4): 2-12.

Joiner, Richard, Gavin, Jeff, Brosnan, Mark, Cromby, John; Gregory, Helen, Guiller, Jane, Maras, Pam, Moon, Amy (2013) 'Comparing First and Second Generation Digital Natives' Internet Use, Internet Anxiety, and Internet Identification', *Cyberpsychology, Behavior, and Social Networking* 16(7): 549-552.

Juslin, Patrik N. & Västfjäll, Daniel (2008) 'Emotional Responses to Music: The Need to Consider Underlying Mechanisms', *Behavioral and Brain Sciences* 31: 559–621.

Jutras, Lisan (2009) 'Facebook Mobilizes Masses - But What For?', *The Globe and Mail*, 7 Dec 2009,

<http://www.theglobeandmail.com/technology/facebook-mobilizes-masses---but-what-for/article4294760/> accessed 24 Oct 2014.

Kakkilaya, B.S. (2008) 'Asian Tsunami: Lessons from the Survivors', *Back2cradle*, <http://www.back2cradle.org/tsunami2.htm> accessed 11 Dec 2014.

Kalinak, Kathryn (1992) *Settling the Score: Music and the Classical Hollywood Film*, University of Wisconsin.

Kamien, Roger (2000) *Music an Appreciation*, Boston, McGraw Hill.

Karlsson, Michael & Clerwall, Christer (2012) 'Patterns and Origins in the Evolution of Multimedia on Broadsheet and Tabloid News Sites', *Journalism Studies* 13(4): 550-565.

Kassabian, Anahid (2001) *Hearing Film: Tracking Identification in Contemporary Hollywood Film Music*, New York, Routledge.

Kastner, Marianna Pinchot & Crowder, Robert G. (1990) 'Perception of the Major/Minor Distinction: IV. Emotional Connotations in Young Children', *Music Perception* 8(2): 189-202.

Katz, Elihu, Adoni, Hanna & Parness, Pnina (1977) 'Remembering the News: What the Picture Adds to Recall', *Journalism Quarterly* 54(2): 231-239.

Kawamoto, Kevin (2003) 'Digital Journalism', in K. Kawamoto (ed.), *Digital Journalism: Emerging Media and the Changing Horizons of Journalism*, USA, Rowman & Littlefield: 1-29.

Kennedy, Gregor E. (2004) 'Promoting Cognition in Multimedia Interactivity Research', *Journal of Interactive Learning Research* 15(1): 43-61.

Kerckhove, Derrick de (2014) 'McLuhan's Decalogue', *Journal of Visual Culture* 13: 61-63.

Kidd, David Comer & Castano, Emanuele (2013) 'Reading Literary Fiction Improves Theory of Mind', *Science* 342: 377-380, <http://www.sciencemag.org/content/342/6156/377.full.pdf> accessed 27 Oct 2014.

Kim, Won, Jeong, Ok-Ran & Lee, Sang-Won (2010) 'On Social Web Sites', *Information Systems* 35(2): 215–236 <http://www.sciencedirect.com.simsrad.net.ocs.mq.edu.au/science/article/pii/S0306437909000866> accessed 24 Oct 2014.

King. Dominic, Greaves, Felix, Exeter, Christopher & Darzi, Ara (2013) '"Gamification": Influencing Health Behaviours with Games', *Journal of the Royal Society of Medicine* 106(3): 76-78.

Kirby, Alan (2006) 'The Death of Postmodernism and Beyond', *Philosophy Now* [magazine], <http://philosophynow.org/issues/58/The_Death_of_Postmodernism_And_Beyond> accessed 12 Apr 2014.

Kittler, Friedrich, von Mücke, Dorothea & Similon, Philippe L. (1987) 'Gramophone, Film, Typewriter', *October* 41: 101-118.

Kitzinger, Jenny (2004) *Framing Abuse: Media Influence and Public Understanding of Sexual Violence Against Children*, London, Pluto Press.

Knodt, Eva M. (1995) 'Forward', in N. Luhmann, *Social Systems*, translated by John Bednarz, Jr., with Dirk Baecker, CA, Stanford University Press.

Kozma, Robert B. (1991) 'Learning with Media', *Review of Educational Research* 61(2): 179-211.

Krapp, Peter (2014) 'Reading for the Noise', *Visual Culture* 13(1): 64-66.

Krumhansl, Carol L. (2002) 'Music: A Link between Cognition and Emotion', *Current Directions in Psychological Science* 11(2): 45-50.

Kunder, Maurice de (2014) 'Size of the World Wide Web', <www.WorldWideWebSize.com> accessed 29 Aug 2014.

Lang, Annie (2000) 'The Limited Capacity Model of Mediated Message Processing', *Journal of Communication* 50(1): 48-55.

Lang, Annie & Dhillon, Kuljinder (1995) 'The Effects of Emotional Arousal and Valence on Television Viewers' Cognitive Capacity and Memory', *Broadcasting & Electronic Media* 39(3): 313-327.

Lanham, Richard A. (1993) *The Electronic Word: Democracy, Technology, and the Arts*, University of Chicago Press.

Larsen, Peter (2002) 'Mediated fiction', in K.B. Jensen (ed.), *A Handbook of Media and Communication Research*, London, Routledge: 131-152.

Larsson, Anders Olof (2012) 'Interactivity on Swedish Newspaper Websites: What Kind, How Much and Why?', *Convergence: The International Journal of Research into New Media Technologies* 18(2): 195-213.

Leeuwen (1985) see van Leeuwen

Légal, Jean-Baptiste, Chappé, Julien, Coiffard, Viviane & Villard-Forest, Audrey (2012) 'Don't You Know That You Want To Trust Me? Subliminal Goal Priming and Persuasion', *Journal of Experimental Social Psychology* 48: 358–360.

Levinson, Paul (1999) *Digital McLuhan: A Guide To The Information Millennium*, Routledge, New York.

Levitin, Daniel J. (2006) *This Is Your Brain on Music: The Science of a Human Obsession*, Dutton.

Li, Xigen (2006) 'Web Page Design and News Retrieval Efficiency: A Content Analysis of Five U.S. Internet Newspapers', in X. Li (ed.), I*nternet Newspapers: The Making of the Mainstream Medium, Mahwah*, New Jersey, Lawrence Erlbaum: 65-80.

Lindgren, Ernest (1963) *The Art of the Film*, 2nd ed., New York, Macmillan.

Lipscomb, S. D (2005) 'The Perception of Audio-Visual Composites: Accent Structure Alignment of Simple Stimuli', *Selected Reports in Ethnomusicology* 12: 37-67.

