

**Memory Biases and Impression Management: The Influence of
Textual Salience, Mood and Recall Order on Accounting
Judgements**

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Declaration

The work presented in this thesis is my original work and has not been submitted for a higher degree to any other university or institution. The source of information used and the extent to which the work of others has been utilised is acknowledged in the thesis. I am the main author of all co-authored papers included in this thesis. Final approval from the Human Research Ethics Committee has been obtained (Ref no. 5201500850).

Sydney, February 14, 2017

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List of Abbreviations

AOI	Area of interest
GAAP	General Accepted Accounting Principles
GEFT	Group embedded figure test
IAS	International Accounting Standards
IASB	International Accounting Standards Board
IJ	Instant judgement
IFRS	International Financial Reporting Standards
JDM	Judgements and decision-making
LTM	Long-term memory
MB	Memory-based judgements
NTP	Negative-to-positive
PTN	Positive-to-negative
SM	Sensory memory
STM	Short-term memory

Abstract

Impression management in accounting is defined as attempts by management to control and manipulate the impressions of users of accounting information by strategically disclosing information included in the narrative sections of annual reports. In this context, the human memory system plays a key role. Previous studies suggested that the human memory is influenced by biases that may result in distortions of judgement.

The aim of this thesis is to examine the role of memory in accounting judgements and decision-making under the context of impression management. To achieve this aim, the thesis includes three papers. Paper one develops a framework outlining the human memory process and explains key biases and errors in memory that may facilitate further biases and errors in judgements and decision-making. Further, this framework distinguishes between on-line judgements (i.e., judgements made without memory retrieval) and memory-based judgements, proposing a relationship between the biases of the memory system and the two types of judgements.

Paper two examines how on-line judgements are influenced by the interactions between the text and readers. Specifically, two biases from the memory system—namely, textual salience and personal mood—are examined as influential factors in the on-line judgements of investors. The findings suggest embedding textual salience (i.e., highlighted favourable cues) in a chairman's letter can easily distort non-professional investors' attention and judgement and readers' positive moods may further enhance their perceptions of the highlighted favourable cues.

Paper three examines how the recall order of non-professional investors and the visual salience embedded in a chairman's letter may influence their memories of previously encoded accounting information and subsequent memory-based judgements. It pays special attention to the effect of memory on impression manipulations and suggests that embedding inappropriate salience (e.g., highlighting favourable cues) or strategically altering readers' recall order (e.g., recalling positive cues first) can easily distort investors' memory and memory-based impressions towards a positive view of a company.

Keywords

Impression management, memory, textual salience, personal mood, recall order, judgements

Chapter 1: Overview of the Thesis

1.1 Introduction

Accounting research often upholds an image of efficient capital markets in which investors (and other users of accounting information) make rational decisions by evaluating all available alternatives (see Hellmann, 2013, for a summary). However, behavioural-science literature provides evidence that judgements and decisions are often psychologically biased. For example, various collected readings such as De Bond (2005), Gilovich, Griffin and Kahneman (2002), Kahneman and Tversky (2000) and Shafir (2004) show that people cannot process unlimited information and that biases, such as optimism, conservatism, overconfidence and overreaction, affect decision-making.

Additionally, to make decisions, users of accounting information interpret the so-called ‘objective, neutral and value free’ information included in annual reports and from other sources, such as the internet. When International Financial Reporting Standards (IFRS)¹ are complied with, it is implicitly presumed by the standard setters that they generate objective, neutral and decision-useful accounting information (IAS 1, 2011, paragraph 15). However, this presumption excludes the governance of management commentary and the design elements of financial information as the application of IFRS is specific to financial statements and not to any other information published in the same document (IAS 1, 2011, paragraph 49–50). The standard explicitly forewarns that ‘IFRS only apply to financial statements and not necessarily to other information presented in an annual report, a regulatory filing, or another document’ and further points out the importance for users to ‘distinguish information that is prepared using IFRS from other information that may be useful to users but is not subject to IFRS requirements’ (IAS 1, 2011, paragraph 50).

¹ This thesis refers to IFRS because they are well endorsed by over 120 countries permitting or requiring their use for financial reporting purposes and thereby highlighting the successful advocacy of the International Accounting Standards Board’s (IASB) efforts in promoting them. However, the existence and importance of other accounting regimes, such as US-GAAP is acknowledged. Alternative accounting regimes may have different objectives than those outlined in the introduction. The term IFRS refers to both the International Financial Reporting Standards issued by the IASB and to the International Accounting Standards issued by the IASB’s predecessor, the International Accounting Standards Committee.

Importantly, annual report sizes have increased noticeably in the last decades—a phenomena that is largely driven by narrative sections amplifying quantified accounting information (Lee 1994, Beattie et al. 2008, Brennan and Merkl-Davies 2013). The content and form of the accounting narratives accompanying the financial statements are recognised to lie within managerial discretion (IFRS Practice Statement Management Commentary, 2010, BC45). This allows management to utilise the less-regulated narrative sections to selectively disclose information or reveal it in such a way that it may distort information users' perceptions of the performances of firms (Beattie and Jones 2002a, Godfrey et al. 2003, Aerts 2005, Merkl-Davies and Brennan 2007, 2011); known as impression management, this practice 'attempts to control and manipulate the impression conveyed to users of accounting information' (Clatworthy and Jones 2001, p. 311). As such, impression management may impede the objective, neutral and fair communication of accounting information (Hoogheimstra 2000).

Against this backdrop, this thesis is motivated by two important questions related to the interpretation of accounting information: First, when and why do some biases and errors in cognitive processes, such as memory, occur and influence users' information processing? Second, how might possible memory biases be adopted in impression management and how can they distort accounting-information users' on-line and memory-based judgements?

This chapter is structured as follows: the second section provides relevant background information about the human memory system and impression management; the third section outlines the aim and objectives of the thesis; the fourth section outlines the research design and methodology used in this thesis; the fifth section offers an overview of the structure of the thesis and explains how each chapter contributes to the objectives of the thesis.

1.2 Impression Management and the Human Memory System

In an accounting context, judgements and decisions underlie complex processes with an external dimension (i.e., accounting information) and an internal dimension (i.e., cognitive functions). In other words, the interpretation of accounting narratives depends on two factors: (i) the content and (ii) the capacity of readers to understand and encode the content (Smith and Taffler 1992, Jones and Shoemaker 1994).

Recent studies suggest a voluminous increase in the usage of unregulated accounting narratives may potentially be susceptible to impression management (Lee 1994, Andersen 2001, Beattie et al. 2008, Brennan and Merkl-Davies 2013), which raises questions about cognitive biases in

judgements and decision-making (JDM) in a financial reporting context. Previous studies have suggested that management may utilise the less-regulated narrative sections to selectively disclose information or to disclose information in such a way that it may distort information users' perceptions of the performances of firms (Beattie and Jones 2002a, Godfrey et al. 2003, Aerts 2005, Merkl-Davies and Brennan 2007, 2011). This practice 'attempts to control and manipulate the impression conveyed to users of accounting information' (Clatworthy and Jones 2001, p. 311).

Commonly adopted mechanisms in impression management include strategically disclosing information in a way that may distort readers' rationality in information processing, such as using visual manipulation (e.g., graphs and colours) (Taylor and Anderson 1986, Beattie and Jones 2002a, 2002b, Amer 2005) and obscuring or hiding negative information (Arnold et al. 2000, Rutherford 2003, Clatworthy and Jones 2006). These mechanisms can be generally concluded as embedding manipulations in 'external content'; however, other 'internal cognitive functions' that may influence people's understanding and information-processing capacities have hardly been examined in previous impression management studies.

In the process of making accounting judgements and decisions, one cognitive function, namely human memory, plays a key role. This function is important in impression management, as whether impression management is successfully applied or not is highly dependent on the human memory system, which dictates how information is encoded and memorised. Specifically, (i) impression management studies are not only interested in how investors' instant judgements are manipulated, but also in how their impressions persist in a long-term way; (ii) substantial biases are involved in memory and may influence subsequent judgements; these biases may be potentially adopted for impression management purposes. However, the effect of memory on impression management has generally been overlooked in the area of accounting. One possible reason is the lack of understanding of human memory, because of which previous accounting research has not been able to propose a clear relationship between memory and JDM, thereby overlooking possible memory biases and errors in impression management studies.

The effect of memory on JDM has long been studied in accounting and finance research. Early scholars, such as Birnberg and Shields (1984), have made important contributions by outlining the effects of internal cognitive processes, such as attention and memory, on accounting JDM. Specifically, Birnberg and Shields's (1984) framework consists of three stages: sensory

memory (SM), short-term memory (STM) and long-term memory (LTM). According to this framework, information cues are initially perceived by sense-perception organs (visual or auditory organs, such as eyes or ears), which can store information over a period ranging from milliseconds to several seconds. In the next stage, perceived information is encoded and temporarily stored in the STM. After a rehearsal or further encoding, the information stored in the STM may be transferred to the LTM. Information stored in the LTM can be retrieved when needed, even after several days or decades. Three memory functions—namely, information encoding (processing raw information in working memory), information storage (retaining the processed information in the LTM) and memory retrieval (retrieving information from the LTM)—cooperate to ensure the memory system works.

Birnberg and Shields (1984) have provided a succinct model for understanding the basic cognitive functions of information processing. However, their framework regards memory processes as highly efficient and does not account for the occurrence of any biases or errors that may distort information processing. The human memory does not provide a literal recounting of past experience; biases and errors may occur and degrade people's decision-making capacities. This is because of human bounded rationality, a theory developed by Simon (1955), suggesting that an individual's information-processing capacity is limited by both internal (e.g., cognitive) constraints and external (e.g., time) constraints. For example, Hirshleifer and Teoh (2003) have provided evidence that humans have limited attention and can only process a finite amount of information simultaneously; the STM can only hold five to nine items or four blocks (Miller 1956, Cowan 2001). Thus, decision-makers tend to adopt heuristic procedures to simplify their cognitive processing to find a satisfactory solution rather than an optimal one (Tversky and Kahneman 1973, Hoch 1984, Kahneman and Riepe 1998, Gigerenzer et al. 1999, Luppe and Fávero 2012). This is especially relevant to the accounting and finance fields, where individuals are usually exposed to information overload and time pressure (Libby and Trotman 1993, Choo 1995, Glover 1997, Braun 2000) and where it is common and necessary to rely on the memory of previously examined information when making judgements (Libby and Trotman 1993, Bonner 2007, p. 108, Hastie and Dawes 2010).

One psychology study from Hastie and Park (1986) suggests that, generally, judgements can be classified into on-line judgements and memory-based judgements, based on whether a memory-retrieval process is involved or not. This suggestion can also be applied to accounting studies and may enhance the understanding of memory for different types of accounting JDM;

it may further outline which biases may occur in certain memory functions and, thus, may provide a new direction for examining memory's effects on JDM studies.

1.3 Aim and Objectives of the Thesis

Combining the important effects of human cognitive processes on JDM and addressing the research gap in impression management, this thesis focusses on human memory and aims to provide theoretical suggestions and empirical evidence about the possible effects of memory on accounting judgements under impression management. Birnberg and Shields (1984) made a significant contribution to the field by emphasising the effect of memory on accounting-information processing. However, they failed to specify the potential effects of particular cognitive constraints on JDM, overlooking the fact that memory biases and errors may occur in information processing, which may result in forgetting or distortions, such as the retrieval of false memories. Other researchers, such as Hogarth (1991) and Ho and Roger (1993), outlined the causes of biases and errors in relation to JDM; however, they did not specify any relationship between the underlying cognitive processes and the biases and errors. As such, it is important to extend their model and to provide theoretical suggestions to explain when and why distortions may occur, as well as the possible consequences of these distortions for JDM in accounting.

In addition, certain biases, such as textual salience, personal mood and memory-recall order, have been identified as influential in the memory process by previous cognitive psychology studies, while they have been overlooked by most accounting research. Textual salience may influence how easily readers of financial reports perceive a piece of information; personal mood may bias the attitude of readers about how they interpret a piece of information; and recall order may distort how readers remember a piece of information. These biases may influence readers' perceptions or their subsequent memories (or both); therefore, they are closely related to impression management studies in accounting. To show a clear relationship about how memory biases may influence the interpretation of narrative accounting information, it is advisable to follow Hastie and Park's (1986) suggestion and examine the effect of memory biases on on-line and memory-based judgements respectively.

To achieve its aim, this thesis has the following objectives: (1) to highlight the effect of the human memory system on accounting JDM; (2) to develop a framework that includes two-pathway judgement-making by considering human memory in light of its potential biases; (2)

To provide empirical evidence for the effects of specific biases that occur in memory (such as textual salience, personal mood and recall order) on accounting judgements—thereby revealing the process of the interpretation of narrative accounting information.

1.4 Research Design

The framework proposed in Chapter 2 forms the conceptual basis of Chapters 3 and 4. Similar to previous cognitive studies in accounting, this thesis adopts an experimental research approach to examine individuals' information encoding and memory retrieval on their judgements. The advantages of using an experimental research method are described as follows: stimuli (i.e., a chairman letter) are randomly assigned across the whole sample, which ensures that there will be no bias and error that would otherwise compromise the results of the research; other confounding factors (e.g., education, gender) and the experiment environment are controlled, which ensures that other variables aside from the dependant variables are held constant; the independent variables are systematically manipulated across groups or paired subjects, which ensures the observation of the effects of independent variables on dependent variables.

Specifically, university business students were recruited as non-professional investors in the experiment. The experiment was conducted in an office-based laboratory to ensure a consistent and tightly controlled environment, reducing the effects of possible extraneous variables. Non-professional investors were requested to make performance evaluation judgements about a company after reading a chairman's letter, which included substantial financial information about the target firm. Modifications were carefully embedded in the chairman's letter to simulate an impression management environment and investor judgements were made based on the different experimental requirements.

1.5 Overview of the Thesis

The structure of this thesis is summarised in Table 1.1, which outlines the contributions of each chapter to the thesis. The thesis follows a thesis-by-publication approach and includes three papers. The first paper (Chapter 2), entitled 'Factors Driving Memory Fallibility: A Conceptual Framework for Accounting and Finance Studies', provides a comprehensive overview of the human memory system and outlines different cognitive constraints that users of financial information may experience in different memory processing stages. The framework

distinguishes between memory-based judgements and on-line judgements (i.e., judgements without memory retrieval), which comprise two dimensions of this framework.

The second paper (Chapter 3), entitled ‘The Effects of Textual Salience and Personal Mood on the Interpretation of Narrative Accounting Information’, focusses on the first dimension (i.e., on-line judgements) outlined in the framework. It attempts to illustrate how possible biases may influence investors’ perceptions in an impression management environment. Specifically, it examines two factors, namely the textual salience used in the chairman’s letter and the non-professional investors’ personal mood (one ‘external’ factor and one ‘internal’ factor respectively) and the effects of each on their perceptions and judgements.

The third paper (Chapter 4), entitled ‘The Effects of Recall Order and Textual Salience on Memory Reconstruction and Investor’s Judgements’, focusses on the second dimension outlined in the framework. It attempts to illustrate how biases may influence investors’ memory reconstruction and to highlight the importance of memory retrieval in impression management. Specifically, it examines memory-based judgements and the effects of two factors: namely, memory-recall order (one ‘internal’ factor) and textual salience (one ‘external’ factor) on accounting-information users’ memories and subsequent judgements.

The final chapter provides a conclusion. The three studies contribute to the objectives of the thesis as follows. The second chapter outlines the effect of memory on JDM by distinguishing judgements into on-line and memory-based types (Objective 1). It further develops a framework considering these two types of judgements (i.e., on-line and memory-based judgements) in terms of possible memory biases and errors (Objective 2). The third and fourth chapters examine how biases identified in the framework may influence investors’ perceptions and memories, with a specific focus on on-line and memory-based judgements under impression management respectively (Objective 3).

Table 1.1: Outline of the thesis

<p>Objectives of the Thesis</p> <ol style="list-style-type: none"> 1. To highlight the effect of the human memory system on accounting JDM. 2. To provide a comprehensive understanding of possible memory biases and errors in judgement that will direct future accounting and finance JDM studies. 3. To provide empirical evidence about how memory biases may influence accounting-information readers' JDM in an impression management context. 	
<p>Chapter 2 (Paper 1)</p> <p>Factors Driving Memory Fallibility: A Conceptual Framework for Accounting and Finance Studies</p>	
<p>Chapter Highlights</p> <ul style="list-style-type: none"> • Shows that the human memory plays a key role in accounting JDM and highlights possible memory biases and errors that may distort decision-makers' rationality in information processing. • Identifies the theoretical and methodological strengths and limitations of previous literature and formulates a framework that will help accounting scholars to understand when and why possible distortions may occur and influence JDM in an accounting context. 	<p>Contributions to the Thesis</p> <ul style="list-style-type: none"> • Provides a comprehensive understanding of relevant memory literature that can be applied in accounting JDM studies. • Develops a framework that provides suggestions to distinguish general accounting judgements into on-line judgements and memory-based judgements—each of which are examined in the following chapters respectively.
<p>Chapter 3 (Paper 2)</p> <p>The Effects of Textual Salience and Personal Mood on the Interpretation of Narrative Accounting Information</p>	
<p>Chapter Highlights</p> <ul style="list-style-type: none"> • Examines the effect of textual salience and personal mood on non-professional investors' attention and perceptions, which explains how impressions towards a target firm are initially manipulated. 	<p>Contributions to the Thesis</p> <ul style="list-style-type: none"> • Focuses on the on-line judgement-making process in an impression management context and provides empirical evidence of the effect of possible information encoding biases on investor judgements.
<p>Chapter 4 (Paper 3)</p> <p>The Effects of Recall Order and Textual Salience on Memory Reconstruction and Investors' Judgements</p>	
<p>Chapter Highlights</p> <ul style="list-style-type: none"> • Examines the effect of memory-recall order and textual salience on non-professional investors' memories and explains how impressions of a target firm persist in memory and are further distorted in memory-based judgements. 	<p>Contributions to the Thesis</p> <ul style="list-style-type: none"> • Focuses on the memory-based judgement-making process in an impression management context and provides empirical evidence of the effects of possible memory-retrieval biases on investor judgements.