Lipscomb, S. D. & Kendall, R. A. (1994) 'Perceptual Judgement of the Relationship between Musical and Visual Components in Film', *Psychomusicology* 13: 60-98.

Lipscomb, S. D. & Tolchinsky, D. E. (2005) 'The Role of Music Communication in Cinema', in D. Miell, R. MacDonald, & D. Hargreaves (eds.), *Musical Communication*, Oxford: Oxford University Press: 383-404.

Logan, Robert K. (2010) *Understanding New Media: Extending Marshall McLuhan*, New York, Peter Lang.

Logan, Robert K. (2013) *McLuhan Misunderstood: Setting the Record Straight*, Toronto, KPH.

Luce, R. Duncan (2003) 'Whatever Happened to Information Theory in Psychology?', *Review of General Psychology* 7(2): 183–188.

Luhmann Niklas (1977) 'Differentiation of Society', *Canadian Journal of Sociology* 2(1): 29-53.

Luhmann, Niklas (1986) 'The Autopoiesis of Social Systems', in F. Geyer and J. van der Zouwen (eds.), *Sociocybernetic Paradoxes*, Sage, London, 172-192.

Luhmann Niklas (1990) *Political Theory in the Welfare State*, translated by Bednarz J. Jr., Walter de Gruyter, Berlin.

Luhmann, Niklas (1995) *Social Systems*, translated by John Bednarz, Jr., with Dirk Baecker, foreword by Eva M. Knodt, CA, Stanford University Press.

Luhmann, Niklas (2000) *Reality of the Mass Media*, translated by Kathleen Cross, Cambridge, Polity Press.

Luhmann, Niklas (2013) *Introduction to Systems Theory*, Cambridge, Polity Press.

MacDonald, Keza (2013) Interview in C. Brooker (presenter) 'How Videogames Changed the World', *Channel Four Television Corporation*, Britain, first broadcast 30 Nov 2013.

MacGregor, Phil (2003) 'Mind the Gap: Problems of Multimedia Journalism', *Convergence* 2003: 8-17.

Mackay, Jenn Burleson & Lowrey, Wilson (2011) 'The Credibility Divide: Reader Trust of Online Newspapers and Blogs', *Journal of Media Sociology* 3: 39-57.

Macquarie Dictionary (2013) 'Entertainment', in S. Butler (ed.), *The Macquarie Dictionary*, <http://search.credoreference.com.simsrad.net.ocs.mq.edu.au/content/entry/macqdict/entertainment/0> accessed 14 Oct 2014.

Madison, Guy (2011) 'Cause and Affect: A Functional Perspective on Music and Emotion', in F. Bacci, & D. Melcher (eds.), *Art and the Senses*, Oxford, Oxford University Press: 329-350.

Magliano, Joseph P., Dijkstra, Katinka & Zwaan, Rolf A. (1996) 'Generating Predictive Inferences While Viewing a Movie', *Discourse Processes* 22(3): 199-224.

Mailman, Joshua (2002/2003) 'Review Forum, Analysing Musical Multimedia by Nicholas Cook. Oxford: Clarendon Press; New York: Oxford University Press, 1998', *Intégral* 16/17: 225-226.

Marash, Dave (2011) 'Fade to Black: As a Video Revolution Sweeps The World, US Television News Caps Its Lens', *Columbia Journalism Review*, September/October: 24-8.

Marchessault, Janine (2014) 'Media Studies as Interdisciplinary Exploration', *Journal of Visual Culture* 13: 82-84.

Markoff, John (2014) 'Scientists Report Finding Reliable Way to Teleport Data', *New York Times* published May 29, <http://www.nytimes.com/2014/05/30/science/scientists-report-finding-reliable-way-to-teleport-data.html?_r=2> accessed 21 Jul 2014.

Marks, Lawrence E. (1978) *The Unity of the Senses: Interrelations Among the Modalities*, New York, Academic Press.

Marks, Martin (1996) 'Music, Drama, Warner Brothers: The Cases of Casablanca and The Maltese Falcon', *Michigan quarterly review* XXXV(1): 112-142, <http://hdl.handle.net/2027/spo.act2080.0035.001:15> accessed 31 Aug 2013.

Marshall, Sandra K. & Cohen, Annabel J. (1988) 'Effects of Musical Soundtracks on Attitudes toward Animated Geometric Figures', *Music Perception* 6(1): 95-112.

Martinec, Radan (2000) 'Rhythm in Multimodal Texts', *Leonardo* 33(4): 289-297.

Maturana, Humberto R. (1974) 'Cognitive Strategies', in H. von Foerster (ed.), *Cybernetics of Cybernetics 1975*, Urbana, IL, University of Illinois: 457-469.

Maturana, Humberto R. (1975) 'The Organization of the Living: A Theory of the Living Organization', *International Journal of Man-Machine Studies* 7(3): 313-332.

Maturana, Humberto R. (1978a) 'Biology of language: The epistemology of reality', in G.A. Miller & E. Lenneberg (eds.), *Psychology and Biology of Language and Thought: Essays in Honor of Eric Lenneberg*, New York: Academic Press: 27-63.

Maturana, Humberto R. (1978b) 'Cognition' [article in English], in P.M. Hejl, K.K. Wolfram & R. Gerhard (eds.), *Wahrnehmung und Kommunikation*, Frankfurt, Peter Lang: 29-49.

Maturana, Humberto R. (1980b) 'Man and Society', in F. Benseler, P.M. Hejl, & W.K. Köck (eds.), *Autopoiesis, Communication, and Society: The Theory of Autopoietic Systems in the Social Sciences*, Frankfurt: Campus Verlag: 11-31.

Maturana, Humberto R. (1980d) 'Biology of Cognition', in H. Maturana & F. Varela, *Autopoiesis and Cognition: The Realization of the Living*, Dordecht, D. Reidel: 5-58.

Maturana, Humberto R. (1981) 'Autopoiesis', in M. Zeleny (ed.), *Autopoiesis: A Theory of Living Organization*, New York, North Holland.

Maturana, Humberto R. (1988a) 'Reality: The Search for Objectivity or the Quest for a Compelling Argument', *Irish Journal of Psychology* 9(1): 25-82.

Maturana, Humberto R. (1988b) 'Ontology of Observing: The Biological Foundations of Self Consciousness and the Physical Domain of Existence', in conference workbook *Texts in Cybernetics, American Society of Cybernetics*, Felton, CA, 18-23 Oct, version edited by Alfredo Ruiz, <http://www.inteco.cl/biology/ontology/index.htm> accessed 5 Oct 2011.

Maturana, Humberto R. (1993) 'Biology of the Aesthetic Experience' <http://www.autopoiesis.com/documents/Maturana%201993.pdf> accessed 2 Jun 2014 [appears to be originally in the German edition of M. Titzmann (ed.), *Theory and Practice:* 37-56 with this chapter in English].

Maturana, Humberto R. & Valela, Francisco J. (1980) *Autopoiesis and Cognition: The Realization of the Living*, Dordrecht, Holland, Reidel.

McAllister, Neil (2013) 'Google Goes Dark for 2 Minutes, Kills 40% of World's Net Traffic', *The Register* [online technical publication] 17 Aug 2013, <http://www.theregister.co.uk/2013/08/17/google_outage/> accessed 22 Apr 2014.

McBride, Kelly & Rosenstiel, Tom (2014) *The New Ethics of Journalism: Principles for the 21ˢᵗ Century*, Los Angeles, Sage.

McCombs, Regina (2011) 'Music in Multimedia: Add Sparingly, Not as a Crutch', *Poynter*, published 16 Mar 2009, updated 24 Aug 2011, <http://www.poynter.org/how-tos/newsgathering-storytelling/94672/music-in-multimedia-add-sparingly-not-as-a-crutch/> accessed 30 Apr 2014.

McGill, William J. (1957) 'Applications of Information Theory in Experimental Psychology', *Transactions of the New York Academy of Sciences* 19(4) Series II: 343–351.

McGurk, Harry & MacDonald, John (1976) 'Hearing Lips and Seeing Voices', *Nature* 264: 746-748.

McLuhan, Marshall (1966) 'The Relation of Environment to Anti-Environment', in *University of Windsor Review*, 11(1): 1-10.

McLuhan, Marshall (1970) 'Education in the Electronic Age', *Interchange* 1(4): 1-12.

McLuhan, Marshall (1994) *Understanding Media: The Extensions of Man*, Cambridge, Massachusetts, MIT Press.

McLuhan, Marshall (2005) *Understanding Me: Lectures and Interviews*, edited by S. McLuhan & D. Staines, Toronto, McClelland and Stewart.

McLuhan, Marshall & Fiore, Quentin (1967) *The Medium is the Massage: An Inventory of Effects*, Co-ordinated by Jerome Agel, New York, Random House.

McMillan, Sally J. (2005) 'The Researchers and the Concept: Moving Beyond a Blind Examination of Interactivity', *Journal of Interactive Advertising* 5(2): 1-4, <http://jiad.org/downloade9b4.pdf?p=58> accessed 17 May 2014.

Meadows, Donella H. (2009) *Thinking in Systems*: *A Primer*, London, Earthscan.

Media Watch (2013) 'Catalyst Challenges the Mainstream', *ABC1*, episode 41, broadcast 11 Nov 2013   <http://www.abc.net.au/mediawatch/transcripts/s3888657.htm> accessed 10 Jan 2014.

Melcher, David & Cavanagh, Patrick (2011) 'Pictorial Cues in Art and in Visual Perception', in F. Bacci & D. Melcher (eds.), *Art and the Senses*, Oxford University Press: 359-394.

Melcher, David & Zampini, Massimiliano (2011) 'The Sight and Sound of Music: Audio-Visual Interactions in Science and the Arts', in F. Bacci & D. Melcher (eds.), *Art and the Senses*, Oxford University Press: 265-292.

Mensing, Donica & Greer, Jennifer D. (2006) 'Above the Fold: A Comparison of the Lead Stories in Print and Online Newspapers', in X. Li (ed.), *Internet Newspapers: The Making of the Mainstream Medium*, Mahwah, New Jersey, Lawrence Erlbaum.

Mesch, Gustavo S. (2009) 'The Internet and Youth Culture', *The Hedgehog Review* 11(1): 50-60, <http://www.iasc-culture.org/THR/archives/YouthCulture/Mesch.pdf> accessed 31 Oct 2014.

Meyer, Leonard B. (1956) *Emotion and Meaning in Music*, University of Chicago Press.

Meyrowitz, Joshua (1985) *No Sense of Place: The Impact of Electronic Media on Social Behavior*, New York, Oxford University Press.

Microsoft (2011) 'A History of Windows: Highlights from the First 25 years', Microsoft <http://windows.microsoft.com/en-US/windows/history> accessed 1 Oct 2011.

Mimica, Jadran (1991) 'The Incest Passions: An Outline of the Logic of Iqwaye Social Organisation', *Oceania* 62 (1,2): 34-57,81-113.

Mingers, John (1989) 'An Introduction to Autopoiesis–Implications and Applications', *Systems Practice* 2(2): 159-180.

Mingers, John (1995) *Self-Producing Systems: Implications and Applications of Autopoiesis*, New York, Plenum.

Mingers, John (2002) 'Can Social Systems Be Autopoietic? Assessing Luhmann's Social Theory', *The Sociological Review* 50: 278–299.

Mitchell, Jeanette A. (2003) 'Changes in Vertebral Artery Blood Flow Following Normal Rotation of the Cervical Spine', *Journal of Manipulative and Physiological Therapeutics* 26(6): 347-351.

Mitchell, Melanie (2009) *Complexity: A Guided Tour*, Oxford University Press.

Mitchell, W.J.T. (2008) 'Addressing Media', *MediaTropes eJournal*, I: 1–18.

Moeller, Hans-Georg (2006) *Luhmann Explained: from Souls to Systems*, Chicago, Open Court.

Monahan, Caroline B., Kendall, Roger A. & Carterette, Edward C. (1987) 'The Effect of Melodic and Temporal Contour on Recognition Memory for Pitch Change', *Perception & Psychophysics* 41(6): 576-600.

Monahan, Jennifer L., Murphy, Sheila T. & Zajonc, R. B. (2000) 'Subliminal Mere Exposure: Specific, General, and Diffuse Effects', *Psychological Science* 11(6): 462-466.

Morgan, G., Goodson, F. & Jones, T. (1975) 'Age Differences in the Associations between Felt Temperatures and Color Choices', *American Journal of Psychology* 88(1): 125.

Morozov, Evgeny (2009) 'The Brave New World of Slacktivism', *Foreign Policy*, published 19 May, <http://neteffect.foreignpolicy.com/posts/2009/05/19/the_brave_new_world_of_slacktivism> accessed 24 Oct 2014.