An earlier version of chapter 2 was presented as a conference paper:

- ‘Factors Driving Memory Fallibility: A Conceptual Framework for Accounting and Finance Studies’, 38th European Accounting Association Annual Congress, Glasgow, Scotland, April 2015 (with Andreas Hellmann and Lurion de Mello).

Chapter 2: Paper 1

Factors Driving Memory Fallibility: A Conceptual Framework for Accounting and Finance Studies

2.1 Abstract

The purpose of this paper is twofold. First, it identifies the theoretical and methodological strengths and limitations of previous literature that relate to the impact of memory on judgments and decision-making. Second, it proposes a framework which incorporates memory functions as well as factors that may cause fallibilities in judgments and decisions. This framework provides a comprehensive understanding about the relationship between judgments and memory as well as possible causes for biases and errors driven by cognitive constraints during the memory process, which have been overlooked by previous research. It may help researchers to better understand the human memory system and its impact on judgments and decisions in accounting and finance context.

Keywords

Memory, Biases and errors, Judgment and decision-making, Conceptual framework

2.2 Introduction

Accounting information plays a pivotal role in capital markets because the annual report and other forms of accounting disclosures summarize the economic consequences of a company's business activities. However, accounting information is not objective, neutral and value-free, because human judgments and decision-making (JDM) affect all stages from the preparation to the application and interpretation of accounting information (Hellmann 2016).

Indeed, JDM in accounting and finance are influenced by numerous variables such as person variables, task variables and environmental variables (Bonner 2007, p. 54). Person variables include characteristics of the decision maker such as the cultural background and abilities, or the cognitive processes used while a judgment or decision is being made. In this context, memory processes are an integral part of JDM (Birnberg and Shields 1984, Kida et al. 1998, Grossman and Welker 2011). Research into memory processes is necessary because both new information encoding and past information retrieval is influenced by the human memory system and may be affected by cognitive constraints. These refer to those physiological factors limiting individuals' information processing quality or capacities such as encoding biases and false memory (Hogarth 1991, Peng and Xiong 2006, Birnberg 2011).

The influence of memory processes on JDM is long-established in accounting and finance research. Early scholars such as Birnberg and Shields (1984) have made significant contributions by outlining internal cognitive processes such as attention and their influence on accounting JDM. However, they failed to specify the potential effects of particular cognitive constraints on JDM. Other researchers such as Hogarth (1991) and Ho and Roger (1993) outlined the causes of biases and errors about JDM. However, they did not specify any relationship between the underlying cognitive processes and the biases and errors. Therefore, the purpose of this paper is twofold. First, to identify the theoretical and methodological strengths and limitations of the previous literature on the effect of memory on JDM in an accounting and finance context. Second, to propose a framework that integrates memory functions with factors that may cause biases and errors in JDM processes.

The framework formulated in this paper outlines memory processes with particular reference to financial accounting, auditing, and finance. It also provides a comprehensive understanding of the different cognitive constraints that decision makers may experience in various memory processing stages and the potential effect that these may have on JDM. Finally, it emphasises

the effect of natural cognitive causes on decision makers' JDM by referring to findings from cognitive psychology.

2.3 Role of Memory in Judgements and Decisions

Early work by scholars such as Birnberg and Shields (1984) formulated a decision-making framework that aims to explain the effect of internal cognitive processes on accounting JDM. This framework extends previous decision-making models (e.g., Mock and Vasarhelyi 1978, Hilton 1980) by outlining the relationship between several cognitive activities. Birnberg and Shields's (1984) framework consists of three stages, sensory memory² (SM), short-term memory (STM) and long-term memory (LTM). According to this framework, information cues are initially perceived by sense perception organs (visual or auditory organs, such as eyes or ears), which can store information over a period ranging from milliseconds to several seconds. In the next stage, perceived information is encoded and temporarily stored in STM. After a rehearsal or further encoding, the information stored in STM may be transferred to LTM. Information stored in LTM can be retrieved when needed, even after several days or decades.

Birnberg and Shields (1984) have provided a succinct model for understanding the basic cognitive activities of information processing. However, their framework regards memory processes as highly efficient and does not account for the occurrence of any biases or errors that may distort information processing. Indeed, the literature shows that JDM processes are affected by a range of different cognitive and physiological constraints (Chewning 1990, Spilker and Prawitt 1997, Arnold et al. 2000, Hirshleifer and Teoh 2003). For example, Hirshleifer and Teoh (2003) have provided evidence that humans have limited attention and can only process a limited amount of information simultaneously; STM can only hold five to nine items or four chunks (Miller 1956, Cowan 2001). This is especially relevant to the accounting and finance fields, where individuals are usually exposed to information overload and time pressure (Libby and Trotman 1993, Choo 1995, Glover 1997, Braun 2000). It is common and necessary to rely on LTM of previously examined information when making judgments (Libby and Trotman 1993, Bonner 2007, p. 108, Hastie and Dawes 2010).

Ultimately, Birnberg and Shields (1984) made a significant contribution by emphasising the effect of internal cognitive processes on judgements. However, distortions may occur in information processing which may result in forgetting or retrieval of false memories. As such,

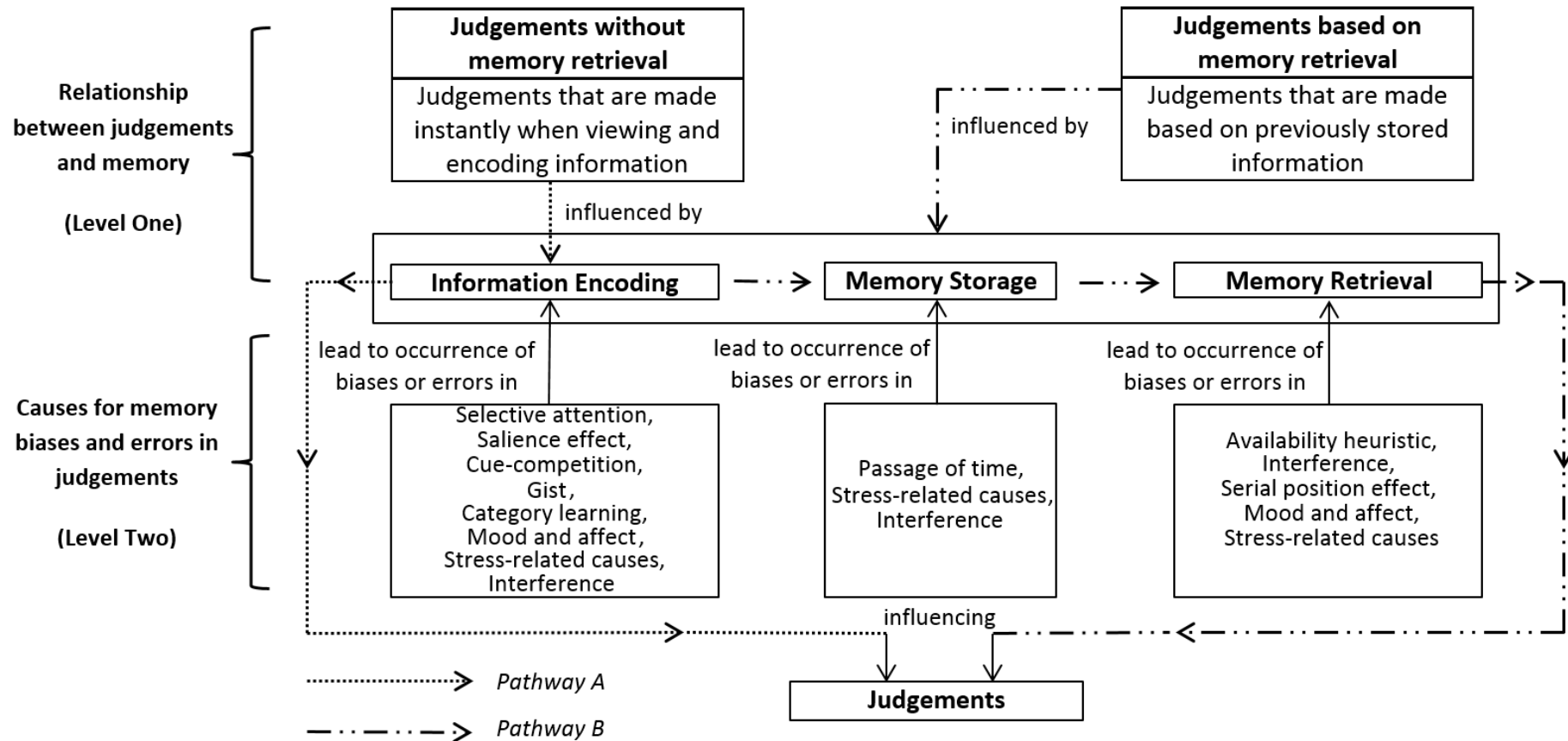
² Also known as attention.

it is important to extend their model, explaining when and why distortions may occur, as well as the possible consequences of these distortions for JDM in accounting and finance. Accordingly, our framework outlined in Figure 1 depicts the relationship between memory and JDM, with a particular focus on those biases and errors that have been identified in accounting and finance studies.

Our framework consists of two levels, namely the relationship between judgements and memory, and the causes of memory biases and errors. The framework distinguishes between judgements with memory retrieval (referred to as memory-based judgements) and judgements without memory retrieval (called on-line judgements). These are influenced by three dependent memory functions, namely information encoding (processing raw information in working memory), information storage (retaining the processed information in LTM) and memory retrieval (retrieving information from LTM).

Although the process of on-line judgement making is not influenced by memory storage and retrieval, it is not completely isolated from other memory functions as it involves information processing in the working memory that may subsequently affect memory storage and retrieval (Hastie and Park 1986). Hence, the framework outlined in Figure 2.1 depicts two pathways for future JDM studies. Specifically, on-line judgements are influenced by information encoding functions (illustrated as *Pathway A*). Memory-based judgements are the collaborative products of all three memory functions, as the information that is ready for retrieval needs to be sequentially processed in information encoding and memory storage (depicted as *Pathway B*).

Figure 2.1: The role of memory on judgement framework



2.4 Causes of Biases and Errors

2.4.1 Information Encoding

Information encoding is the first function of the memory process, one that allows individuals to encode and manipulate the perceived raw information (i.e. SM) together with information stored in STM. Information encoding is necessary for subsequent memory storage and memory retrieval, as this memory function gives individuals the capacity to convert information into a format that can be stored in LTM. Several causes of biases and errors in information processing may occur due to cognitive constraints and limited processing capacity. The six factors identified below are carefully selected from a much broader list of factors that may cause biases during the information encoding stage. These factors are intended to increase the awareness of preparers of accounting information and how certain actions during the information encoding stage are likely to impact information storage and retrieval resulting in biased judgements and decisions.

2.4.1.1 Selective attention

Selective attention is a significant factor that may lead to biases and errors in an individual's information encoding process because decision makers have a limited processing capacity. This means that they have to allocate their finite processing capacity (i.e., their attention) to limited and selected tasks to maintain an effective and efficient problem-solving capacity (Weber and Johnson 2009). This phenomenon has been confirmed in the literature as a universal and compulsory mechanism in information processing (Tversky and Kahneman 1973, Birnberg and Shields 1984, Hirshleifer and Teoh 2003).

Previous research has suggested that selectively allocated attention, known as conscious attention,³ is a scarce cognitive resource for decision makers, due to their limited processing capacity (Simon 1978). Kahneman (2002) has stated that how to allocate this scarce cognitive resource wisely is important for JDM studies. This is because of conscious attention, which requires effort, focuses on particular tasks or memories to the exclusion of other tasks. Without

³ Conscious (voluntary) attention is opposite to unconscious (involuntary) attention. Kahneman (1973) emphasised the limited capacity and selective aspect of attention. He also separated attention into two categories based on its purpose: momentary task intention (conscious or voluntary attention) or more enduring disposition (unconscious or involuntary attention), such as the orienting response to novel stimuli.

sufficient attention allocated to certain tasks (e.g., too many distractions), shallow encoding or forgetting may occur and degrade the memory retrieval capacity.

There is an increasing recognition that accounting information preparers should not simply provide information, but should also consider the accounting information users' attention and processing capacity (Braun 2000, Hirshleifer and Teoh 2003). For example, Hirshleifer and Teoh (2003) have noted that instead of assuming investors are fully rational, researchers should consider investors' limited attention and processing capacity when examining their JDM. Their findings suggest that limited attention may affect investors' cognitive resource allocation, resulting in selective attention to certain accounting information. The selective attention could be due to information disclosed in different reporting formats, complexity and font sizes (Maines and McDaniel 2000, Chung and Monroe 2001, Muiño and Trombetta 2009, Mueller et al. 2014). Several JDM biases, including salience effect and narrow framing,⁴ may all relate to this characteristic of information encoding.

2.4.1.2 Salience effect

The salience effect refers to the information encoding phenomenon in which some stimuli or cues are being encoded more efficiently than others. An item's salience describes the state or quality through which it is made distinct from other elements in the environment. The salience effect is considered an essential cognitive mechanism that facilitates people's learning and information processing by focusing a person's limited attention on the most relevant available resources. This effect is robust and widely applicable in multidisciplinary JDM studies (Fiske 2013). Previous studies have provided evidence suggesting that information disclosed in different salient degrees may affect accounting information users' attention allocation. For example, this could involve various formats of financial reporting. Design elements, such as colours (So and Smith 2002, Courtis 2004) and graphs (Tractinsky and Meyer 1999, Amer 2005, Muiño and Trombetta 2009) may attract more attention, thereby influencing a person's information processing and JDM (Hand 1990, Miller 2002).

Prior research suggests that companies utilise salience to selectively disclose information in a way that could distort information users' perceptions of a firm's true performance (Arunachalam et al. 2002, Clatworthy and Jones 2003, Godfrey et al. 2003, Amer 2005). For example, management may use inappropriate formats or overly designed graphs that could

⁴ Narrow framing refers to the behavioural phenomenon that people have tendency to analyse problems in a specific context without adequately reflecting broader considerations.

cloud one's judgment (Tractinsky and Meyer 1999, Arunachalam et al. 2002, Beattie and Jones 2008). Additionally, they could select inadequate benchmarking for earnings announcements to magnify performance (Schrand and Walther 2000), adopt distorted graphs of income and earning (Pennington and Tuttle 2009), and use discretionary disclosure of corporate narratives (Merkl-Davies and Brennan 2007, 2011) to enhance salience and manipulate information users' judgements.

2.4.1.3 Cue competition

Another potential source of biases and errors that may influence information encoding is cue competition. When decision makers process multiple cues differently, some cues will weaken the effect of others, and the impact of irrelevant cues may outweigh the relevant ones thereby causing subjects to use relevant cues less (e.g., Kruschke and Johansen 1999). Schick, Gordon, and Haka (1990) have found that cue competition is significant when accounting information users' demand for information processing exceeds their actual processing capacity. This information overload together with time pressure will result in an increase in processing errors due to the conflicting cues being presented to the subjects. This will ultimately lead to a decrease in the quality of judgements.

Hirshleifer, Lim, and Teoh (2009) examine the impact of cue competition on investor decision making during periods of information overload. Their findings reveal that releasing earnings announcements of multiple companies simultaneously may cause investors' underreaction to market intelligence. Their research design used abnormal return as the dependent variable and the number of announcements per day as independent variables. Their findings suggest that simultaneously release of information results in investor distraction, and competing and conflicting results in earnings are likely to result in investors not using relevant information in their decision making.

From an auditing perspective, Braun (2000) share some light on how one can mitigate cue competition errors when an auditor uses a certain pattern to detect fraudulent activity amongst large volumes of information. The findings suggest that when auditors faced moderate time pressures, the cue competition phenomenon itself was mitigated. This resulted in more conscious attention being given to task-related cues, rather than a broader range of cues being browsed. Although time pressure mitigated cue competition errors, it also led to some other potential errors: the processes of identifying which cues were task-related may also be biased due to auditors' heuristics or experience.

2.4.1.4 Gist

As outlined above, an individual's decision-making is constrained by limited cognitive resources. Individuals employ different encoding styles to process information efficiently under cognitive constraints. Gist in information processing refers to a phenomenon in which individuals encode a piece of information based on its general meaning (i.e. the information's semantic features). Reyna and Brainerd (1995) were the first to propose the impact of gist through their fuzzy-trace theory which suggests that individuals encode information in representations of an event's semantic features; for example, reciting a paragraph based on its general ideas. Although the gist trace enables people to understand the meaning or common features of a stimulus, it lacks contextual detail.

If information is initially encoded in gist trace, information users do not encode and store the precise quantitative data, but rather summarise the gist or essential meaning of information, which may save time and effort. However, this efficient mechanism sometimes results in biases and errors in information encoding as well as during memory retrieval. In the context of processing accounting information presented in a graphical format, Beattie and Jones (2002b) find that users tend to encode the gist of the graph, rather than remembering all the details contained within it. The findings suggest that, as long as the information was encoded in the gist trace, individuals were not able to retrieve the precise verbatim information (Brainerd and Reyna 2002, Lampinen et al. 2006). However, when asked to retrieve some verbatim information, individuals may have felt familiar with the information they had encoded using its gist. Individuals may further reconstruct their memory based on the gist fragments in mind that they had already encoded. This is susceptible to potential biases and errors as gist only captures limited verbatim information (Chang et al. 2002).