Moyer-Gusé, E. & Nabi, R. L. (2009) 'Explaining the Effects of Narrative in an Entertainment Television Program: Overcoming Resistance to Persuasion', *Human Communication Research* 36(1): 45-48.

Mundorf, Norbert, Drew, Dan, Zillmann, Dolf & Weaver, James (1990) 'Effects of Disturbing News on Recall of Subsequently Presented News', *Communication Research* 17: 601-15.

Musto, Denise (2013) Letter from ABC Audience and Consumer Affairs dated 27 September of responding to complaint about *Catalyst* episode *Chiropractors*.

Myers, Rollo H. (1968) *Erik Satie*, New York, Dover.

Nattiez, Jean-Jacques (1990) *Music and Discourse: Toward a Semiology of Music*, Princeton University Press.

Nelson, Robert U. (1946) 'Film Music: Color or Line?', *Hollywood Quarterly* 2(1): 57-65.

Newell, Fiona N. (2004) 'Cross-Modal Object Recognition', in G.A. Calvert, C. Spence & B.E. Stein (eds.), *The Handbook Of Multisensory Processes*, MIT Press, 123-139.

NPPA (2014) 'Code of Ethics', *National Press Photographers Association (USA)*, <https://nppa.org/code_of_ethics> accessed 15 Jan 2014.

O'Hear, Steve (2007) 'Deleting Online Predators Act: R.I.P.', *ZDNet*, published January 4, <http://www.zdnet.com/article/deleting-online-predators-act-r-i-p/> accessed 13 Jan 2015.

O'Leary, Amy (2009) 'Hitting the Right Note When News Sites Mix Music and Journalism', interview by Z. M. Seward, *Nieman Journalism Lab* <http://www.niemanlab.org/2009/03/hitting-the-right-note-when-news-sites-mix-music-and-journalism/> accessed 27 Apr 2014.

Opgenhaffen, Michael (2008) 'Redefining Multimedia: The (Dis)Integrated Use of Multiple Media and Modalities in Convergent Journalism' [Conference Paper], *International Communication Association, Annual Meeting*.

Opgenhaffen, Michaël (2009) *Multimedia, Interactivity, and Hypertext in Online News: Effect on News Processing and Objective and Subjective Knowledge*, doctoral thesis, <http://lirias.lessius.eu/bitstream/123456789/4387/1/PhD_archive.pdf> accessed 8 May 2014.

Opgenhaffen, Michaël & d'Haenens, Leen (2011) 'The Impact of Online News Features on Learning from News: A Knowledge Experiment', *International Journal of Internet Science* 6 (1): 8-28, <http://www.ijis.net/ijis6_1/ijis6_1_opgenhaffen_and_dhaenens.pdf> accessed 5 Sep 2014.

Örnebring & Jönsson (2004) 'Tabloid Journalism and the Public Sphere: a Historical Perspective on Tabloid Journalism', *Journalism Studies* 5(3): 283–295.

Oxford Dictionaries (2014) 'Social Media', <http://www.oxforddictionaries.com/definition/english/social-media> accessed 16 Oct 2014.

Page, Scott E. (2009) *Understanding Complexity Course Guidebook*, Chantilly, Virginia, The Teaching Company.

Page, Scott E. (2011) *Diversity and Complexity*, Princeton University Press, New Jersey.

Penn, Gemma (2000) 'Semiotic Analysis of Still Images', in M.W. Bauer & G. Gaskell (eds.), *Qualitative Researching with Text, Image and Sound*, London, Sage: 227-245.

Pew (2011) 'Newspapers' Revenue Continue to Decline', *Pew Research Centre*, <http://www.pewresearch.org/daily-number/newspapers-revenue-continues-to-decline/> accessed 6 Nov 2013.

Pfaff, W., Hensen, B., Bernien, H., van Dam, S. B., Blok, M. S., Taminiau, T. H., Tiggelman, M. J., Schouten, R. N., Markham, M., Twitchen, D. J., & Hanson, R. (2014) 'Unconditional Quantum Teleportation Between Distant Solid-State Quantum Bits', *Science* 1253512 Published online 29 May 2014 [DOI:10.1126/science.1253512] <http://www.sciencemag.org/content/early/2014/05/28/science.1253512> accessed 21 Jul 2014.

Phillips, Nicola (2013) 'Book Review: Michel Chion Audio-Vision: Sound on Screen', *FilmSound.org* <http://filmsound.org/philips.htm > accessed 29 Sep 2013.

Pickford, Ralph W. (1972) *Psychology and Visual Aesthetics*, London, Hutchinson Educational.

Poirier, Richard (1992) *The Performing Self: Compositions and Decomposition in the Languages of Contemporary Life*, New Brunswick New Jersey, Rutgers University Press.

Posner, Michael I., Nissen, Mary J. & Klein, Raymond M. (1976) 'Visual dominance: an Information-processing Account of its Origins and Significance', *Psychological Review* 83(2): 157-171.

Postman, Neil (1986) *Amusing Ourselves to Death: Public Discourse in the Age of Show Business*, London, Heinemann.

Potts, John (2008) 'Who's Afraid of Technological Determinism? Another Look at Medium Theory', *Fibreculture* 12 <http://twelve.fibreculturejournal.org/> accessed 27 Jan 2014.

Prakash, Neha (2014) 'We Can't Trust Anyone, Not Even the Puppy in That KLM Airlines Video', *Mashable*, published 25 Sep, <http://mashable.com/2014/09/24/klm-airlines-dog-fake/> accessed 6 Oct 2014.

Pritchard, Stephen (2012) 'The Readers' Editor on… Moderating Online Comments', *The Observer*, 21 Oct 2012, <http://www.guardian.co.uk/theobserver/2012/oct/21/readers-editor-moderating-online-comments> accessed 23 Oct 2012.

Pulvermüller, Friedemann (2005) 'Brain Mechanisms Linking Language and Action', *Nature Reviews Neuroscience* Jul 6(7): 576-82.

Quandt, Thorsten (2008) '(No) News on The World Wide Web?: A Comparative Content Analysis of Online News in Europe and the United States', *Journalism Studies* 9(5): 717-738.

Rafaeli, Sheizaf (1988) 'Interactivity: From New Media to Communication', in R. Hawkins, J. Wiemann & S. Pingree (eds.), *Advancing Communication Science: Merging Mass and Interpersonal Processes,* Newbury Park, CA, Sage: 110–34.