2.4.1.5 Category learning

Some cognitive biases and errors may come from an individual's learning behaviour and habits. These include category learning, which is defined as 'the search for and listing of attributes that can be used to distinguish exemplars from non-exemplars of various categories' (Bruner et al. 1977, p. 233). In other words, category learning is a strategy that employs mental categories to help decision makers classify objects, events or ideas based on an understanding of their relevant or common features. It is closely related to an individual's information encoding efficiency and subsequent memory retrieval accuracy, as an individual's capacity to

encode information into categories directly influences how that person encodes and stores information.

Libby et al. (2002) have suggested that the development of category structures reduces the cost of information processing and allows decision makers to respond effectively and efficiently to learning. For example, Peng and Xiong (2006) found that when investors assessed a firm's value, their limited processing capacity drove their category learning behaviour. Specifically, investors allocated more attention to market-level factors, which have easily classified common features, rather than firm-specific features.

Categorizing is believed to be a fundamental and efficient mechanism for learning and decision making. However, when being inappropriately employed, such as with misleading categories or in categories with irrelevant components, the category learning mechanism may lead to cognitive biases. For example, Maines (1995) and Libby et al. (2002) employed experimental methodologies to examine how the format of financial information affected decision making. They identified several mental categories that investors may rely upon when assessing corporate performance. Strategies such as labelling numerical information as 'income' and linking 'net income' to performance, all played a role in simplifying investors' information encoding. Once a piece of information was assigned to a certain mental category, the existing mental category blocked other usable information out of that category. This may bias and degrade an individual's information encoding capacity.

2.4.1.6 Mood and affect

In addition to the cognitive causes outlined previously, people's personal emotions can also lead to information processing biases and errors. Previous psychology research has indicated that a person's mood and emotional state (affect) are ubiquitous and significant in influencing judgements and information processing (Bower 1992, Wadlinger and Isaacowitz 2006, Clore and Huntsinger 2007). For example, Clore and Huntsinger (2007) found that people judged events more positively when they were in a positive mood than when they were in a negative mood.

Wadlinger and Isaacowitz (2006) examined the effect of emotion on visual stimuli with different emotional valence (positive, neutral or negative). Before watching the stimuli, the subjects were divided into two groups; however, only one group was given sweets to create a positive induction condition. The subjects were then presented with several slides, each

containing an image with different emotional valence. Eye-tracking results suggested that participants in a positive mood paid more attention to visual stimuli with high positive valence. Also, their attention may have been selectively broadened towards peripheral stimuli that could provide a highly positive emotional valence.

In an accounting context, studies have investigated the effect of mood on professionals' judgements, suggesting that personal mood may bias auditors' information encoding. For example, Chung et al. (2008) have examined auditors' inventory valuation and found that the auditor's mood influenced the degree of conservatism in their inventory valuation. Specifically, auditors in a more positive mood were less conservative compared to auditors in a negative mood. These findings are consistent with those of Wright and Bower (1992), who examined perceptions of the degree of riskiness and probabilities of success and found that a decision maker in a positive mood perceived information more positively. Specifically, decision makers in a positive mood usually attributed higher probabilities for positive outcomes and lower probabilities for negative outcomes.

Some studies have also found that the accounting information presented may lead to information users' mood changes, influencing their information encoding. Kida and Smith (1995) and Kida et al. (1998) have examined the influence of affective response⁵ on individuals' information encoding and retrieval capacities. The numerical information in financial reporting was encoded into three forms: the numerical value itself, comparisons between numerical values and effective response to those comparisons. Their findings demonstrated that information resulting in an effective response was encoded more easily than other forms of information. They suggested that an effective response could be viewed as a kind of gist, which is encoded together with financial information in the memory process, drawing more conscious attention.

The memory biases identified above were drawn from a vast array of biases that are discussed in the psychology and cognitive science literature. These biases were then closely aligned to the issues that arise when accounting information is encoded for on-line and memory-based judgements. Both types of judgements encounter biases that are likely to either enhance or impair one's ability to recall or use the right information. Preparers and users of accounting and financial information should pay close attention to these biases, so information is presented

⁵ Kida and Smith (1995), and Kida et al. (1998) define affective response as people's personal emotional reactions to financial information, such as good or bad performance, favourable or unfavourable news.

in a way that minimises the errors caused by the biases and aids the decision makers in a meaningful way.

2.4.2 Memory Storage

Memory storage refers to the retention of information after it is encoded. Thus, those biases and errors that occur in the information encoding stage may also be carried over to subsequent memory storage and memory retrieval for memory-based judgements. The retention or storage of information is referred to as the function of LTM (Atkinson and Shiffrin 1968, Birnberg and Shields 1984, Ruchkin et al. 2003). Although STM can also store information, the capacity is limited to a time interval of 30 seconds. Hence, the current section mainly focuses on the impact of LTM retention capacity on JDM.

Memory storage is a relatively ‘static’ function in comparison to information encoding and memory retrieval, which involve substantial brain activities such as cognition and categorising (Weber and Johnson 2009). As such, relatively fewer factors may influence memory retention capacity. Passage of time and stress-related causes are two factors that were identified as being the most relevant for JDM in the field of accounting and finance.

2.4.2.1 Passage of time

Memory decay theory was first proposed by Thorndike (1914) and refers to memory fading due to the passage of time. This theory suggests that events occurring between information encoding and memory retrieval have no impact on stored memory, but that the passage of time between encoding and retrieval may influence stored memory. Specifically, the longer time that has passed after information encoding, the more memory will decay and be forgotten.

In an accounting context, the impact of time on an individual’s JDM was examined by Johnson (1994) who looked at how Auditors identified errors and their capacity to recall information. The study used a two-stage experiment that tested auditors’ memory recall capacity after reviewing an audit work paper. The participants were asked to complete a memory recall task one hour or one day after they had read the contents of the work paper. The responses to the questions showed that auditors had better memory recall capacity after one hour than after one day. The auditors’ capacity to recall information diminished significantly after one day, confirming the memory decay theory (see also Sprinkle and Tubbs 1998).

Recently, neuroscience has provided some natural explanation for memory decay, as a neurochemical memory trace is created when the brain encodes new information. However, this trace tends to disintegrate slowly over time unless it is actively rehearsed (Neath and Nairne 1995, Tonoki and Davis 2012). The more time that has passed, the more memory traces are subjected to decay, resulting in more information being forgotten.

Technology-based applications may mediate this bias. In an auditing context, Dowling and Leech (2007) found that audit support systems and decision aids are widely employed in audit firms to extract and analyze client data, to enforce the firms' audit methodology and to provide automated decision support. Specifically, auditors may use a variety of applications including analytical procedures, audit report writing, electronic work papers, internet search tools, and databases for knowledge management (Janvrin et al. 2008, Bierstaker et al. 2014). Auditors may also utilize data mining techniques to analyze large amounts of external data in the audit process (Brown-Liburd et al. 2015). However, the obtained data need to be interpreted and this process may be influenced by the biases occurring in the information encoding stage.

2.4.2.2 Stress-related causes

Psychology studies have found that stress is one important factor that may affect human memory, not only the memory storage capacity but also their encoding and retrieving capacity (McGaugh 1998, Kuhlmann et al. 2005). Specifically, decision makers may find it difficult to pay attention to stimuli or to retrieve from their memory when they are under stress. Findings suggest that the body of people under stress reacts by secreting stress hormones in the blood, which may cause changes in certain areas of the brain (e.g., hippocampus) thereby frequently resulting in LTM impairment (Henckens et al. 2009).

However, the impact of stress has received relatively less attention in accounting and finance contexts. A few accounting studies focused on the impact of time pressure on information searching and judgement making (Choo 1995, Braun 2000, Keith 2003). However, other pressures may include anxiety over the consequences of making errors, pressure from clients and superiors and also pressure from conflicts between ethics and interests (Weick 1983). These pressures can potentially lead to stress and depression in decision makers, thereby impairing their memory function and capacity. Importantly, the impact of varying degrees of stress related factors driving distortions in information processing and memory storage requires further investigation in accounting and finance.

2.4.3 Memory Retrieval

The memory retrieval process requires individuals to recollect their previously encoded information. This reconstructive process is subject to potential distortions and errors (Stahlberg and Maass 1997). Information retrieved from LTM may differ from the information that was processed originally, either in quantity or quality. A possible explanation for this phenomenon is that new information forms neuron traces in the brain, which may decay over time (Schacter 1999, Jonides et al. 2008). By employing reconstructive processes, individuals can supplement other aspects of available personal knowledge into the gaps found in their memory recollection to provide a fuller and more coherent image, albeit one that may be biased and distorted. From a broad set of factors that may influence the memory retrieval process, we identified availability heuristic, interference, serial position, and mood as the main factors that may affect JDM in accounting and finance.

2.4.3.1 Availability heuristic

The availability heuristic refers to the phenomenon that individuals employ the most available information that comes to mind for problem-solving and JDM. The availability heuristic is an unconscious cognitive propensity that aligns with the notion ‘if you can think of it, it must be important’. It indicates that the likelihood of making certain judgements is based on the recall of relevant instances or the construction of plausible scenarios or examples. Research has found that judgements and predictions about the frequency or likelihood of certain events often adopt the availability heuristic as a shortcut strategy for information processing (Tversky and Kahneman 1973). Specifically, ‘the more instances recalled, or the greater the ease with which one can recall certain instances or generate plausible explanations for an event, the higher will be the judged probability of occurrence of the event’ (Moser 1989, p. 435).

Some previous accounting studies have suggested that making judgements based on cognitive availability can lead to biases and errors apart from optimal statistical judgements (Libby 1985). Specifically, previous research has suggested that the availability heuristic may lead to inference biases resulting from the biased representations produced by the recall. For example, Moser (1989) asked investor subjects to generate reasons to support or not support a specific increase in a company’s earnings, followed by judging the probability of that increase. Consistent with psychological findings of the availability heuristic, subjects who generated relatively more supporting reasons made high probability judgements. Similar findings can also be found in Moser (1992).

2.4.3.2 Interference

Interference is referred to as ‘memory loss that is the result of the interaction of a retrieval cue (consisting of both items and context information) with similar traces stored in memory’ (Criss et al. 2011, p. 317). Interference can occur in all memory functions (not just retrieval), and may impact memory recall in two ways, known as retroactive interference and proactive intervention (Hoch 1984). Retroactive interference mainly influences how people retrieve information and occurs when new information interferes with old memories. This may lead to forgetfulness or distorting old memories (e.g., overwriting stored memory) based on competition between the two. Proactive interference may impact on how people encode information and occur when existing memories interfere with new information (e.g., impeding information encoding (Baddeley and Hitch 1977). Importantly, interference may impair both the processing speed and memory retention performance and are usually thought to occur when information and memory are similar (Tomlinson et al. 2009).

Psychology studies have examined the effect of interference cues in information processing, suggesting that the previously encoded and stored information may form a type of interference and inhibit following encoding and memory retrieval (Roediger and Thorpe 1978, Roediger and Karpicke 2006). Roediger and Thorpe (1978) conducted an experiment where participants were divided into two groups, with one group of participants being asked to recall items with cues as hints (e.g. categorised lists of items) and the other group of participants being invited to make a free recall without any cues. At first, the group with cues had better recall than the free recall group. However, in the following stage, all the participants were asked to make a free recall of new information without cues. The group that had been provided with cues in the earlier stage did not perform as well as the other group; the cues they had been subjected to earlier interfered when encoding the new information and with subsequent memory recall (Danner et al. 2007). Additionally, Hoch (1984) has suggested that when individuals generate reasons for judgements, they cannot help but to continue thinking about the reasons they had already generated. Thus, providing new reasoning based on new information is likely to be hindered due to the strong effect of the already-generated memory. Similar findings are also provided by Danner et al. (2007), who asserted that three or more retrievals of a specific mean towards a goal inhibited the competing ways of the same goal.

Several studies have confirmed the effect of interference on reason generation and memory retrieval capacity in an auditing context (Frederick 1991, Anderson et al. 1992, Green 2008,

Morrill et al. 2012). For example, Frederick (1991) has examined how auditors with different levels of experience mentally represented internal control knowledge, and whether these representations differentially affected their memory retrieval. In his experiment, auditors were given internal control procedures, categorised as either schematic or taxonomic. The schematic and taxonomic presentations of internal control procedures were both hierarchic cognitive structures, but with control procedures grouped by and vertically related to the control objectives, respectively. Thus, the two presentations could influence memory in similar ways, but they produced different memory recall patterns. This research hypothesised that output interference influenced taxonomic structures as items (internal control procedures) within a category were not primarily connected to each other but only to the superordinate category within which they were nested. The findings suggested that auditors recalled less internal control procedures from the taxonomic organisation, confirming the inhibiting effect of output interference (e.g., the category in the taxonomic presentation) on memory retrieval. Morrill et al. (2012) also provided similar findings of the interference effect on auditors' internal control assessments.

One study has examined the interference effect from investors' perspectives, and the findings have suggested that interference may influence reason generation in investors' predicting behaviour. Moser (1989) found that interference can play a role in determining what cognitive sources are available to investors when they make predictions. As most investment-related predictions are often challenging and uncertain, the investor may make predictions based on the most available and easily obtained information. Therefore, the thoughts first generated in the investor's mind were commonly adopted with the highest priority for the predictions, and using financial statements in the prediction process did little to moderate these effects.

One noteworthy implication is that the interference effect could explain why more intelligent and experienced people may make more errors when retrieving information from LTM (Johnson 1994). Previous findings have suggested that experienced auditors may make more memory reconstruction errors when retrieving information due to interference (Moeckel 1990). This finding implies that an auditor's experience may lead to more memory reconstruction errors when retrieving information from memory. Specifically, it suggests that experienced auditors have a more sophisticated and broader knowledge structure, which enables them to connect unrelated memory fragments easily to support their judgements. However, novice auditors, who lack certain experience and the knowledge to integrate memory fragments, may put more effort into accurate memory retrieval, resulting in less memory reconstruction errors.

Further, an experienced auditor's incorrect memory reconstruction may also cause interference and confirmation biases with subsequent memory retrieval and reasoning. This may lower the probability of self-examination, which may exacerbate the quality of memory retrieval.

2.4.3.3 Serial position effect

The serial position effect, also known as order effect, refers to a phenomenon in which people recall the first and last items of a series more proficiently, and the middle items less proficiently (Hogarth and Einhorn 1992). The serial position effect is formed from two components: the primacy and recency effect. The primacy effect is seen when people are asked to recall a list of items, and they recall the first several items easier than elements in the middle. The recency effect refers to a potential bias in judgements that states people are more likely to remember those items at a list's end than the other items.

The serial position effect has drawn substantial attention in accounting and finance research as investors' and auditors' judgement making processes have been characterised as a sequential process of obtaining and evaluating evidence. For example, Baird and Zelin (2000) provide evidence for the existence of a primacy effect on non-professional investors' perception of positive and negative qualitative information contained in a company's president letter. Theis et al. (2012) and Hellmann et al. (2017) provide evidence for recency effects in the context of information provided in a management report. Additionally, Hellmann et al. (2017) show that the recency effect is not reduced by the inclusion of a graph in the management report.

Similarly, some auditing studies have shown that the order of information processing can influence auditors' judgements (Tubbs et al. 1990, Asare 1992, Ahlawat 1999, Guiral-Contreras et al. 2007). Tubbs et al. (1990) have found that the order effect, especially regarding recency, may influence auditors' belief revisions. They noted that if auditors evaluated information based on an irrelevant aspect of evidence (such as the order in which they had evaluated something), the quality of their judgements may be impaired. Similar findings have confirmed the influence of order effect on auditing decision making and have emphasised the recency bias as a causing factor of memory distortion. For example, Ahlawat (1999) has compared the influence of recency effect when auditors make judgements individually, versus in a group. The study found that auditors who worked independently are likely to experience recency effects. Auditors who worked in groups made less recency bias errors and more accurate evaluations as group memory was more accurate than individual memory.

However, other studies have provided conflicting evidence on order effects in auditing (Kennedy 1993, Monroe and Ng 2000). For example, Monroe and Ng (2000) examined the occurrence of order effects in auditors' inherent risk assessments and stated that no recency effect was found in auditors' JDM. This study suggested that not all audit situations were influenced by an order effect. One explanation for the results may be that when auditors face negative consequences, they become conservative and cautious, mitigating the recency bias.

2.4.3.4 Mood and affect

Decision makers' emotional status not only influences how they encode and interpret information but also influences the nature of their prior knowledge or experience retrieved from memory. For example, several accounting studies have noted that numerical information in financial reports may result in affective reactions⁶ and thus may lead to biases in subsequent memory retrieval (see Kida and Smith 1995, Kida et al. 1998). Specifically, Kida et al. (1998) have provided empirical evidence indicating that managers were better able to retrieve affective reactions than other forms of memory traces. Additionally, they found that managers were more likely to reconstruct data that is consistent with affective reactions.

Additionally, psychologists have provided some other mood-related findings that could be of interest to accounting scholars. For example, a positive mood may lead to the retrieval of positive outcomes in comparable situations (Isen et al. 1978, Blaney 1986, Lewis et al. 2005). Mood-congruent memory theory supports their findings. This theory states that information congruent with one's current mood can be retrieved more proficiently (see Matt et al. 1992). Also, one recent study from Clore and Huntsinger (2007) has provided some experimental evidence showing that positive (negative) affective information promotes (inhibits) the cognitive responses accessible or dominant in a particular situation.