Reese, Stephen D. (1990) 'Multi-channel Redundancy Effects On Television News Learning', unpublished doctoral dissertation [referenced in T. Grimes, *Audio-Video Correspondence and Its Role in Attention and Memory*].

Ritchie, David (1986) 'Shannon and Weaver: Unravelling the Paradox of Information', *Communication Research* 13(2): 278-298.

Roach, Neil W., Heron, James & McGraw, Paul V. (2006) 'Resolving Multisensory Conflict: A Strategy for Balancing the Costs and Benefits of Audio-Visual Integration', *Proceedings of the Royal Society: Biological Sciences*, 273: 2159-68.

Robinson, Andrew (1995) *The Story of Writing*, London, Thames & Hudson.

Rockefeller Foundation (2014) 'Warren Weaver', *100 Years The Rockefeller Foundation: People* <http://rockefeller100.org/biography/show/warren-weaver> accessed 26 Jul 2014.

Ronald, Edmund M. A., Sipper, Moshe, & Capcarrère, Mathieu S. (1999) 'Design, Observation, Surprise! A Test of Emergence', *Artificial Life* 5(3): 225-239.

Rosenstiel, Tom (2012) 'Media Ethics Landscape in Digital Age', *Conference: Journalism Ethics in the Digital Age*, October 23, Paley Center, New York, <http://fora.tv/2012/10/23/Pew_and_Poynter_Media_Ethics_Landscape_in_Digital_Age> accessed 20 Dec 2013.

Rosenstiel, Tom & Mitchell, Amy (2011) 'The State of the News Media: An Annual Report on American Journalism, Overview', *Pew Research Center's Project for Excellence in Journalism,* <http://stateofthemedia.org/2011/overview-2/> accessed 6 Nov 2013.

Rusciano, Frank L. (2010) 'The "Right to Know" vs "Knowing What's Right": Tabloid Ethics and News Reporting on the Iraq War', *Media, War & Conflict* 3(3) 245-260. This paper was originally prepared for and presented at the Oxford Round Table, Oxford University, 5 Aug 2004.

Schaffer, Lemuel C. & Hannafin, Michael J. (1986) 'The Effects of Progressive Interactivity on Learning from Interactive Video', *Educational Communication and Technology* 34(2): 89-96.

Schultz, Tanjev (1999) 'Interactive Options in Online Journalism: A Content Analysis of 100 U.S. Newspapers', *Journal of Computer-Mediated Communication* 5(1).

Schwartz, Barry (2004) *The Paradox of Choice: Why More is Less*, New York, ECCO.

Self-Assembly Lab (2014) <www.selfassemblylab.net/index.php> accessed 22 Sep 2014.

SEOMOZ (2011) 'Mission ImposSERPble: Establishing Click-through Rates', <http://www.seomoz.org/blog/mission-imposserpble-establishing-clickthrough-rates> accessed 25 Mar 2013.

Shannon, Claude E. (1948) 'A Mathematical Theory of Communication', *The Bell System Technical Journal* 27:379–423, 623–656 (July/ October) <http://cm.bell-labs.com/cm/ms/what/shannonday/shannon1948.pdf> accessed 10 Aug 2011.

Shannon, Claude (1956) 'The Bandwagon', *IRE Transactions on Information Theory* 2(1). Available from IEEE Xplore Digital Library, http://ieeexplore.ieee.org/xpl/articleDetails.jsp?reload=true&arnumber=1056774&tag=1 accessed 26 Jul 2014.

Shannon, Claude E. & Weaver, Warren (1964) *The Mathematical Theory of Communication*, University of Illinois Press.

Shao, Hanyu & Weng, Xuchu (2011) 'Unitization Benefits Associative Recognition Whereas Impairs Item Recognition', *Multimedia Information Networking and Security (MINES)*, Third International Conference, Shanghai.

Shapiro, K., Egerman, B. & Klein, R. (1984) 'Effects of Arousal on Human Visual Dominance', *Perception & Psychophysics* 35(6): 547-552.

Sink, Patricia E. (1983) 'Effects of Rhythmic and Melodic Alterations on Rhythmic Perception', *Research in Music Education* 31(2): 101-113.

Sink, Patricia E. (1984) 'Effects of Rhythmic and Melodic Alterations and Selected Musical Experiences on Rhythmic Processing', *Research in Music Education* 32(3): 177-193.

Sloboda, John A. (1985) *The Musical Mind: The Cognitive Psychology of Music*, Oxford, Clarendon Press.

Smith, Jeff (2013) 'The Sound of Intensified Continuity', in J. Richardson, C. Gorbman & C. Vernallis (eds.), *The Oxford Handbook of New Audiovisual Aesthetics*, Oxford University Press: 331-356.

Speer, Nicole K., Reynolds, Jeremy R., Swallow, Khena M. and Zacks, Jeffrey M. (2009) 'Reading Stories Activates Neural Representations of Visual and Motor Experiences', *Psychol Sci*. 20(8): 989–999, published online 30 Jun 2009, <http://www.ncbi.nlm.nih.gov/pmc/articles/PMC2819196/> accessed 5 Jun 2013.

Spencer, Leon (2015) 'Quantum Storage Breakthrough Key to "Unbreakable" Encryption', *ZDNet*, published 12 Jan 2015, <http://www.zdnet.com/article/quantum-storage-breakthrough-key-to-unbreakable-encryption/> accessed 13 Jan 2015.

Spyridou, Paschalia–Lia & Veglis, Andreas (2008) 'Exploring Structural Interactivity in Online Newspapers: A Look at the Greek Web Landscape', *First Monday* 13(5) <http://firstmonday.org/ojs/index.php/fm/article/view/2164/1960> accessed 19 May 2014.

Stanford (2014) 'What Are Some of the Benefits to Using Google Custom Search?', *Stanford University*, <https://answers.stanford.edu/solution/what-are-some-benefits-using-google-custom-search> accessed 27 Apr 2014.

Statista (2014) 'Number of Monthly Active Facebook Users Worldwide', <http://www.statista.com/statistics/264810/number-of-monthly-active-facebook-users-worldwide/> accessed 29 Aug 2014.

Statistic Brain (2014) 'Twitter Statistics', <http://www.statisticbrain.com/twitter-statistics> accessed 31 Oct 2014.

Steensen, Steen (2011) 'Online Journalism and the Promises of New Technology', *Journalism Studies* 12(3): 311-327.

Steuer, Jonathan (1992) 'Defining Virtual Reality: Dimensions Determining Telepresence', *Journal of Communication* 4(24): 73-93.