2.5 Conclusions

This paper described the relationship between memory and JDM in an accounting and finance context. Additionally, it has highlighted that decision makers make judgements under substantial cognitive constraints and that these may result in biases and errors. To understand

⁶ Affective reactions are defined as an evaluative response that represents a positive or negative valence in memory structures (Kida et al. 1998).

when and why specific biases and errors occur in memory processes, the framework outlined in this paper has subdivided memory processes into three stages.

As human memory does not provide a literal recount of experience, the three memory functions that constitute the memory system are exposed to different types of biases and errors. The effective process of memory depends on the encoding process that is subjected to distortions by other intervening cognitive functions such as individual attention and task characteristics. Memory stored in the human brain may decay over time and from other physiological factors. Also, information retrieval processes may also be degraded due to biases and errors such as the recency effect. The application of technology-based decision aids may mediate memory decay. However, it is likely that such applications may not have an influence on the biases that are closely linked to personal characteristics of individuals. Furthermore, technology may not be used by all individuals or in all circumstances. For example, Jensen et al. (2010) found that both professionals and novices improved their assessment accuracy by using decision aids. However, they also found that both groups frequently discounted the decision aid's recommendations. Future research is required to examine the influence of technology on the biases outlined in this paper.

With the development of modern cognitive psychology theory and neuroscience technology, some human cognitive processes can be observed and measured with laboratory experiments. Thus, the framework presented in this paper may be useful for future accounting and finance research aiming to reveal the fundamental causes for cognitive biases and errors in information processing and JDM, rather than considering the human brain as 'black box'.

Chapter 3: Paper 2

The Effects of Textual Salience and Personal Mood on the Interpretation of Narrative Accounting Information

3.1 Abstract

This paper examines the effects of textual salience and personal mood on non-professional investors' interpretations of accounting narratives. Additionally, this study utilises eye-tracking to provide insights into the processes individuals use to assess financial information and form positive or negative performance-related judgments. The results reveal that non-professional investors are likely to rate the performance of a firm more positively when favourable cues in a chairman's report are highlighted in bold. This salience effect is strengthened if non-professional investors are in a higher mood status.

Keywords

Impression management, textual salience, personal mood, accounting narratives, investor judgments, eye-tracking

3.2 Introduction

The changing forms of annual reports have been underpinned by the significant increase in annual report sizes which is largely driven by narrative sections amplifying quantified accounting information (Lee 1994, Beattie et al. 2008, Brennan and Merkl-Davies 2013). However, previous studies have suggested that management may utilise the less-regulated narrative sections to selectively disclose information or communicate information in such a way that it may distort information users' perceptions of the performances of firms (e.g. Godfrey et al. 2003, Aerts 2005, Beattie and Jones 2008, Merkl-Davies and Brennan 2007, 2011). Such behaviour is known as impression management, which is defined in an accounting context as the strategic manipulation of corporate narratives to influence the perceptions and subsequent decisions of users in accordance with a view intended by management (Merkl-Davies and Brennan 2007).

Previous impression management studies have suggested that management is tending to use visual emphases to overemphasise good news and hide bad news in the narratives. For example, research suggests that stimuli, such as photographs (Preston et al. 1996) and graphs (Beattie and Jones 2002a, 2002b, Amer 2005), strategically included in narratives may distort readers' perceptions. The reason for this may be that photographs and graphs attract visual salience as readers' capacity to recall visual information is usually superior to their ability to recall statistical or plain textual information (Leivian 1980, Arunachalam et al. 2002, Beattie and Jones 2008). Because readers tend to simplify their cognitive processing, salient information is typically overweighted simply because it is visually emphasised (Fiske and Taylor 1991).

While prior research largely focussed on visual salience for impression management purposes, textual salience has received relatively less attention in accounting research. Prior studies in accounting largely focused on the textual content of narratives included in annual reports such as the length of accounting narratives (Clatworthy and Jones 2006, Henry 2008), the complexity of accounting narratives (Arnold et al. 2000, Rutherford 2003) and the textual reporting strategies adopted in chairman's reports

(Clatworthy and Jones 2006). However, textual salience refers to the properties (i.e., the location, colour, font or typeface) of textual information that are relevant for influencing readers' attention, perceptions and subsequent memories of the information (Van Dijk 2006, Brennan et al. 2009, Guillamon-Saorin et al. 2012). To date, only a few studies have examined textual salience in accounting narratives. Guillamon-Saorin et al. (2012), for example, examined opportunistic disclosure practices in press release headlines. They showed that firms tend to selectively disclose positive information in places with higher textual salience such as headlines.

However, the effectiveness of written communication and impressions conveyed by narratives depends not solely on textual characteristics but also on the interaction between the content and the reader. Reading comprehension involves multiple elements at different cognitive levels as emphasized in numerous theories of reading (e.g. Kintsch and Dijk 1978, Just and Carpenter 1980, Kintsch 1988, Graesser et al. 1994, Kintsch 1998). For example, higher-level cognitive processes inherent in reading comprehension include the assignment of meaning, processing the mental representations of the meaning of words, and saving them in memory (Anderson 2000, p. 389).

Importantly, psychology studies have suggested that the formation of perceptions and affective impressions is highly dependent upon readers' moods (Zajonc 1980, Schwarz and Clore 1983, Wadlinger and Isaacowitz 2006, Chung et al. 2008). For example, Wadlinger and Isaacowitz (2006) found that people in positive moods will selectively broaden their visual attention to favourable stimuli. Similarly, Rowe et al. (2007) found that positive moods may increase the scope of an individual's visual attention. Against this backdrop, this study aims to investigate the effects of textual salience and mood on readers' interpretations of accounting narratives.

This study contributes to the accounting literature on impression management by providing original evidence on a variable, i.e. textual salience, which has been overlooked in the accounting literature. This is important because the extent of

managerial discretion in relation to the complementary design elements assisting the presentation of financial information such as the use of headlines and bolded cues is still largely left unregulated. Additionally, this study utilises eye-tracking to provide a novel insight into how individuals engage with financial information included in annual reports. This constitutes a methodological advancement in accounting research.

The next section reviews the literature on accounting narratives, textual salience and personal mood. It also develops hypotheses. Section 3.4 provides an overview of the research design. Section 3.4 presents the results and discusses the main findings. The last section concludes the paper.

3.3 Literature Review and Hypotheses Development

3.3.1 Textual Salience in Corporate Reporting

The concept of *visual hierarchy* describes the pattern that the human eye follows when reading a document. According to this concept, the first objects being identified are those that have the highest contrast compared with their environment (Djamasbi et al. 2011). In other words, the reader of a document glances first at the page and pays attention to a limited amount of information with high textual or visual salience. During this first stage, the reader attempts to find a point of entry into the page. In the second stage, the reader extracts more information from information located around the entry point that he/she identified previously (Scott 1993, Wolfe 1994, Djamasbi et al. 2011).

Regarding the first stage, previous accounting studies have largely focused on visual salience and examined the use of pictures (Graves et al. 1996, Preston et al. 1996) and financial graphs (Beattie and Jones 2002a, 2002b, 2008, Pennington and Tuttle 2009, Hellmann et al. 2017). These studies provide robust evidence that stimuli disclosed in graphical format attract more attention and can influence readers' judgements. However, only few accounting studies have examined the effects of textual salience on

users' perceptions (Merkl-Davies and Brennan 2007, Brennan et al. 2009, Brennan and Merkl-Davies 2013).

The textual salience of a text item describes the state or quality that makes it stand out among other elements in the environment and includes the properties of the text such as font size, text styles and typefaces (Van Dijk 2006, Brennan et al. 2009, Guillaumon-Saorin et al. 2012). Importantly, textual salience is considered a key cognitive mechanism in facilitating people's learning and information processing, as it enables people to focus their limited attention on the most relevant resources available and influences people's judgements about causality (Hirshleifer and Teoh 2003, Pennington and Tuttle 2009).

Brennan et al. (2009) reviewed impression management studies and suggested that information included in narratives can exhibit three different levels of textual salience based on its properties. Specifically, the information presented in headlines or headings is considered to have the highest salience, followed by bullet points and bold text. According to the concept of *visual hierarchy*, a piece of text with higher salience (e.g., words that appear in bold font among otherwise plain text) would make that piece of information stand out and serve as a point of entry into the page. Studies in other disciplines such as psychology, advertising and marketing support this and provide evidence that readers' information searching and encoding processes can be misdirected by the attributes of font size, text style, the length of words, colours and the locations of text components (Ling and van Schaik 2002, 2006, Oh et al. 2008, Djamasbi et al. 2011, Sanocki and Dyson 2012, Mueller et al. 2014). For example, Mueller et al. (2014) suggested that information presented in larger font sizes may enhance the speed of collecting information, lead to faster decision making and improve recall. Additionally, a word presented in a prominent font within a plain text paragraph may easily attract readers' attention and be viewed as more important (Brennan et al. 2009, Mueller et al. 2014).

This phenomenon may be explained by Kruschke and Johansen's (1999) findings on perceptual cue competition suggesting that when readers perceive multiple cues with different salience levels, the more salient cues will impede the perception of the less salient cues and the presence of irrelevant cues may result in the important cues being used less. Additionally, recent studies have used eye-tracking techniques to examine the impact of font size and line spacing on eye movements and reading speeds. The results of these studies provide evidence that people's perceptions and judgments tend to be driven by the most salient cues (Rayner et al. 2010, Slattery and Rayner 2013).

Consequently, we expect that non-professional investors' interpretation of accounting narratives is influenced by cues highlighted in bold. Brennan et al. (2009) noted that bold text has lower salience than titles and subheadings; however, if the bold text is found to have a significant effect on investors' perceptions, similar results may also be found in the texts with higher salience (e.g., subheadings or titles). Additionally, Smith and Kida (1991) and Maines and McDaniel (2000) show that non-professional investors have ill-defined valuation models and lack task-specific knowledge. As such, we expect that non-professional investors are likely to overweight salient information. If the salient information is positive in nature, this may elevate the performance evaluation. Thus, it was hypothesised that:

H1: Non-professional investors are likely to rate the performance of a firm higher when favourable cues in a chairman's report are highlighted in bold than when favourable cues are not highlighted in bold.

3.3.2 Mood in Information Processing

Nofsinger (2005) argued that economic behaviour is not reflecting the simple processing of quantitative numbers, but is a complex process between rational economic thinking and how the users feel about stimuli (see also MacGregor et al. 2000, Pixley 2002, Dreman 2004). Indeed, previous psychology studies provide robust evidence that personal mood is a major factor in influencing judgements (Christianson

1992, Wright and Bower 1992, Clements and Wolfe 2000, Wadlinger and Isaacowitz 2006). This phenomenon, called affect heuristic may lead to judgments based on how people feel about a particular alternative instead of doing an extensive search for information about the alternative (Finucane et al. 2000).

Schwarz and Clore's (1983) *feelings-as-information* model depicts that people tend to use their feelings or current mood as sources of information when making judgements or decisions. Previous studies have provided consistent findings to support this model and have suggested that people tend to evaluate targets or tasks more positively when they are in a positive mood than when they are in a negative mood (e.g. Wright and Bower 1992, Wadlinger and Isaacowitz 2006, Chung et al. 2008). For example, Chung et al. (2008) examined the effect of auditors' moods on inventory valuation tasks and found that auditors' moods influenced the degree of conservatism in their inventory valuation and that auditors in positive moods were less conservative than auditors in negative moods. Similarly, Wright and Bower (1992) found that decision makers in happy moods perceived information more positively. Thus, decision makers in positive moods usually give higher probabilities for the positive outcomes of events and lower probability for the negative outcomes of events. Accordingly, hypothesis 2 is stated as:

H2: Non-professional investors in a positive mood are likely to rate the performance of a firm higher than those who are in a negative mood.

Additionally, individuals in negative moods tend to uncover more negative information and retrieve more negative information from their memories when making judgements (Clore et al. 1994, Wegener and Petty 1994). Conversely, individuals in positive moods uncover more positive information and recall more positive information from their memories (Bhattacharjee and Moreno 2013). These findings indicate that moods may direct people's attention to information that more suitably explains their feelings. Research also suggested that individuals in a positive mood status are more prone to adopt heuristics in their cognitive processing, because people tend to maintain their positive mood engaging in effortless processing rather than extensive processing

(Kunda 1999, Schwarz 2002). Similarly, Wadlinger and Isaacowitz (2006) found that positive moods may selectively broaden people's visual attention to other stimuli, create positive affective responses and, consequently, impact judgements. Thus, decision makers who are in a positive mood may unconsciously allocate more conscious attention to stimuli that are consistent with their mood. As such, the mood may affect the perception of salient cues and may enhance the effect of textual salience.

Accordingly, hypothesis 3 is stated as:

H3: Favourable cues highlighted in bold are more likely to be observed and thus will have a greater effect on elevating non-professional investors' performance evaluations when investors have a positive mood status than a negative mood status.

3.4 Research Design

3.4.1 Research Method

In order to test the hypotheses, a 2x2 between-subjects experimental design was adopted to capture the main effects of the two independent variables of textual salience and personal mood on the dependent variable of non-professional investor judgments. The experiment was conducted in a laboratory to ensure a consistent and tightly controlled environment, reducing the effects of possible extraneous variables. It was untimed to alleviate time pressure on participants.

Ninety-one business students were recruited from an Australian university from various accounting and finance courses to participate in the study. Business students are used to represent non-professional investors as prior literature has identified them as proxies who possess relevant knowledge and/or experience (Pinsker 2007, 2011, Hellmann et al. 2017). To ensure that all participants had sufficient knowledge about accounting and finance topics, only undergraduate students in their third year or postgraduate students

were recruited. As an incentive for participating, each participant received a compensation of AUD10 after the administration of the experiment.

An online questionnaire⁷ was used in the experiment and comprised of three parts (Appendix 3.1). The first part of the questionnaire considered the gender of participants and their educational background. These items provide additional information on individual factors that may have influenced judgments as identified in previous studies (e.g. Dwyer et al. 2002, Agnew and Szykman 2005).

The second part required participants to rate their current mood on a ten-point scale in which (1) was very negative and (10) was very positive⁸. The mood scores were immediately reviewed by one of the investigators. Participants who rated their current mood as being between 8 and 10 were assigned to the positive mood group. Meloy et al. (2006) found that monetary incentives can alter mood. Consequently, participants who rated their mood as being 8 received an AUD10 mood induction payment. This payment was designed to elevate the mood of those participants away from the lower boundary (Meloy et al. 2006). Participants who rated their current mood as being not greater than 7 were assigned to the negative mood group as there was no distinction between negative mood and neutral mood.

After measuring participants' moods, the stimulus material was shown on the screen. It represented the chairman's report of a fictitious Australian company (see Appendix 3.2). The purpose of using a fictitious company was to mitigate the possibility of evoking representative heuristic or familiarity biases in participants. The information contained in the stimulus was based on a publicly listed Australian company, however the firm's

⁷ Prior to the administration of the experiment, a pilot test of the experimental stimulus and questionnaire was conducted to ensure that they were understandable, logically articulated and appropriate in layout. The pilot study was trialled on 7 research students and academics. Amendments made to the questionnaire after the pilot test included swapping the order of certain questions to improve their logical flow and re-phrasing instructions and questions.

⁸ Single item scales have been used in the literature to assess the mood of participants (e.g., Rowe et al. 2007, Meloy et al 2006).

name and some financial information were carefully modified. As outlined in Figure 3.1, half of the participants in each mood group (i.e. the positive mood group and the negative mood group) were randomly assigned to read a chairman's letter that highlighted the company's favourable performance in bold font. Based on the findings of previous research, information on a company's profitability (Clatworthy and Jones 2001), return of equity (Kohut and Segars 1992), dividend pay outs, turnover, earnings per share and debt ratio (Courtis 2004) were used as cues. The stimulus contained mixed information with both positive and negative components. Positive cues contained in the stimulus related to three main areas, namely the financial profitability for the year, enhanced brand equity domestically and internationally, and reduced gearing. Negative cues in the stimulus also related to three main areas, namely difficult market conditions, reduced total revenue, and a decline in share price. The number of cues used in the stimulus was limited and the length of the excerpt was confined to one page to deter information complexity as an extraneous variable. In order to avoid any order effects, the positive and negative cues were presented in a mixed sequence, with most paragraphs including both positive and negative components. The other half of the participants in each mood group was assigned to read a chairman's letter that had no highlighting.

Figure 3.1: Participants allocation into four groups

	Stimulus with cues in bold	Stimulus without cues in bold
Positive mood	Group 1 n = 21	Group 2 n = 20
Negative mood	Group 3 n = 25	Group 4 n = 25

The final part of the questionnaire required participants to rate their judgments in relation to how well they thought the company was performing after reading the stimulus. A 10-point Likert scale was used to measure and discriminate between the extent of poor and good performance (a rating of 1 implied very poor performance; a rating of 10 implied very good performance).

3.4.2 Data Analysis

For the purpose of analysing the hypotheses, different statistical methods have been adopted. T-tests were used to examine the effects of textual salience and mood on non-professional investors' judgments. The joint effect of the two variables was examined in a two-way analysis of variance (ANOVA) test with interactions.

To further examine the effects of textual salience on judgments, the participants were subjected to reading the experimental stimulus under the utilisation of an eye-tracking device (Tobii T120). The eye-tracking device was built into a desktop screen (60hz) and did not hinder the participants to engage with the stimulus in any way. Prior studies in accounting and finance that have used similar eye-tracking technology include Shavitt et al. (2010), Chen et al. (2016) and Hellmann et al. (2017).

Specifically, the eye-tracking device was used in this study to measure participants' eye movements (saccades) and fixations. Previous studies suggest visual acuity is inhibited during saccades, thus fixations are the only channel of visual information acquisition (Henderson and Hollingworth 2003, Rayner 2009). Fixations are associated with readers' depth of processing and spatial distribution of attention (Hegarty 1992, Rayner 1998, 2009), therefore, important to the study of attention and perception.

Fixations can either be determined by a summation (dwell-time)⁹ or differentiation (velocity detection)¹⁰ method. The detection of fixations is based on predetermined thresholds. For the summation method, Rayner (1998) defines the accepted threshold to distinguish fixations from saccades as approximately 200–300 milliseconds. For the differentiation method, the commonly adopted threshold for the detection of fixations is 30 degrees gaze velocity per second (Olsen and Matos 2012). If the gaze velocity is above this threshold, it is classified as a saccade; if it is below, it is classified as a fixation. In this study, the differentiation method was adopted because it allows for more sophisticated fixation filters to be used. Specifically, this study adopted the I-VT (Velocity-Threshold Identification) setting within the differentiation method. Additional to the 30 degrees gaze velocity threshold, the I-VT filter sets a maximum angle of 0.5 degrees between fixations and a maximum duration of 75ms for the gap between fixations (Kliegl et al. 2004, Komogortsev et al. 2010). In addition, fixation durations lower than 60ms are discarded which may improve the accuracy of fixation detection.

Eye-tracking data analysis comprises of examining heat maps and area of interests (AOIs). Heat maps are used to ascertain overt attention, salient cues and fixations. Specifically, heat maps provide an indication of the proportion of the accumulated time that each participant spent fixating on the different areas of the stimulus materials relative to the total time that the participants spent looking at the stimulus materials. They were generated by computing the relative time duration a reader spends in a visual area (Bojko 2009). This approach was taken to eliminate the effect of participants having different reading and comprehension capacities due to their different backgrounds. The heat maps show areas in different colours. Red regions depict a high

⁹ Summation method refers to the average stationary signals over a specified period whereby a fixation is identified if the duration exceeds the predetermined threshold (Duchowski 2007, p. 138-141).

¹⁰ Differentiation method refers to determining eye movement velocities whereby a fixation is identified if the velocity falls below the predetermined threshold (Duchowski 2007, p. 138-141).

concentration of fixations, yellow regions depict a moderate concentration of fixations, and green regions depict a low concentration of fixations.

AOIs provide statistical evidence on how attention is spent within pre-created areas. They were created around all cues highlighted in bold.¹¹ For the stimulus with plain text, AOIs were created in the same sizes and locations (i.e. surrounding the same areas of text) as for the stimulus that had highlighted cues. Two indicators of visual attention were calculated: the fixation count measures the number of times that a participant fixated on/within an AOI and the visit count measures the number of times that a participant visited an AOI. Previous literature has shown the importance and relevance of both fixation count and visit count on reading processing (Rayner 1998, Jacob and Karn 2003).

3.5 Results and Discussions

Table 3.1 summarises participants' demographic data. Group 1 (favourable cues highlighted in bold; participants with positive mood) consists of 21 participants; Group 2 (plain text; participants with positive mood) consists of 20 participants; Group 3 (favourable cues highlighted in bold; participants with negative mood) consists of 25 participants; Group 4 (plain text; participants with negative mood) consists of 25 participants. Overall, there were 48 (i.e., 52.7%) male participants and 43 (i.e., 47.3%) female participants. The total sample included 89 participants majoring in accounting and finance (or both if the students were completing a double degree) and 2 participants majoring in management and marketing.

¹¹ The cue words are put in the centre of each AOI. Additionally, the each AOI included one or two words surrounding the cue word as a buffer for catching visual fixations.

Table 3.1: Sample characteristics

	Full sample	Group 1	Group 2	Group 3	Group 4
Gender	(n = 91)	(n = 21)	(n = 20)	(n = 25)	(n = 25)
Male	52.70%	58.70%	46.67%	58.54%	48.00%
Female	47.30%	41.30%	53.33%	41.46%	52.00%
Education					
Third –year undergraduate	86.81%	89.13%	84.44%	90.24%	84.00%
Postgraduate coursework	4.40%	6.52%	2.22%	2.44%	6.00%
PhD	8.79%	4.35%	13.34%	7.32%	10.00%
Major					
Accounting	40.66%	43.48%	40.00%	43.90%	40.00%
Finance	57.14%	54.35%	57.78%	56.10%	56.00%
Other business majors	2.20%	2.17%	2.22%	0.00%	4.00%

Notes: Group 1 consists of participants with positive moods who were exposed to a stimulus with favourable cues highlighted in bold; Group 2 consists of participants with positive moods who were exposed to a stimulus with plain text; Group 3 consists of participants with negative moods who were exposed to a stimulus with favourable cues highlighted in bold; Group 4 consists of participants with negative moods who were exposed to a stimulus with plain text.

3.5.1 Hypotheses Testing

3.5.1.1 The effect of textual salience on investors' judgements

H1 predicted that non-professional investors were likely to rate the performance of a firm higher when favourable cues in the chairman's report were highlighted in bold than when favourable cues were not highlighted in bold. To test this hypothesis, a two group sample t-test was undertaken that compared the mean values of the performance ratings. The results of the t-test are shown in Table 3.2.

Table 3.2: Hypothesis 1 results

Performance ratings of the targeted firm	No. Observations	Mean	Standard Deviation	t-value	p-value
Chairman's report without favourable cues highlighted	45	6.289	1.687		
Chairman's report with favourable cues highlighted	46	7.174	1.539	-2.615	0.001

Notes: The dependent variable is participants' judgements of performance towards the target firm. The mean values are tested as shown, t-value and P-value are reported in one tailed way. This difference was statistically significant at the 0.1% level (t-value = -2.615, one-tailed p-value < 0.001).

The participants subjected to a chairman's report with favourable cues highlighted in bold gave significantly higher performance ratings (mean = 7.174) than participants subjected to a chairman's report without favourable cues highlighted (mean = 6.289). This difference was statistically significant at the 0.1% level (t-value = -2.615, one-tailed p-value < 0.001). This suggests that the embedded favourable cues highlighted in bold effectively elevated participants' judgements, which is supporting H1.

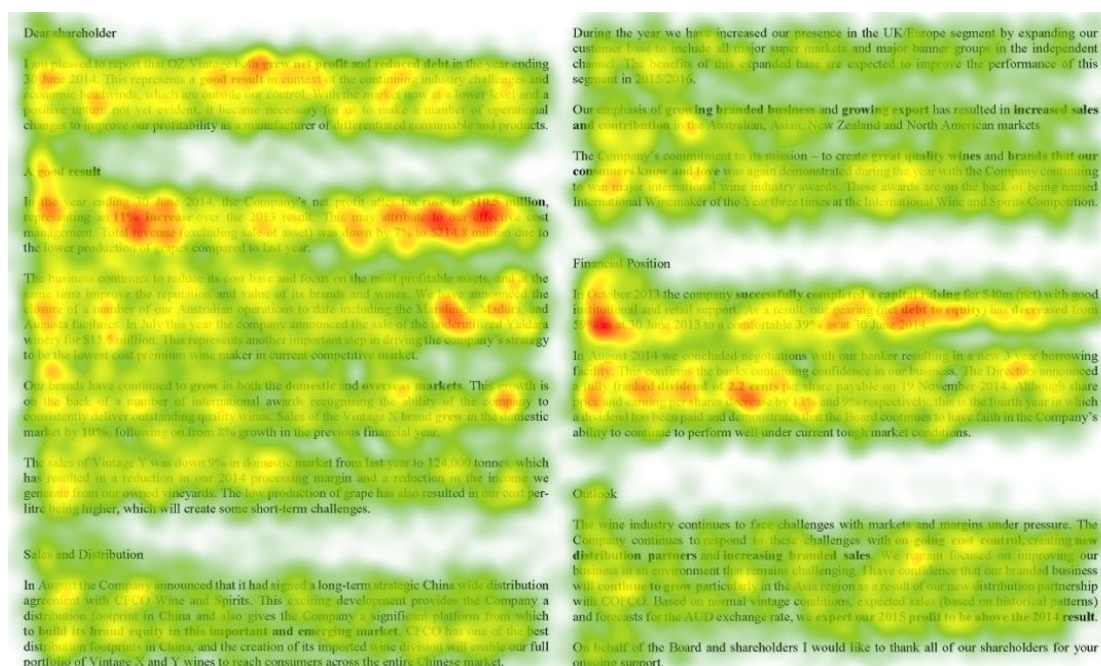
A possible reason for this may be that participants spent more time processing the favourable cues if they are highlighted in bold. The eye-tracking data provides additional evidence that the cues highlighted in bold effectively attracted participants' attention. Figure 3.2 presents the heat maps contrasting the two groups (i.e., Group 1 and Group 3) exposed to the cues highlighted in bold with the two groups (i.e., Group 2 and Group 4) exposed to plain text. Panel A shows the accumulated heat map for participants who read the chairman's report in plain text. Panel B shows the accumulated heat map for participants who read the chairman's report with favourable cues highlighted in bold.

Figure 3.2: Heat maps of the chairman's report without highlighted cues (Panel A) and with highlighted cues (Panel B)

Panel A



Panel B



Notes: Red regions depict a high concentration of attention, yellow regions depict a moderate concentration of attention, and green regions depict a low concentration of attention. Panel A represents Group 2 and Group 4. Panel B represents Group 1 and Group 3.

Overall, Figure 3.2 shows that all readers spent relatively more time and attention on the left-side column of the document. This is consistent with previous research that suggested that readers only have limited attention and begin to selectively process information after a short time of concentration (Kahneman 1973, Hirshleifer and Teoh 2003, Peng and Xiong 2006). However, there is a difference between the groups in regard to the right-side column. Figure 3.3 enlarges the second and the third paragraphs of the right-side column. The content of these paragraphs is related to the financial position.

Figure 3.3: Heat maps of the financial position section

Panel A



Panel B



Notes: Red regions depict a high concentration of attention, yellow regions depict a moderate concentration of attention, and green regions depict a low concentration of attention. Panel A represents Group 2 and Group 4. Panel B represents Group 1 and Group 3.

Panel A of Figure 3.3 shows that participants paid attention to the whole paragraph with a stronger focus on the beginning of the paragraphs if no cues were highlighted. This is consistent with the findings of Guillamon-Saorin et al. (2012) who suggested that the subtitle and beginning of a document will attract more attention. However, Panel B of Figure 3.3 shows that participants paid significantly more attention to bolded cues such as ‘successfully completed a capital raising’, ‘debt to equity has decreased to 39%’ and ‘a franked dividend’ as compared to plain text.

Figure 3.4: AOIs within the financial position section

Panel A

Financial Position

In October 2013 the company **successfully completed a capital raising** for \$40m (net) with good institutional and retail support. As a result, our gearing (net **debt to equity**) has **decreased from 59%** as at 30 June 2013 **to a comfortable 39%** as at 30 June 2014.

In August 2014 we concluded negotiations with our banker resulting in a new 3 year borrowing facility. This confirms the banks continuing confidence in our business. The Directors announced a **fully franked dividend of 2.2 cents per share** payable on 19 November 2014. Although share price and earning per shares decrease by 13% and 9% respectively, this is the fourth year in which a dividend has been paid and demonstrates that the Board continues to have faith in the Company’s ability to continue to perform well under current tough market conditions.

Panel B

Financial Position

In October 2013 the company **successfully completed a capital raising** for \$40m (net) with good institutional and retail support. As a result, our gearing (net **debt to equity**) has **decreased from 59%** as at 30 June 2013 **to a comfortable 39%** as at 30 June 2014.

In August 2014 we concluded negotiations with our banker resulting in a new 3 year borrowing facility. This confirms the banks continuing confidence in our business. The Directors announced a **fully franked dividend of 2.2 cents per share** payable on 19 November 2014. Although share price and earning per shares decrease by 13% and 9% respectively, this is the fourth year in which a dividend has been paid and demonstrates that the Board continues to have faith in the Company’s ability to continue to perform well under current tough market conditions.

Notes: Panel A represents Group 2 and Group 4. Panel B represents Group 1 and Group 3.

AOIs provide further evidence on how attention is spent within the financial position section. Recall that AOIs are pre-created rectangles surrounding the highlighted cues. As depicted in Figure 3.4, there are 4 AOIs in this section. A1 refers to the area that states that the ‘company successfully completed a capital raising for \$40m (net)’. A2 refers to the area that states ‘our gearing (net debt to equity) has decreased from’. A3

refers to the area that states ‘to a comfortable 39% as’. A4 refers to the area that states ‘a fully franked dividend of 2.2 cents per share’.

Table 3.3 shows the mean values and standard deviations of two metrics (i.e. fixation count and the visit count) related to the four AOIs highlighted in Figure 3.4. Overall, participants who were exposed to the stimulus with favourable cues highlighted in bold fixated more on the AOIs than participants who were shown plain text. For example, A1 attracted an average of 15.32 fixations when it was highlighted in bold as compared to 5.78 fixations when this area was not highlighted. The results of the visit count also suggest that highlighted cues result in higher cognitive loads. Specifically, the visit count shows that participants were reading the AOIs more often if the cues were highlighted (5.19 times on average) as compared to plain text (3.75 times on average).

Table 3.3: AOI analysis for participants subjected to the stimulus with highlighted cues versus participants subjected to plain text

	A1		A2		A3		A4	
	Fixation Count	Visit Count	Fixation Count	Visit Count	Fixation Count	Visit Count	Fixation Count	Visit Count
Chairman's report with favourable cues highlighted (Group 1 and Group 3)								
Mean	15.32	5.11	20.63	5.84	6.75	3.6	18.1	6.2
SD	(11.41)	(3.43)	(12.08)	(4.46)	(4.15)	(2.23)	(10.39)	(3.59)
Chairman's report without favourable cues highlighted (Group 2 and Group 4)								
Mean	5.78	3.11	13.10	3.70	5.6	2.6	13.9	5.6
SD	(5.52)	(2.89)	(5.02)	(1.89)	(4.30)	(1.96)	(8.85)	(3.20)

Notes: The fixation count measured the number of times that a participant fixated on/within an AOI; the visit count measured the number of visits to an AOI.

3.5.1.2 The effect of mood on investors' judgements

To examine the influence of mood on participants' judgements, a t-test was conducted to compare the mean of participants' performance ratings towards the targeted firm. As

previously outlined, participants were assigned to one of two mood groups based on self-ratings of their current mood. Group 1 and Group 2 included participants with a positive mood and Group 3 and Group 4 included participants with a negative mood. In order to eliminate any confounding effect from salience, two separate t-tests were conducted. The results are shown in Table 3.4.

Table 3.4: Hypothesis 2 results

Panel A: Group 4 and 2					
Investors' performance ratings of the targeted firm	No. Obs.	Mean	Standard Deviation	t-value	p-value
Investors in Negative Mood	25	5.880	1.691		
Investors in Positive Mood	20	6.800	1.576	-1.860	0.034
Panel B: Group 3 and 1					
Investors' performance ratings of the targeted firm	No. Obs.	Mean	Standard Deviation	t-value	p-value
Investors with Negative Moods	25	6.560	1.417		
Investors with Positive Moods	21	7.905	1.375	-3.250	0.001

Notes: The dependent variable is participants' judgements of performance towards the target firm. In order to eliminate the confounding effect from salience, two separate t-tests were adopted for robust purpose. The mean values are tested as shown, t-value and P-value are reported in one tailed way.

Panel A of Table 3.4 shows the effect of personal mood on judgements in relation to the group of participants who had been shown the stimulus material without favourable cues highlighted (i.e., Group 4 and Group 2). Participants in positive moods gave higher performance ratings (mean = 6.800, SD = 1.576) of the targeted firm than participants in negative moods (mean = 5.880, SD = 1.691). This difference was significant at the 3.4% level (with a t-value equal to -1.860). Panel B of Table 3.4 shows the results for participants who were shown the stimulus materials with favourable cues highlighted (i.e., Group 1 and Group 3). Similarly, the results showed that participants in positive moods rated the performance of firms more positively (mean = 7.905, SD = 1.417) than

participants in negative moods (mean = 6.560, SD = 1.375). This difference was also statistically significant ($p = 0.001$, with a t -value of -3.250). Thus, the results in Table 3.4 support H2.

3.5.1.3 The influence of mood on the effect of textual salience

H3 predicted that highlighted favourable cues will have a greater effect when investors have a positive mood status. A two-way ANOVA test with interactions was undertaken to examine variances in the variables. Table 3.5 shows the results of the variance analysis between two factors (i.e. textual salience and mood) towards the dependant variable (i.e., performance judgements)¹².

Table 3.5: Hypothesis 3 results

Source	ss	df	Mean Square	F-statistic	p-value
Salience	15.042	1	15.042	7.22	0.009
Mood	31.534	6	5.256	2.52	0.028
Salience x Mood	30.244	6	5.041	2.42	0.034
Error	160.450	77	2.084		
Total	249.670	90	2.774		

Notes: This table presents the ANOVA results between independent variables (Salience, mood and the interaction between salience and mood) and the dependent variable (i.e., judgements of performance towards the target firm). All p -values are one-tailed unless otherwise stated.