Stevens, Meghan (2013) 'Autopoiesis in Multimedia News Messages: A Discussion', *Multimodal Communication* 2(1): 55-83.

Stewart , Patrick A. & Schubert, James N. (2006) 'Taking the "Low Road" with Subliminal Advertisements: A Study Testing the Effect of Precognitive Prime "RATS" in a 2000 Presidential Advertisement', *Harvard International Journal of Press/Politics* 11: 103-114.

Stilwell, Robynn J. (2013) 'Audiovisual Space in an Era of Technological Convergence', in J. Richardson, C. Gorbman & C. Vernallis (eds.), *The Oxford Handbook of New Audiovisual Aesthetics*, Oxford University Press: 125-145.

Strate, Lance (2010) 'Korzybski, Luhmann, and McLuhan', *Proceedings of the Media Ecology Association* 11: 31-42 <http://www.media-ecology.org/publications/MEA_proceedings/v11/5.%20Strate.pdf> accessed 28 Jan 2014.

Stravinsky, Igor (1936) *Chronicle of My Life*, London, Victor Gollancz.

Sturgill, Amanda, Pierce, Ryan & Wang, Yiliu (2010) 'Online News Websites: How Much Content Do Young Adults Want?', *Journal of Magazine and New Media Research* 11(2): 1-18, <http://aejmcmagazine.arizona.edu/Journal/Spring2010/SturgillPierceWang.pdf> accessed 20 Apr 2012.

Sun, Ruben (2009) 'Marketing as Utility as a Natural Progression of Thought', <http://www.facebook.com/note.php?note_id=132933241509&ref=nf> accessed 13 Apr 2014.

Tan, Siu-Lan, Cohen, Annabel J, Lipscomb, Scott D., Kendall, Roger A. (2013) *The Psychology of Music in Multimedia*, Oxford University Press.

Tan, Siu-Lan, Spackman, Matthew P. & Bezdek, Matthew A. (2007) 'Viewers' Interpretations of Film Characters' Emotions: Effects of Presenting Film Music Before or After a Character is Shown', *Music Perception* 25(2): 135-152.

Telus (2013) 'Unleashing Gen Y Potential in Customer Service', *Telus International Insight Paper*, <http://www.iare.com/files/documentlibrary/White%20Paper%20-%20Unleashing%20Gen%20Y%20Potential%20in%20Customer%20Service.pdf> accessed 29 Oct 2014.

Terrett A.G. (1995) 'Misuse of the Literature by Medical Authors in Discussing Spinal Manipulative Therapy Injury', *Journal of Manipulative & Physiological Therapeutics* 18(4): 203-10.

Teubner, Gunther (1987) *Autopoietic Law: A New Approach to Law and Society*, Berlin, de Gruyter.

The Australian (2012) 'Taiwan Teen Dies After Gaming for 40 Hours', *The Australian Newspaper*, published 2 Aug 2012 <http://www.theaustralian.com.au/news/breaking-news/taiwan-teen-dies-after-gaming-for-40-hours/story-fn3dxix6-1226428437223> accessed 26 Aug 2012.

Thims, Libb (2012) 'Thermodynamics ≠ Information Theory: Science's Greatest Sokal Affair', *Journal of Human Thermodynamics* 8(1): 1-120, <http://www.humanthermodynamics.com/TNETIT.pdf> accessed 18 Oct 2014.

Thompson, Kristin & Bordwell, David (2003) *Film History: An Introduction*, 2nd edition New York: McGraw Hill.

Thussu, Daya Kishan (2007) *News as Entertainment: The Rise of Global Infotainment*, Los Angeles: Sage.

Tibbits, Skylar (2013) 'The emergence of "4D printing"', *TED*, <www.ted.com/talks/skylar_tibbits_the_emergence_of_4d_printing> accessed 22 Sep 2014.

Topping, Seymour (2014) 'Pulitzer biography', *The Pulitzer Prizes*, <http://www.pulitzer.org/biography> accessed 28 Oct 2014.

Toynbee, Jason (2008) 'Media Making and Social Reality', in D. Hesmondhalgh & J. Toynbee (eds.), *The Media and Social Theory*, London: Routledge.

Tribus, Myron (1983) 'Thirty Years of Information Theory', in F. Machlup & U. Mansfield (eds.), *The Study of Information: Interdisciplinary Messages*, New York, John Wiley: 475-513.

Uko, Ndaeyo (2002) 'Hard News is No News: The Changing Shape of News in the 21st Century' [conference proceedings], *Communication: Reconstructed for the 21st Century*, Australia New Zealand Communication Association, <http://www.anzca.net/conferences/anzca02.html> accessed 20 Nov 2011.

Uko, Ndaeyo (2007) *Story Building: Narrative Techniques for News and Feature Writers*, Lanham, MD, University Press of America.

Uricchio, William (2014) 'The Greatest Art Form of the Twentieth Century', *Visual Culture* 13(1): 104-106.

van Leeuwen, Theo (1985) 'Rhythmic Structure of the Film Text', in T. A. van Dijk (ed.), *Discourse and Communication: New Approaches to the Analysis of Mass Media Discourse and Communication*, Berlin: Walter de Gruyter.

Varela, Francisco. J., Maturana, Humberto R. & Uribe, R. (1974) 'Autopoiesis: The Organization of Living Systems, Its Characterization and a Model', *Biosystems* 5(4): 187-196.

Veltkamp, Martijn, Custers, Ruud &Aarts, Henk (2011) 'Motivating Consumer Behavior by Subliminal Conditioning in the Absence of Basic Needs: Striking Even While the Iron is Cold', *Journal of Consumer Psychology* 21: 49–56.

Vernallis, Carol (2004) *Experiencing Music Video: Aesthetics and Cultural Context*, New York, Columbia University Press.

Vettehen, Paul Hendriks, Nuijten, Koos, & Beentjes, Johannes (2005) 'News in an Age of Competition: The Case of Sensationalism in Dutch Television News, 1995–2001', *Journal of Broadcasting & Electronic Media* 49(3): 282-295.

Vettehen, Paul Hendriks, Nuijten, Koos, & Peeters, Allerd (2008) 'Explaining Effects of Sensationalism on Liking of Television News Stories: The Role of Emotional Arousal', *Communication Research* 35(3): 319-338.

Vogrinčič, Ana (2008) 'The Novel-Reading Panic in 18th-Century in England: An Outline of an Early Moral Media Panic', *Media Research* 14(2): 103-124.