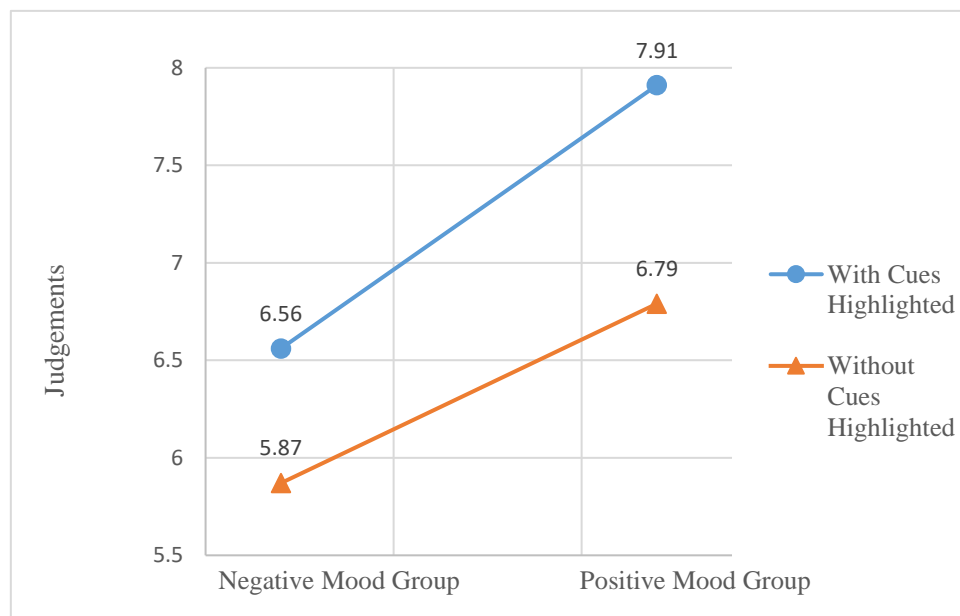
The results show that salience ($F = 7.22$, $p = 0.009$) and mood ($F = 2.52$, $p = 0.028$) had a significant effect on the performance judgements. The interaction effect between the two variables was also significant at 3.4% ($F = 2.42$). These results provide preliminary supporting evidence for H3.

In addition, Figure 3.5 shows the relationship between the variables and provides a summary of the mean values shown in Table 3.4. The X-axis in Figure 3.5 shows the

¹² Control variables are not reported in this ANOVA because a pre-test showed no statistically significant difference in mean values.

negative and positive mood levels from left to right. The Y-axis shows participants' judgements, which were plotted separately based on the four experimental conditions. The average value of judgements made for Group 1 (7.91) is much significantly higher than the other three groups (Group 2 = 6.79; Group 3 = 6.56; Group 4 = 5.87). Figure 3.5 suggests that the two variables (bolded cues highlighted and positive mood) have the same directional effect on elevating investors' judgements towards the company.

Figure 3.5: Means of participants' judgements under four experimental conditions



A post-hoc test was conducted to provide additional evidence on the joint effect of mood and textual salience on investors' judgements. The Levene statistic (0.498, $p = 0.684$) is not significant, indicating no violation of homogeneity assumption.

Table 3.6 shows the results of the post-hoc test. We used Tukey's LSD method to provide multiple comparisons among groups. The results suggest that there is a statistically significant difference in the average performance evaluation between Group 1 (Positive mood and cues highlighted in bold) and the other three groups (Group 2, $p = 0.023$; Group 3, $p = 0.004$; Group 4, $p = 0.000$). There is also a statistical significant difference between Group 2 and Group 4 ($p = 0.047$), suggesting higher personal mood will elevate investors' judgements after reading a chairman's report without highlighting.

Table 3.6: Multiple comparisons of investors' judgments

(I) Groups	(J) Groups	Mean Difference (I-J)	Std. Error	Sig.
Positive mood with bolded cues (Group 1)	Positive mood without bolded cues (Group 2)	1.105*	0.476	0.023
	Negative mood with bolded cues (Group 3)	1.345*	0.451	0.004
	Negative mood without bolded cues (Group 4)	2.025*	0.451	0.000
Positive mood without bolded cues (Group 2)	Positive mood with bolded cues (Group 1)	-1.105*	0.476	0.023
	Negative mood with bolded cues (Group 3)	0.240	0.457	0.601
	Negative mood without bolded cues (Group 4)	0.920*	0.457	0.047
Negative mood with bolded cues (Group 3)	Positive mood with bolded cues (Group 1)	-1.345*	0.476	0.004
	Positive mood without bolded cues (Group 2)	-0.240	0.457	0.601
	Negative mood without bolded cues (Group 4)	0.680	0.457	0.118
Negative mood without bolded cues (Group 4)	Positive mood with bolded cues (Group 1)	-2.025*	0.451	0.000
	Positive mood without bolded cues (Group 2)	-0.920*	0.457	0.047
	Negative mood with bolded cues (Group 3)	-0.431	0.362	0.118

Notes: * indicates a significance level of 5%.

The significant difference between Group 1 and the other groups may be attributed to a significant joint effect between textual salience and personal mood. A possible explanation for such a joint effect is that investors who are in a positive mood status are more likely to overweight the positive performance-relevant cues highlighted in bold as compared to investors who are in a negative mood.

Figure 3.6: Heat maps of the financial position section of participants with negative mood (Panel A) and with positive mood (Panel B)

Panel A



Panel B



Notes: Red regions depict a high concentration of fixations, yellow regions depict a moderate concentration of fixations, and green regions depict a low concentration of fixations. Both Panels comprised cues highlighted in bold. Panel A shows the heat map for Group 1, Panel B shows the heat map for Group 3.

Figure 3.6 provides further evidence that can be used to explain the interaction effect. Panel A shows the heat map of participants with negative moods while Panel B shows the heat map of participants with positive moods. Both panels comprise text with cues highlighted in bold; however, Panel B shows that the highlighted performance relevant cues tended to attract more attention from participants when they were in positive moods.

Table 3.7: AOI analysis for participants with positive moods versus participants with negative moods

	A1		A2		A3		A4	
	Fixation Count	Visit Count	Fixation Count	Visit Count	Fixation Count	Visit Count	Fixation Count	Visit Count
Positive mood investors with favourable cues highlighted (Group 1)								
Mean	15.32	5.11	22.68	6.16	6.75	3.6	18.1	6.2
SD	(11.41)	(3.43)	(12.96)	(4.29)	(4.15)	(2.23)	(10.39)	(3.59)
Negative mood investors with favourable cues highlighted (Group 3)								
Mean	9.94	3.69	14.05	5.42	6.53	4	13.05	5
SD	(6.23)	(1.99)	(6.82)	(2.46)	(3.72)	(2.38)	(6.92)	(2.21)

Notes: The fixation count measured the number of times that a participant fixated on/within an AOI; the visit count measured the number of visits to an AOI.

Table 3.7 shows the fixation count and visit count statistics for the four AOIs within the financial position section of the stimulus material. The results show that participants in positive moods fixated more frequently on the areas with highlighted cues than participants in negative moods. For example, positive mood participants fixated 18.1 times on A4 while negative mood participants fixated 13.05 times on A4. In relation to the visit count, except for cues within A3 (that were reread 3.6 times versus 4 times for positive mood and negative mood participants, respectively), participants in positive moods reread highlighted cues more frequently than participants in negative moods. These findings are consistent with previous research that suggested that readers tend to pay more attention to information that is consistent with their mood status (Wadlinger and Isaacowitz 2006, Rowe et al. 2007).

3.6 Conclusions

The findings of this study provide evidence about how non-professional investors' interpretations of accounting narratives are influenced by textual salience and personal

mood. It extended previous research on impression management by examining the effects of font properties (i.e., bold font) of textual information on investors' judgements and further considered whether mood had any joint effect in influencing investors' judgements.

The findings suggest that highlighting text in a bold font attracts significant attention that can bias investors' judgements. Eye-tracking data provides showed that text in bold font was more likely to be perceived by readers. Statistical results showed that text in bold fonts created significant differences in participants' subsequent judgements.

In this study, positive moods were found to elevate participants' judgements. The joint effect of mood and salience on investors' judgements was also examined. Participants' in positive moods were more likely to be attracted by highlighted favourable cues than participants in negative moods. Thus, investors in positive moods may be more susceptible to impression management techniques that highlight positive cues. Mood was shown to significantly strengthen participants' biased perceptions. Thus, financial disclosures that may trigger personal mood can be one potential mechanism in impression management.

Limitations of this study include the examination of only two variables that may influence users' interpretation of accounting narratives. However, as previous research provides strong evidence that visual salience has a strong effect on judgments, further research is required to examine the joint influence of both textual and visual salience. Furthermore, the self-rating of participants' moods may have biased the results. Although this method has been used in the previous psychology literature, it is still a subjective evaluation process. Future studies may adopt techniques from the neurosciences to provide a more objective measure on mood. Furthermore, participants within the positive mood group consist of those who received an induction payment and those who scored high without induction payment. We did not test whether there is any difference within the positive mood group. Finally, whilst this experiment was undefined by time constraints to prevent time pressure from influencing judgments, the

consequence of permitting unlimited time may enable cognition to interfere with perception. However, such a compromise would have been difficult to balance in order to realistically reflect the nature of an investing task. Nevertheless, future research could examine the effects of time pressure on non-professional investor judgments.

Appendix 3.1: Online questionnaire

What is your gender?

- ☐ Male
- ☐ Female

Which degree program are you currently studying?

- ☐ Bachelor (Undergraduate)
- ☐ Postgraduate (Coursework)
- ☐ Postgraduate (Research)

What is your major?

- ☐ Accounting
- ☐ Finance
- ☐ Marketing
- ☐ Management
- ☐ Economics

What is your current mood?

- ☐ Very negative/sad
- ☐
- ☐
- ☐
- ☐
- ☐
- ☐
- ☐
- ☐
- ☐ Very positive/excited

Instructions

You will be shown a chairman's report from the annual report of OZ Vintage, an Australian vintage wine maker. This company currently produces two main brands of wine, namely Vintage X and Vintage Y. This report is a summary of the company's performance, operational strategies, financial indicators and market outlook. After reading the chairman's report, you will be requested to make performance evaluations of this company. Notice: You CANNOT go back to a previous page once you clicked "Next"

[Experiment stimulus Shown on the screen]

How would you evaluate the future performance of this firm?

- ☐ Very negative
- ☐
- ☐
- ☐
- ☐
- ☐
- ☐
- ☐
- ☐
- ☐ Very positive

Would you recommend this firm to your friends?

- ☐ Very unlikely
- ☐ Unlikely
- ☐ Somewhat unlikely
- ☐ Undecided
- ☐ Somewhat likely
- ☐ Likely
- ☐ Very likely

Appendix 3.2: Stimulus with favourable cues highlighted

Dear shareholder

I am pleased to report that OZ Vintage both **grew net profit** and **reduced debt** in the year ending 30 June 2014. This represents **a good result** in context of the continuing industry challenges and economic headwinds, which are outside our control. With the market now at a lower level and a positive upturn not yet evident, it became necessary for us to make a number of operational changes to improve our profitability as a manufacturer of differentiated consumable and products.

A good result

In the year ending 30 June 2014, the Company's net profit after tax **rose to \$10.5 million**, representing an **11% increase** over the 2013 result. This may attribute to our effective cost management. Total revenue (excluding sale of asset) was down by 7% to \$214.8 million due to the lower production of grapes compared to last year.

The business continues to reduce its cost base and focus on the most profitable assets, and at the same time improve the reputation and value of its brands and wines. We have announced the closure of a number of our Australian operations to date including the Maralinga, Madura, and Augusta facilities. In July this year the company announced the sale of the underutilized Yaldara winery for \$15.5 million. This represents another important step in driving the company's strategy to be the lowest cost premium wine maker in current competitive market.

Our brands have continued to **grow** in both the **domestic** and **overseas markets**. This growth is on the back of a number of international awards recognising the ability of the company to consistently deliver outstanding quality wines. Sales of the Vintage X brand **grew** in the domestic market by **10%**, following on from 8% growth in the previous financial year.

The sales of Vintage Y was down 9% in domestic market from last year to 124,000 tonnes, which has resulted in a reduction in our 2014 processing margin and a reduction in the income we generate from our owned vineyards. The low production of grape has also resulted in our cost per-litre being higher, which will create some short-term challenges.

Sales and Distribution

In August the Company announced that it had signed a long-term strategic China wide distribution agreement with CFCO Wine and Spirits. This exciting development provides the Company a distribution footprint in China and also gives the Company a significant platform from which to **build its brand equity in this important and emerging market**. CFCO has one of the best distribution footprints in China, and the creation of its imported wine division will enable our full portfolio of Vintage X and Y wines to reach consumers across the entire Chinese market.

During the year we have increased our presence in the UK/Europe segment by expanding our customer base to include all major super markets and major banner groups in the independent channel. The benefits of this expanded base are expected to improve the performance of this segment in 2015/2016.

Our emphasis of **growing branded business** and **growing export** has resulted in **increased sales and contribution** in the Australian, Asian, New Zealand and North American markets

The Company's commitment to its mission – to create **great quality wines and brands that our consumers know and love** was again demonstrated during the year with the Company continuing to win major international wine industry awards. These awards are on the back of being named International Winemaker of the Year three times at the International Wine and Spirits Competition.

Financial Position

In October 2013 the company **successfully completed a capital raising** for \$40m (net) with good institutional and retail support. As a result, our gearing (net **debt to equity**) has **decreased** from 59% as at 30 June 2013 to a **comfortable 39%** as at 30 June 2014.

In August 2014 we concluded negotiations with our banker resulting in a new 3 year borrowing facility. This confirms the banks continuing confidence in our business. The Directors announced a fully franked **dividend of 2.2 cents** per share payable on 19 November 2014. Although share price and earning per shares decrease by 13% and 9% respectively, this is the fourth year in which a dividend has been paid and demonstrates that the Board continues to have faith in the Company's ability to continue to perform well under current tough market conditions.

Outlook

The wine industry continues to face challenges with markets and margins under pressure. The Company continues to respond to these challenges with **on-going cost control**, creating **new distribution partners** and **increasing branded sales**. We remain focused on improving our business in an environment that remains challenging. I have confidence that our branded business will **continue to grow** particularly in the Asia region as a result of our new distribution partnership with COFCO. Based on normal vintage conditions, expected sales (based on historical patterns) and forecasts for the AUD exchange rate, we **expect our 2015 profit to be above the 2014 result**.

On behalf of the Board and shareholders I would like to thank all of our shareholders for your ongoing support.

Chapter 4: Paper 3

The Effects of Recall Order and Textual Salience on Memory Reconstruction and Investors' Judgements

4.1 Abstract

This paper examines the effects of recall order and textual salience on non-professional investors' memory of previously encoded accounting narratives and subsequent memory-based judgements. Specifically, it adopts an experimental approach to examine the role of memory on non-professional investors' memory-based performance evaluations towards a company after reading its chairman's letter. The results show that embedding textual salience in a chairman's letter or altering investors' memory recall order will influence their memory of some key financial indicators of the company, and this will further influence investors' memory-based performance evaluations. One important implication from the findings is that impression management can be achieved in the process of memory retrieval by manipulating investors' memory.

4.2 Introduction

The human memory is an integral part of many judgments and decisions in accounting and finance. For example, tasks such as auditors recalling previously reviewed evidence (Moeckel 1990, Johnson 1994), auditors making judgements based on their knowledge and experience (Choo and Trotman 1991, Libby and Trotman 1993, Grossman and Welker 2011) or investors recalling financial data (Kida and Smith 1995, Kida et al. 1998, Peng and Xiong 2006, Pennington and Tuttle 2009) may all be influenced by memory processes.

However, the human memory does not provide a literal recounting of all past experiences (Schacter 1999). Biases and errors may occur during memory retrieval because an individual's information processing capacity is limited by both cognitive and external constraints (see Ding et al. 2017 for a summary). Memory reconstruction is a cognitive phenomenon that may explain why biases and errors occur during memory retrieval (Kida et al. 1998, Sprinkle and Tubbs 1998, Cocks et al. 2001, Grossman and Welker 2011). Reconstructive memory is a theory originally proposed by Bartlett (1932). It suggests that in the absence of all information available during memory retrieval, individuals tend to fill the gaps in the retrieved memory based on their perception, world knowledge, social influences, culture or the limited information available to them in a subjective manner. Based on this, Moser (1989) suggested that memory reconstruction may affect investors' reasoning and subsequent judgement-making.

Companies may exploit memory reconstruction for impression management purposes. Impression management is concerned with shaping the perceptions of others by constructing favourable depictions of one's self (Leary and Kowalski 1990, Hooghiemstra 2000). In an accounting context, it is defined as the strategic manipulation of corporate narratives to influence the perceptions and subsequent decisions of users by a view intended by management (Merkel-Davies and Brennan 2007). Previous studies identified several techniques that may be utilised by management to emphasise positive outcomes and obfuscate negative outcomes such as rhetorical manipulations (e.g., Aerts 1994), reading ease and readability manipulations (e.g., Jones and Shoemaker 1994), and structural manipulations involving order effects (e.g., Hellmann et al. 2017).

Additionally, there is an impressive body of literature on presentational and visual manipulations. For example, research suggests that stimuli, such as photographs (Preston et al. 1996) and graphs (Beattie and Jones 2002a, 2002b, 2008, Amer 2005), strategically included

in narratives may distort readers' perceptions. The reason for this may be that photographs and graphs attract visual salience as readers' capacity to recall visual information is usually superior to their ability to recall statistical or plain textual information (Arunachalam et al. 2002, Beattie and Jones 2008). While prior research largely focussed on visual salience for impression management purposes, textual salience has received relatively less attention in accounting research (e.g., Guillamon-Saorin et al. 2012). Textual salience refers to the properties (i.e., the location, colour, font or typeface) of textual information that are relevant for influencing readers' attention, perceptions and subsequent memories of the information (Van Dijk 2006 Brennan et al. 2009, Guillamon-Saorin et al. 2012).

More importantly, the effects of visual manipulation on memory reconstruction and subsequent memory-based judgements are not entirely understood in the impression management literature because prior studies largely failed to distinguish between instant judgments and memory-based judgments. For example, the effect of visual and structural manipulations on judgments may be explained as manipulative cues attracting readers' visual attention in information processing (Merkl-Davies and Brennan 2007, Brennan and Merkl-Davies 2013). However, judgments may also be driven by biased memories of previous impressions of a firm. In light of this, the aim of this study is to examine the effect of memory reconstruction on investors' judgements. Specifically, information recall order and textual salience are examined as two variables that may influence individuals' memory reconstruction and subsequent memory-based judgments. By providing insights into how reconstructed memory may drive non-professional investors' judgements and how the memory reconstruction process is influenced by textual salience, we extend the scope of existing impression management studies largely focussing on visual salience and instant judgments.

The next section outlines the literature on memory reconstruction, salience and recall order. The potential effect of these factors in accounting practice is discussed and hypotheses are formulated. The following section describes the research methods. The fourth section outlines the results and provides a discussion, while the last section concludes this paper.

4.3 Literature Review and Hypotheses Development

4.3.1 Memory Reconstruction and Performance Evaluations

The human memory is not a literal recounting of past experiences. Biases and errors may occur unconsciously and lead to the degradation of an individual's information processing capacity (Schacter 1999). The human memory includes three brain functions; namely, information encoding (processing information in working memory), memory storage (retaining the processed information in long-term memory) and memory retrieval (retrieving information from long-term memory when needed) (Atkinson and Shiffrin 1968). As such, individual's judgements can be distinguished into memory-based judgements and instant judgements based on whether memory retrieval is involved or not (Hastie and Park 1986). This distinction is important to accounting studies, as many accounting judgements require the involvement of memory (e.g., knowledge, experience and memory of previous financial data), while the process of retrieving information from memory is subject to various biases and errors (Ding et al. 2017).

Memory reconstruction theory may explain the key reasons for the occurrence of memory biases in memory-based judgements (Schacter 1999). By employing reconstructive processes, individuals recollect information and supplement the gaps in their memory with other aspects of their available knowledge to provide a fuller and more coherent image, albeit one that is often biased and distorted (Schacter et al. 1998). For example, confirmation biases may lead to an enhanced memory that is consistent with decision-makers' beliefs, and thus result in overconfidence in judgement-making when they face contradictory evidence (Plous 1993). The availability heuristic is another example of how a reconstructed memory influences memory-based judgements. Proposed by Tversky and Kahneman (1973), this bias suggests that decision-makers tend to evaluate an object or task based on the ease of recalling relevant instances. This is especially relevant to evaluative judgements of probability and frequency, as people's beliefs often lean towards those for which they can recollect more supporting evidence from memory (Hoch 1984). Moreover, individuals often count the number of retrieved items favouring particular hypotheses rather than organising them into a comprehensive problem presentation (Wolfe and Pennington 2000), which increases the chance of biased reasoning and distorted judgements.

The availability heuristic may also explain why individual's judgements of the same task may change from time to time. Studies suggest people often change their judgements not because their earlier judgements are inappropriate, but because subsequent judgements are formed anew when needed (Lien and Stayman 1998). New judgements may be revised based on a

comparison of the newly encoded information and previous information that is recalled from memory (Albarracín et al. 2012). This indicates that information has a higher chance of being used in memory-based judgments if it can be easily retrieved from memory (Lien and Stayman 1998); therefore, factors that influence individuals' ease of memory recall may drive changes in subsequent judgements.

In an accounting context, Kida et al. (1998) examined financial managers' memory reconstruction accuracy and found that information representational formats have a significant effect on accounting information users' memories. Kida et al. (1998) required financial managers to recall a memory after reading an overview of a company that included 12 financial ratios. In their experiment, six ratios represented the target firm's data, while six ratios represented industry data. In addition, of these 12 ratios, six indicated a positive performance and six indicated a negative performance. The participating managers could make their performance evaluation of the target firm based on their interpretation of these 12 ratios. After one hour, all managers were required to recall the ratios they had read before. The findings suggest that the managers memorised numerical ratios that could trigger affective responses the best (i.e., positive and negative performance-related ratios), followed by numerical ratios in comparison forms and then numerical ratios without comparisons. Ultimately, this experiment shows that managers' final decisions are strongly influenced by their strongest trace of memory.

Hence, we are expecting that non-professional investors' memory-based judgements are influenced by their reconstructed memory and the number of cues they are recalling. Hence, hypothesis 1 is stated as follows:

H1: Non-professional investors' memory-based performance evaluations are more likely to be higher (lower) if they recall more positive (negative) cues included in a chairman's report.

4.3.2 Factors That May Influence Memory Reconstruction

Based on previous psychology studies, cognitive factors, such as the interference effect and the salience effect, have been identified as influential factors in memory retrieval (Kahneman and Tversky 1982, Libby 1985, MacLeod 2002, Fine and Minnery 2009). Therefore, two specific factors derived from the interference effect and salience effect (namely recall order and textual salience) are discussed in the following sections.

4.3.2.1 Interference in memory reconstruction

Interference theory states that people fail to recall previously encoded information not because the memory is lost, but because new information interferes with retrieval of old information (Anderson 2003). Interference is evident, for example, when people have difficulty recalling their home phone numbers from past residences. Hoch (1984) describes interference as occurring when individuals generate reasons for judgements and decision-making. As they formulate their decision, they cannot help considering the reasons that they have already generated; therefore, whatever is thought about first interferes with and inhibits subsequent thoughts about an issue (Moser 1989). Put differently, the order of memory retrieval may lead to significant differences in the retrieved memories and thereby further influence memory-based judgements.

This bias, known as memory recall order bias, has been examined by Moser (1989) who tested the effect of interference on investors' predictive judgements. The study adopted an experimental method, which required 85 investors to recall the reasons supporting their earnings performance evaluations towards a company under two conditions, recalling positive cues first, followed by negative cues versus recalling negative cues first, then positive cues. The findings suggest that investors list significantly more positive reasons when they were requested to recall them in the positive to negative (PTN) order; investors listed more negative reasons when they were requested to recall them in the negative to positive (NTP) order. Importantly, given different recalling orders, non-professional investors make judgements based on the information available in memory, and this may produce significant differences in their predictive judgements.

Based on the previous literature, we expect a similar direction will be found, and thus hypothesis 2 is formulated as follows:

H2: Non-professional investors are more likely to recall a greater number of positive (negative) cues if they recall positive (negative) cues first as compared to non-professional investors who recall negative (positive) cues first.

4.3.2.2 Salience effects on memory reconstruction

The salience effect refers to the perception phenomenon in which some stimuli or cues are perceived and encoded more easily than others. An item's salience describes the state or quality

through which it is made distinct from other items in the environment. Saliency is considered to be a key cognitive mechanism that facilitates people's learning and information processing by focusing a person's limited attention on the most pertinent available resources. This effect is robust and widely applicable in multidisciplinary studies (Alba and Chattopadhyay 1986, Braun 1994, Fiske 2013).

Previous studies have provided evidence suggesting that information disclosed with different degrees of saliency may affect accounting information users' attention allocation (Arunachalam et al. 2002, Brennan and Merkl-Davies 2013). Visual saliency is the most widely studied area in attention and perception studies. Pictures, graphs and/or figures have shown a superior effect in attracting readers' attention than plain text (Merkl-Davies and Brennan 2007, 2011). For example, studies have found different formats of financial reporting, including design elements such as colours (So and Smith 2002, Courtis 2004) and graphs (Beattie and Jones 1997, Arunachalam et al. 2002, Amer 2005) may attract more attention, thereby influencing investors' rationality in their information processing (Hand 1990, Miller 2002).

Information presented in salient levels attracts more attention, and thus may be expected to be more influential in memory-based judgements after a long period of time. This is because, according to the levels of processing theory formulated by Craik and Lockhart (1972), deeper levels of processing lead to longer-lasting and strong memory traces than shallow levels of processing. Those salient stimuli that receive more attention should be recalled more easily and in greater detail. Therefore, if a company's management attempts to provide more salient information to emphasise the positive aspects of the company, this information should be recalled more easily when needed in the future compared to information without saliency.

Previous impression management studies in accounting have not considered how salient information cues influence memory reconstruction and subsequent memory-based judgements. Only one study, that of Pennington and Tuttle (2009), considers the memory effect in investors' impression manipulations. Specifically, this study suggests that when investors must rely on their memory of previously encoded information, they are more susceptible to biases that are embedded in misleading graphs. Importantly, it emphasises that biased impressions of the target firm can be persistent and are enhanced through readers' memory reconstruction processes. Although this study did not provide consistently significant results, the findings are important for future impression management studies since they highlight the effect of memory in distorting accounting judgements.

In order to further examine how memories are recalled under an impression management environment, this study focuses on one type of textual salience: highlighted text (i.e., bolded text) in accounting narratives. Compared with pictures or graphs, highlighting text by changing its orthographic features (i.e., shape, typeface, capitalisation) has been found to influence recall at lower levels (Craig and Lockhart 1972), but this does not impair its importance in accounting impression management studies. This is because recent studies have found that the length of accounting narratives has increased significantly (Andersen 2001) and management often embed manipulations by changing the orthographic feature of disclosed information (e.g., Guillamon-Saorin et al. 2012). As impression management aims to create an enhanced positive impression by readers, only some positive information is highlighted in a chairman's letter. Accordingly, hypothesis 3 is as follows:

H3: Non-professional investors are more likely to recall a greater number of positive cues from a chairman's report if those positive cues are highlighted in bold text compared to when they are not highlighted in bold.

4.4 Research Design

In order to test the hypotheses, a 2x2 between-subjects experimental design is used to capture the main effects of the two independent variables of interference and textual salience on the dependent variable of non-professional investor judgments. The experiment was conducted in a laboratory to ensure a consistent, controlled environment, reducing the effects of possible extraneous variables. It was untimed to alleviate time pressure on participants as this could potentially influence and/or alter the participants' natural cognitive processing behaviour or their inability to consider relevant cues (Busemeyer and Johnson 2004, p. 148).

Eighty-nine students were recruited from various accounting and finance courses in an Australian university to participate in the study. All participants were in at least the third year of their business course, to ensure that they had an adequate background in accounting and finance. Students are used to represent non-professional investors as prior literature has identified them as proxies who possess relevant business knowledge and/or experience (Thaler et al. 1997, Tuttle et al. 1997, Hellmann et al. 2017). As an incentive for participating, a monetary compensation of AUD10 was paid to each participant.

The experiment required the participants to read the chairman's report of a fictitious company (see Appendix 4.2), which was based on a publicly-listed Australian company. The purpose of using a fictitious company was to mitigate the possibility of evoking representative heuristic or familiarity biases in participants. This is an improvement of the methodologies used in previous literature, which did not control for familiarity bias (e.g., Moser 1989). The stimulus contained mixed information with both positive and negative components. Positive cues contained in the stimulus related to three main areas, namely the financial profitability for the year, enhanced brand equity domestically and internationally, and reduced gearing. Negative cues in the stimulus also related to three main areas, namely difficult market conditions, reduced total revenue, and a decline in share price. The number of cues used in the stimulus was limited and the length of the excerpt was confined to one page to deter information complexity as an extraneous variable. In order to avoid any order effects, the positive and negative cues were presented in a mixed sequence, with most paragraphs including both positive and negative components.

To examine memory reconstruction (Hypothesis 1), the full sample was used. To further examine interference (Hypothesis 2), half of the participants were randomly selected and requested to recall cues in the PTN order (Figure 4.1, Group 1 and Group 2). The other half of the participants were requested to recall cues in the NTP order (Figure 4.1, Group 3 and Group 4). To further examine salience effects (Hypothesis 3), half of the participants were randomly assigned to read a version of the stimulus with the company's favourable performance cues highlighted in bold font (Figure 4.1, Group 1 and Group 3). The purpose of highlighting specific information in bold was to create positive impressions in the participants (Djamasbi et al. 2011). Based on the findings of previous research, information cues about a company's profitability, return on equity, dividend payouts, turnover, earnings per share and debt ratio were highlighted as performance evaluation cues (Clatworthy and Jones 2001, Kohut and Segars 1992, Courtis 2004). The other half of the participants were randomly assigned to read the chairman's letter that had no highlighting (Figure 4.1, Group 2 and Group 4).

Figure 4.1: Participants allocation into four groups

	Stimulus with cues in bold	Stimulus without cues in bold
Positive to negative recall order	Group 1 n = 21	Group 2 n = 21
Negative to positive recall order	Group 3 n = 20	Group 4 n = 20

The experiment comprised of six sections¹³. The first section involved an on-line questionnaire which collected information on the participants' gender and their educational background, such as degrees and majors. These items provide additional information on individual factors that may have influenced judgements, as identified in previous studies (e.g., Dwyer et al. 2002, Agnew and Szykman 2005). As all participants were university students of similar age, the factor of age is excluded. In the second section, the stimulus material (i.e., the modified chairman's report) was shown on the screen of a laboratory computer.

The third section required participants to rate their judgement of how well they thought the company would perform immediately after reading the stimulus. This is an instant judgment as participants had no prior knowledge about the stimulus material. A 10-point Likert scale was used to measure the performance rating (a rating of 1 implied very poor performance; a rating of 10 implied very good performance). The even-point scale was chosen to provoke judgment, as opposed to having a midpoint in the scale where they were neutral and/or unsure in what the stimulus conveyed (Hellmann et al. 2017).

After the performance evaluation task, a distraction task was introduced in section four to disrupt participants' short-term working memory. This is because information that one has just read may be retained in working memory for several seconds, and without clearing it, the persuasiveness of long-term memory reconstruction on memory-based judgements may be degraded (Festini and Reuter-Lorenz 2013). The distraction task was comprised of several

¹³ Prior to the administration of the experiment, a pilot test of the experimental stimulus and questionnaire was conducted to ensure that they were understandable, logically articulated and appropriate in layout. The pilot study was trialled on 7 research students and academics. Amendments made to the questionnaire after the pilot test included swapping the order of certain questions to improve their logical flow and re-phrasing instructions and questions.

group embedded figure tests (GEFTs), which required around five minutes to complete. For each question, participants were asked to find where a simple target figure was included in four complicated figures (see Appendix 4.3). This method is established and has been used in the previous literature (e.g., Damarla et al. 2010).

In section five, participants were asked to recall the cues that helped them make evaluation judgements. Half of the participants were instructed to recall positive cues first, followed by negative cues (Figure 4.1, Groups 1 and 2); the other half were instructed to recall negative cues first, followed by positive cues (Figure 4.1, Groups 3 and 4). Participants were also informed that the more correct cues they recalled, the greater the monetary compensation they received would be (i.e. one dollar for each correct cue recalled). This was to ensure that participants concentrated and were motivated to recall the cues. All participants were requested to write down their retrieved cues as one cue per line, and during the process of recalling, participants were not able review previous information. The retrieved cues could be either several key words or a short sentence. This recall task was designed to examine the recall order effect on participants' memory retrieval capacity. In the last section of the experiment, participants were asked to rate the performance of the target firm again. All judgements were measured exactly as in section three.

4.5 Results and Discussions

Different statistical methods were adopted to analyse the data. First, in order to examine the effect of memory retrieval on non-professional investors' judgements (Hypothesis 1), a regression method was used to examine the paired data at an individual level to assess why and how an individual's subsequent memory-based judgements were different from their original judgements (i.e., instant judgements in this study). Secondly, between-groups t-tests were used to examine the effect of two variables, interference (Hypothesis 2) and textual salience (Hypothesis 3), on investors' memory reconstruction. Data analysis was performed using Stata12. Seven participants were excluded from the final data analysis, either because they recalled nothing or did not complete the experiment. Descriptive statistics of the remaining 82 participants are reported in Table 4.1.

Table 4.1: Sample characteristics

	Full sample	Stimulus without cues in bold	Stimulus with cues in bold	PTN	NTP
Gender					
Male	40	17	23	23	17
Female	42	24	18	19	23
Education					
Undergraduate	70	36	34	37	33
Postgraduate	5	1	4	2	3
PhD	7	4	3	3	4
Major					
Accounting	34	15	19	19	15
Finance	45	25	20	22	23
Other	3	1	2	1	2
	n = 82	n = 41	n = 41	n = 42	n = 40

Notes: ‘Other’ includes business units such as marketing, management or economics. PTN refers to positive-to-negative recall order; NTP refers to negative-to-positive recall order. Participants who received the stimulus without cues in bold represent Group 2 and Group 4. Participants who received the stimulus with cues in bold represent Group 1 and Group 3. Participants who were asked to recall in the PTN order represent Group 1 and Group 2. Participants who were asked to recall in the NTP order represent Group 3 and Group 4.

As shown in Table 4.1, most participants were undergraduate students majoring in accounting and finance (more than 90% of the total sample). The gender balance was approximately equally distributed between males and females. As per the experimental procedure, the whole sample was split into four groups, and the overall characteristics of each group were similar to those of the full sample.

4.5.1 Hypothesis Testing

4.5.1.1 The effect of reconstructed memory on non-professional investors’ judgements

Ding et al. (2017) suggest that instant judgements and memory-based judgements should be distinguished as biases and errors may be involved in the process of memory retrieval, thereby resulting in additional distortions in memory-based judgements. Hypothesis 1 is formulated to answer how and why reconstructed memory may influence memory-based judgements. Specifically, it suggests that non-professional investors’ memory-based performance evaluations are more likely to be higher (lower) if non-professional investors recall more positive (negative) cues included in a chairman’s report. It proposes a direction between reconstructed memories of positive and negative cues and on memory-based judgements.

To test this relationship, a regression method was adopted. The dependent variable was the investor's subsequent memory-based judgement and the independent variables were the numbers of positive and negative cues that the participant remembered from the chairman's letter. Other control variables, such as gender, education levels and majors, were also regressed as dummy variables with the independent variables. The dependent variable was pretested to ensure it followed a normal distribution, and the independent variables had low correlations. The results are shown in Table 4.2, Column 1.