Walby, Sylvia (2003) 'Complexity Theory, Globalisation and Diversity' [paper], *Conference of the British Sociological Association*, University of York.

Walker, Robert (2014) 'Why Computer Programs Can't Understand Truth - And Ethics of Artificial Intelligence Babies', *Science 2.0*, published 9 Nov 2014, <www.science20.com/robert_inventor/why_computer_programs_cant_understand_truth_and_ethics_of_artificial_intelligence_babies-148791> accessed 18 Dec 2014.

Walton, Kendall (1994) 'Listening with Imagination: Is Music Representational?', *Aesthetics and Art Criticism* 52(1): 47-61.

Warman, Matt & Barrett, David (2014) 'Google Must Delete Your Data If You Ask, EU Rules', Telegraph [newspaper] published 13 May 2014, http://www.telegraph.co.uk/technology/google/10827005/Google-must-delete-your-data-if-you-ask-EU-rules.html accessed 20 Jun 2014.

Wasike, Ben (2013) 'Framing News in 140 Characters: How Social Media Editors Frame the News and Interact With Audiences via Twitter', *Global Media Journal -- Canadian Edition* 6(1) 5-23.

Waxman, Olivia B. (2014) 'Watch a Puppy Return Lost Items to Passengers in Viral Ad for KLM Airline', *Time Magazine,* published 25 Sep 2014, <http://time.com/3429993/klm-airlines-puppy-lost-and-found-service/> accessed 6 Oct 2014.

Weaver, Warren (1964) 'Recent Contributions to the Mathematical Theory of Communication', in C. E. Shannon & W. Weaver, *The Mathematical Theory of Communication*, University of Illinois Press.

Weis, Elizabeth & Belton, John (1985) *Film Sound: Theory and Practice,* Columbia University Press.

Wiener-Bronner, Danielle (2014) 'Dutch Scientists Successfully Teleport Data for the First Time', *The Wire,* <http://www.thewire.com/technology/2014/05/scientists-achieve-teleportation/371919/> accessed 8 Nov 2014.

Wilson, Edward O. (1999) *Consilience: The Unity of Knowledge*, Toronto, Random House Vintage.

Winegarner, Beth (2013) '5 Tips on How to Desensationalize Stories', Poynter, <http://www.poynter.org/how-tos/232832/5-tips-on-how-to-desensationalize-stories/> accessed 7 Jun 2014.

Wolfe, Tom (2005) 'Forward', in S. McLuhan & D. Staines (eds.), *Marshall McLuhan Understanding Me: Lectures and Interviews*, Toronto, McClelland and Stewart.

Xu, Heng, Oh, Lih-Bin & Teo, Hock-Hai (2009) 'Perceived Effectiveness of Text Vs. Multimedia: Location-Based Advertising Messaging', *International Journal of Mobile Communications* 7(2): 154-177.

Young, Kay & Saver, Jeffrey L. (2001) 'The Neurology of Narrative', *SubStance* 30: 72-84.

Young, Kimberly (2009) 'Understanding Online Gaming Addition and Treatment Issues for Adolescents', *The American Journal of Family Therapy* 37: 355-372.

Young, Sally (2010) 'The Journalism "Crisis": Is Australia Immune or Just Ahead of Its Time?', *Journalism Studies* 11(4): 610-624.

YouTube (2014) 'Statistics', <https://www.youtube.com/yt/press/statistics.html> accessed 29 Aug 2014.

Zacks, Jeffrey M. & Magliano, Joseph P. (2013) 'Film, Narrative, and Cognitive Neuroscience', in D. P. Melcher and F. Bacci (eds.), *Art & the Senses*, New York, Oxford University Press.

Zbikowski, L.M. (2002/2003) 'Music Theory, Multimedia, and the Construction of Meaning: Analysing Musical Multimedia by Nicholas Cook', *Intégral* 16/17: 251-268.

Zeng, Qian & Li, Xigen (2006) 'Factors Influencing Interactivity of Internet Newspapers: A Content Analysis of 106 U.S. Newspapers' Web Sites', in X. Li (ed.), I*nternet Newspapers: The Making of the Mainstream Medium, Mahwah*, New Jersey, Lawrence Erlbaum: 139-158.

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Glossary

Acousmatic: A term from film theory; a sound without a visible source (see Chion 1994: 71-73).

Anempathetic effect: A term from film theory; an effect created when the music is 'indifferent' to the images and language. This has the effect of intensifying the meaning of the images and language (see Chion 1994: 8-9).

Beat: A regular rhythmic pattern of music; it is a basic time unit of a piece of music; also referred to as a pulse; metronome can be used to sound out the basic beat of music.

Complex system: A system having diverse, interdependent, networked parts that may have the ability to adapt, and where emergence of something new and unexpected may occur depending on the properties of the individual parts and how they interact.

Composition: Refers to the entire multimedia text which includes all the media which composes the multimedia text or system for the entire time the multimedia occurs; similar to a music composition which refers to the entire piece of music; encompasses all the media involved as does Maturana's term "organization" which refers to all the components of an autopoietic system.

Emergence: Occurs when something new and unexpected is the result of the individual properties of the parts and how they interact.

Empathetic effect: Occurs when music expresses the meaning of the images and language in a scene (Chion: 1994: 8-9).

Human interactivity: refers to interpersonal interactivity (Chung & Yoo 2008:378)

Human-medium interactivity: refers to interactivty between a human and a medium; includes interactivity such as customization of webpages (Chung & Yoo 2008:378).

Human-to-computer interactivity: refers to humans interacting with media such as menus and searches (McMillan 2005:1).

Human-to-content interactivity: refers to humans interacting with personalization tools and forms (McMillan 2005:1).

Human-to-human interactivity: refers to media between humans such as email (McMillan 2005:1).

Illusory redundancy: The illusion that two media have the same meanings when in fact one medium is ambiguous and its meaning is being influenced by the other, but this influence is not apparent (Chion 1994: 7).

Image rhythm: In images, rhythm is created by movement, the type of shots and editing. Images are like music in that they have a rhythm created by the beat, tempo and accent of movements within the images, Rhythm in films is also created by editing (Bordwell & Thompson 2008: 250-1,360). Additionally rhythm in films can be created by alternating different shots (van Leeuwen 1985: 216-9, 222) such as close-ups and long shots.

Information: Data that has meaning; "adds context and interpretation to the data, imbuing them with meaning" (Bogost, Ferrari & Schweizer 2010: 60).

Infotainment: A hybrid of news, tabloid journalism, current affairs, documentary, media
                       spectacle and entertainment (Thussu 2007: 69,82,163).

Integrated multimedia: Also called a multimedia system. A configuration consisting of
                       multiple media subsystems that interact and cannot act independently,
                       where dominance passes from one media to another and there is a
                       possibility of conflict between media.

Interactive news site: The news site 1) responds to actions by the user that create permanent
                       modifications to information displayed such as weather for a particular
                       region; 2) has a facility for the user to make a comment on-line or send a
                       message to the news story creator.

Interactive news story: The news item has the facility to respond to actions by the user such as
                       requests for specific information. For this to occur, the multimedia must
                       have a non-linear structure, such as a search or menu facility that allows
                       access to data in varying sequences. The ability of the user to skip forward
                       in a video or audio file on an ad hoc basis, without knowing what
                       information is where, is not considered as being an interactive story facility,
                       even if it might be claimed to be an interactive facility of a machine.

Interactivity: The "extent to which users can participate in modifying the form and
                       content of a mediated environment in real time" (Steuer 1992: 84) in that the
                       level of interactivity is commensurate with how much users can modify
                       data, and modify the way that data is accessed, at the time the data is
                       accessed. Interactivity can be defined interpersonal and content.
                       Interpersonal interactivity occurs with facilities such as e-mail and
                       discussion forums while content interactivity occurs with multiple choices
                       and the unrestrained navigation that occurs with hyperlinks (Zeng & Li
                       2006:141-3).

Intermedia: Refers to the interactions between the media (subsystems) that compose
                       multimedia.

Intermedial relationship: The relationship between two media.

Interpersonal multimedia: The facilities for users which are associated with the news story
                       such as email, comments on the news site, Facebook and Twitter.

Linear narrative: A story that has a single narrative that is rigidly followed.

Media subsystem: See subsystem.

Medium-human interactivity: The facility for users to express personal opinions (Larsson
                       2012).

Medium interactivity: Content interactivity (Chung & Yoo 2008: 378).

Message: The overall theme or the essence of a news story from the news angle taken
                       by the journalist. A series of messages culminate in the final message.

Messaging: The process of creating a story from a sequence of messages.

Metre: In music, like the beat, has a consistent rhythmic pattern. Unlike the beat,
                       metre is characterized by alternating strong and weak beats.

Mickey-mousing: The close synchronization of music and image, both movement and
                       meaning, that is often seen in cartoons and which can easily and
                       unintentionally slip into cartoon mode, where humour is created by the close
                       match of sound and image; a close form of conformance.

Multimedia scene: Similar to a film scene in that it refers to a single event but for multimedia the multimedia scene changes when a subsystem becomes active or inactive so that a change in the active subsystems indicates a change of multimedia scene.

Multimedia system: A configuration consisting of multiple media subsystems that interact, where dominance passes from one media to another and there is a possibility of conflict between media

Multimedia text: Multimedia used for informational genres such as news and education.

Multimedia: A constructed montage of media normally containing both audio and visual elements where the different media interact and where there is a possibility for incongruency between the media, and there is some type of technology involved. As commonly used and understood, the term multimedia does not refer to multiple media occurring at the same time such as in a live opera performance. Most people do consider that the Internet is multimedia.

News story: A stand-alone item which appears on a news website and is a story or provides information about a fact, event or situation.

Nonlinear narrative: The story has an open non-rigid structure that allows the user to navigate through the elements of a story (when combined with multimedia often referred to as interactive)

Non-redundant media: The various media each tell a different part of the story, such as the video clip providing different information to the news text.

Redundant media: The various media tell almost exactly the same story. This frequently occurs in cartoons and is often referred to as mickey-mousing.

Rhythm: In music is the grouping of separate sounds into structured patterns. While strictly speaking, beat and metre are separate to rhythm, here the term 'rhythm' is used loosely, and normally includes all three temporal modes: rhythm, beat and metre.

Sleight-of-hand: Occurs when one medium creates an illusion in another. Chion gives the example of *Star Wars The Empire Strikes Back*, where doors do not move but are seen closed then open and it is the sound that creates the illusion that the doors can be seen opening (Chion 1994: 12).

Special report: A special report provides more information and more background than is normally contained in a news report and is considerably longer.

Structure: Refers to the active media in a particular scene of a multimedia text.

Subsystem   The components of a multimedia text; exactly how the subsystems are categorised depends on the decision as to how the multimedia text should be evaluated. A useful categorization for a complex multimedia text is: oral language, written language, video image, photographs, animations, still graphics, music, sound effects and silence. In film these are referred to as channels and are: image, speech, music, noise and written material.

Synchresis: A term created by Chion from a combination of the words synchronism and synthesis, is a special form of synchronization that occurs when synchronization glues together unlikely combinations of sound and image (Chion 1994:54,63,115).

Synchronization: A regular process of recurring accents within different media that appear to occur at the same time. Accent in music can be created using tone, loudness or beat. Accent in images can occur through movement or change. Accent in language can be created through loudness or starting or stopping a phrase or sentence.

System: A system is "an interconnected set of elements that is coherently organized in a way that achieves something" (Meadows 2009: 11).

Vococentric/verbocentric: The effect of voices dominating attention even when other media are present (Chion 1994: 5-6).

Appendix A: Subliminal Images & Timings

This is a list of timings of the subliminal frames in the first 63 seconds of the ABC *Catalyst* episode *Chiropractors*. For instance, 0'29" F5 refers to the fifth frame of the 29th second.

Seq #	Time of effect & frame #	# of frames	Scene overlaid with subliminal image
1	0'29" F5	1	Over first frame of the medical doctor making anti chiropractic statements.
2	0'37" F17	1	Over a baby being held and treated by a chiropractor.
3	0'37" F18	1	Over the face of a mother speaking positively about her child chiropractic treatment.
4	0'38" F12-13	2	Over the face of a mother speaking positively about her child chiropractic treatment.
5	0'42" F19-20	2	Over face of mother whose child is being treated by chiropractic.
6	0'45" F25	1	Over parents walking into the clinic of a chiropractor.
7	0'46" F1	1	Over chiropractor, children and mother while the chiropractor is treating one of the children.
8	0'46" F20-21	2	Over chiropractor and child, while the chiropractor is treating the child.
9	0'54" F3-4	2	Over a woman being treated by chiropractor.
10	0'54" F23-24	2	Over a woman being treated by chiropractor.
11	1'02" F13-14	2	Over mother and a baby being treated by a chiropractor.
12	1'03" F8-F9	2	Over a chiropractor, baby and mother.