Table 4.2: The results of regression on investors' memory-based performance evaluation of the target firm

Variables	Memory-based judgements (1)	Memory-based judgements (2)
NPos	0.507*** (0.138)	0.249*** (0.073)
NNeg	-0.304*** (0.146)	-0.248*** (0.078)
IJ		0.761*** (0.068)
Gender (dummy)		
Female	0.061 (0.323)	0.101 (0.194)
Education (dummy)		
Masters	-0.077 (0.644)	-0.111 (0.387)
PhD	1.060 (0.642)	0.642 (0.389)
Major (dummy)		
Finance	-0.128 (0.345)	0.202 (0.210)
Management	-0.285 (1.499)	-0.220 (0.901)
Economics	0.545 (1.420)	0.018 (0.854)
Marketing	0.290 (0.461)	0.133 (0.277)
Cons	4.948	0.896
Observations	82	82
R-squared	0.319	0.758
Adj. R-squared	0.223	0.720

Notes: The dependent variable for this regression is 'investors' memory-based performance evaluation judgements towards the target firm'. *** indicates a significance level of 1%.

NPos = Number of positive cues recalled; NNeg = Number of negative cues recalled; IJ = Instant judgements

In addition, based on literature suggesting that individuals' memory-based judgements may be revised after comparison with newly-encoded information and previous information recalled from memory (Albarracin et al. 2012), the original judgements (i.e., instant judgements) were

also regressed together with the two main independent variables. This was done to illustrate which variable had the most important impact on memory-based judgements. At the same time, this additional regression of the paired data (i.e., each participant made two judgements sequentially) can also be treated as a check of investors' rationality in information reasoning in memory-based judgements, as rational investors should not make completely different judgements after a short time delay. The results are shown in Table 4.2, Column 2.

As shown in Table 4.2, Column 1, the number of recalled positive and negative cues are highly significant, indicating that they are influential in memory-based judgements. The number of positive cues recalled was positively related to memory-based judgements with a coefficient equal to 0.507, and the number of negative cues recalled was negatively related to memory-based judgements, with a coefficient equal to -0.304. Both are significant at the 1% level. Other control variables were regressed as dummy variables and none of the control variables exhibited a significant effect on judgements. The results provide primary support for Hypothesis 1.

Column 2 shows that adding instant judgements into the regression does not eliminate the significance of the previous two independent variables on memory-based judgements. The number of positive cues recalled was positively related to memory-based judgements, and the number of negative cues recalled was negatively related to memory-based judgements. Both are significant at the 1% level. Importantly, the original instant judgement was the most significant variable (i.e., $t\text{-value} = 11.7$ from $0.761/0.068$) with the highest coefficient (0.763), indicating a positive relationship with memory. In other words, a one-unit increase in instant judgements will lead to a 0.763 unit increase in memory-based judgements. This means investors who make high instant judgements will generally also give relatively high memory-based judgements.

To summarise, the results from Column 2 show that investors' memory-based judgements are strongly determined by their previous judgements (i.e., instant judgements in this study). The memories of positive and negative cues work as supplementary factors to adjust participants' original instant judgements to subsequent memory-based judgements.

These findings confirm that the human memory plays a key role in influencing memory-based performance evaluation judgements as suggested by Ding et al. (2017). Specifically, the findings support the argument that memory-based judgements are not simple recollections of

a previous memory of the original judgement, but a process of combining and processing all available information anew. This suggests that investors' performance evaluation judgements can be revised unconsciously based on investors' available memory. Therefore, the following analysis examines the effect of two variables that may influence investors' memory.

4.5.1.2 The effect of recall order on investors' memory reconstruction

Hypothesis 2 states that non-professional investors are more likely to recall a greater number of positive (negative) cues if they recall positive (negative) cues first, compared to non-professional investors who recall negative (positive) cues first. A between groups t-test was used to compare the average number of cues that investors recalled under different recalling orders. To eliminate the confounding effect of salience on memory, the t-test was only applied to those participants who read the stimulus without bolded cues (Groups 2 and 4). Investors' memory performance for positive and negative cues from the stimulus are reported in Table 4.3.

Table 4.3: The effect of recall order on investors' memory reconstruction

Panel A: The number of positive cues an investor recalled					
	No. obs.	Mean	Standard deviation	t-value	p-value
NTP (Group 3)	20	3.75	1.069	-0.43	0.335
PTN (Group 1)	21	3.9	1.221		
Panel B: The number of negative cues an investor recalled					
	No. obs.	Mean	Standard deviation	t-value	p-value
NTP (Group 3)	20	3.65	1.039	1.76	0.043**
PTN (Group 1)	21	3	1.304		

Notes: PTN refers to positive-to-negative recall order; NTP refers to negative-to-positive recall order. NTP includes participants who were requested to recall negative cues first. PTN includes participants who were requested to recall positive cues first. ** indicates a significance level of 5%.

The average number of positive cues recalled by the participants are shown in Panel A of Table 4.3. For the group of investors with the NTP recall order, an average of 3.75 positive cues were recalled; for the group of investors with a PTN recall order, an average of 3.9 positive cues were recalled. This suggests that the recall order does not have a significant effect on the number of positive cues recalled, as the t-value was equal to -0.43 ($p = 0.335$). In contrast, Panel B, which shows results of the effect of recall order on the number of negative cues recalled, revealed a significant difference in the mean number of cues recalled. The participants with a NTP recall order remembered an average of 3.65 negative cues, while the participants

with a PTN recall order remembered 3.00 negative cues on average. This difference was significant at the 5% level, with a t-value equal to 1.76.

This suggests that recall order has a greater effect if cues are negative. A reason for this may be the tendency of an individual towards loss aversion. This phenomenon describes an asymmetric evaluation of positive and negative outcomes where losses and negative outcomes have greater impact on a reference point than gains and positive outcomes (Tversky and Kahneman 1991).

4.5.1.3 The effect of textual salience on investors' memory reconstruction

Hypothesis 3 states that non-professional investors are more likely to recall a greater number of positive cues from a chairman's report if those positive cues are highlighted in bold than when they are not. Specifically, it proposes a relationship between textual salience and the memory cues that participants may recall.

To examine the effect of embedded textual salience (i.e., cues in bold) on the number of cues that investors recalled, a between group t-test was adopted. Additionally, the overall sample was further split based on investors' recall order, which provides a more robust result for the t-test. As highlighting positive performance cues is a common mechanism of impression manipulation in financial reporting, only the number of positive cues was examined in this t-test. The results are reported in Table 4.4.

Table 4.4: The effect of textual salience on investors' memory reconstruction

Panel A: Positive-to-negative recall order					
The number of positive cues that an investor recalled	No. obs.	Mean	Standard deviation	t-value	p-value
Without bolded cues (Group 2)	21	3.9	1.221	-4.663	0.000***
With bolded cues (Group 1)	21	5.62	1.161		
Panel B: Negative-to-positive recall order					
The number of positive cues that an investor recalled	No. Obs.	Mean	Standard deviation	t-value	p-value
Without bolded cues (Group 4)	20	3.75	1.069	-1.445	0.078*
With bolded cues (Group 3)	20	4.25	1.118		

Notes: *** indicates a significance level of 1% and * indicates a significance level of 10%.

For the group of investors who recalled positive cues first, reading a chairman's letter with bolded favourable cues triggers a much stronger memory of positive cues (mean = 5.62) compared to reading a plain text chairman's letter (mean = 3.9). This increase in memory of

positive cues is significant at the 1% level, with a t-value equal to -4.663. A similar result was found for the group of investors who recalled negative cues first, with the average number of positive cues recalled increasing from 3.75 to 4.25 for the participants who read the reports without and with bold cues, respectively. This difference is also significant, although with a p-value of approximately 7.8%.

Overall, the bolded favourable cues in the chairman's letter showed a consistent effect in enhancing investors' memory of positive aspects of the target firm. It complements previous impression management studies in accounting by verifying that the salience effect is not only influential in readers' perceptions, but also in readers' memory retention.

4.5.1.4 The joint effect of textual salience and recall order on memory-based judgements

Hypotheses 2 and 3 examined the effects of two independent variables on investors' memory reconstruction. An additional analysis was adopted to investigate the joint effect of interference and textual salience on memory reconstruction. For this purpose, a one-way ANOVA followed by post-hoc test was utilised. Table 4.4 presents descriptive statistics of the four groups under different experimental conditions. The Levene Statistic and ANOVA results are reported in Table 4.5.

Table 4.5: Homogeneity of Variances and ANOVA results

Panel A: Test of Homogeneity	Levene Statistic	df1	df2	Sig.	
	0.069	3	78	0.976	
Panel B: ANOVA	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	45.25	3	15.083	11.505	0.000
Within Groups	102.262	78	1.311		

As shown in Table 4.5, the Levine Statistic (0.069, $p = 0.976$) is not significant, indicating no violation of the homogeneity assumption. The ANOVA result ($F = 11.505$, $p = 0.000$) is significant, suggesting that there are at least two groups exhibiting significant mean-value differences.

Figure 4.2 provides a summary of the mean values outlined in Table 4.4. The average number of positive cues recalled for Group 1 (5.62) is significantly higher than the other three groups (Group 2 = 3.9; Group 3 = 4.25; Group 4 = 3.75). Figure 4.2 suggests that the two conditions (PTN and bolded cues highlighted) have the same directional effect on elevating the average number of positive cues recalled.

Figure 4.2: The joint effect of textual salience and memory recall order on investors' memory reconstruction

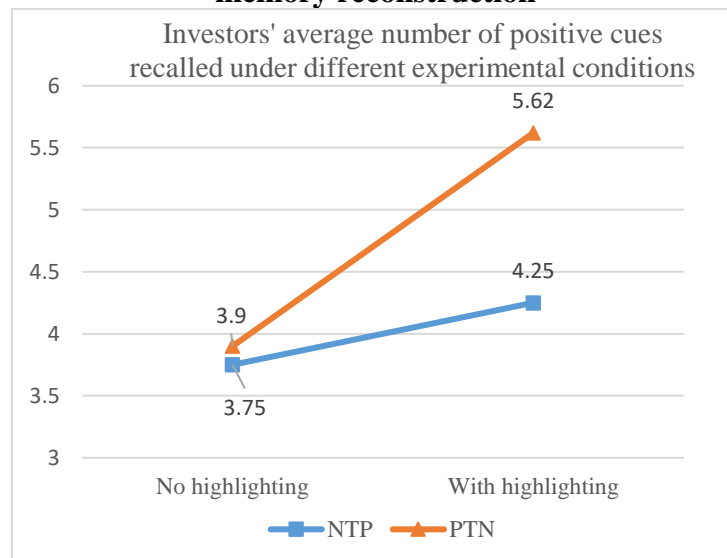


Table 4.6 shows the results of the post-hoc test. We used Tukey's HSD method to provide multiple comparisons among groups. The results suggest that there is a statistically significant difference in the number of positive cues recalled between Group 1 (PTN recall order and cues highlighted in bold) and the other three groups (Group 2, $p = 0.000$; Group 3, $p = 0.001$; Group 4, $p = 0.000$).

Table 4.6: Multiple comparisons of number of positive cues recalled by using Tukey HSD

(I) Groups	(J) Groups	Mean Difference (I-J)	Std. Error	Sig.
PTN with bolded cues (Group 1)	PTN without bolded cues (Group 2)	1.714*	0.353	0.000
	NTP with bolded cues (Group 3)	1.369*	0.358	0.001
	NTP without bolded cues (Group 4)	1.869*	0.358	0.000
PTN without bolded cues (Group 2)	PTN with bolded cues (Group 1)	-1.714*	0.353	0.000
	NTP with bolded cues (Group 3)	-0.345	0.358	0.770
	NTP without bolded cues (Group 4)	0.155	0.358	0.973
NTP with bolded cues (Group 3)	PTN with bolded cues (Group 1)	-1.369*	0.358	0.001
	PTN without bolded cues (Group 2)	0.345	0.358	0.770
	NTP without bolded cues (Group 4)	0.500	0.362	0.515
NTP without bolded cues (Group 4)	PTN with bolded cues (Group 1)	-1.869*	0.358	0.000
	PTN without bolded cues (Group 2)	-0.155	0.358	0.973
	NTP with bolded cues (Group 3)	-0.500	0.362	0.515

Notes: * indicates a significance level of 5%.

The significant difference in the number of positive cues recalled may be attributed to a significant joint effect between salience and recall order. A possible explanation for such a joint effect is that the memory of highlighted positive cues is more likely to be enhanced when investors are requested to recall positive cues first as compared to recalling negative cues first.

4.5.2 Additional Analysis

The analyses above suggest that memory reconstruction biases can be utilised for impression management purposes. As our experiment collected paired data (i.e., each participant made two judgements sequentially) from each participant, we further examined whether reconstructed memory results in individual's judgements changing over time. A regression was adopted to determine the relationship between investors' memory and their judgement changes. Specifically, the dependent variable was the difference between each investor's two

judgements, which was measured as the value of the subsequent memory-based judgement minus the value of the original instant judgement. The independent variables were the numbers of positive and negative cues that participants remembered from the chairman's letter. Other control variables such as gender, education levels and majors were also regressed as dummy variables.

The dependent variable was pretested to show that it followed a normal distribution. A low correlation between independent variables ($\rho = 0.0747$) was found, suggesting there was no multicollinearity issue in this regression. Based on our previous findings, a linear regression model was adopted. The relationship is proposed as follows:

$$MB - IJ = \beta_0 + \beta_1 NPos + \beta_2 NNeg + \beta_3 Control + \varepsilon$$

where 'MB' and 'IJ' represent the value of investors' subsequent memory-based and original instant judgements, respectively. The number of positive and negative cues that an investor recalled is represented as 'NPos' and 'NNeg' in this model, while other control variables such as gender, education and majors are included as 'Control'. The main coefficients of interest are β_1 and β_2 . The regression results are shown in Table 4.7.

Table 4.7: The result of regression on the changes between investors' memory-based and on-line judgements of the target firm

Model	Coefficient	Std. Err.	t-value	p-value
NPos	0.205***	0.072	2.83	0.006
NNeg	-0.241***	0.086	-2.78	0.007
Gender (dummy)				
Female	0.167	0.229	0.73	0.469
Education (dummy)				
Master	-0.112	0.571	-0.2	0.845
PhD	0.425	0.351	1.21	0.229
Major (dummy)				
Finance	0.290	0.224	1.29	0.201
Management	-0.193	0.358	-0.54	0.593
Economics	-0.119	0.287	-0.42	0.678
Marketing	0.057	0.262	0.22	0.828
Controls	-0.496	0.454	-1.09	0.278

Notes: The dependent variable for this regression is 'the changes between memory-based judgements and on-line judgements'. *** indicates a significance level of 1%, ** indicates a significant level of 5% and * indicate a significance level of 10%. NPos = Number of positive cues recalled; NNeg = Number of negative cues recalled

As shown in Table 4.7, the coefficient of the number of negative cues recalled is 0.205. This means that the number of positive cues that an investor recalled is positively related to their changes of judgements, and the relationship is highly significant ($t = 2.83$ with $p\text{-value} < 0.01$). The coefficient of the number of negative cues recalled is -0.241, suggesting that the number of negative cues that an investor recalled is negatively related to their changes of judgements, and the relationship is highly significant ($t = -2.78$, $p\text{-value} < 0.01$). Other control variables were regressed as dummy variables because they are all categorical data, and none of the control variables exhibited a significant effect on judgements.

Overall, the results are consistent with the availability heuristic in memory reconstruction; that is, individuals tend to use the information held in their minds to reason and make judgements. The findings in Table 4.2, Column 2 indicate that memory-based judgements are strongly related to previous instant judgements. Together with the results from Table 4.7, the overall findings suggest that for the same task, participants' memory-based judgements are adjusted based on their previous judgements. Even when participants were told to rate the company based on their memory of their previous rating, they unconsciously relied on their retrieved memories in subsequent judgements. The significant effect of positive and negative memory cues found in this regression also confirm that the memory reconstruction process is not a comprehensive recollection of all details that an individual has read, but is more like a comparison of positive and negative cues he/she remembers.

4.6 Conclusions

This paper examined the effect of memory reconstruction on accounting judgements in two sequential stages. Specifically, Stage 1 attempted to answer the question whether reconstructed memory is a cause of distortions in memory-based judgements. The findings suggest that the more positive (negative) cues one can remember from a chairman's letter, the more likely it is that he/she will make a higher (lower) memory-based evaluation of the company's performance. Stage 2 examined the effect of two variables on investors' memory reconstruction, namely recall order and textual salience. The results suggest that embedding textual salience, such as highlighting cues in bold, will enhance investors' memories of particular information. In addition, the findings suggest that participants perceive the performance of a company more positively if they recall positive cues first.

Overall, our findings indicate that biases resulting from interference and salience may unconsciously occur and degrade participants' capacity to make judgements. The findings show that biases may not only affect instant judgments but also has the capability to influence memory and subsequent memory-based judgments. Therefore, an important suggestion from our results is that future impression management studies are not confined only to studies of information users' attention and perception, but also examine the influence of a specific impression management technique on memory reconstruction.

This study extends the scope of existing impression management studies by providing insights into how reconstructed memory may drive non-professional investors' judgements. Specifically, it distinguishes between instant judgments and memory-based judgements while previous impression management studies largely focussed on perception and attention and implicitly examined instant judgments. As such, the methodologies used in this study, such as making paired judgements after short delays and conducting cued recall tasks, complement the previous impression management literature and may benefit future experimental studies in judgements and decision-making.

However, investors' memory recall may depend on factors that were not examined in our experimental setting such as an individual's intelligence and concentration level. Future research may examine the influence of such variables on memory reconstruction. We also did not examine investors' memory recall accuracy on judgements. Future research could examine the relationship between memory recall accuracy and investors' confidence in their

judgements. Finally, we did not pre-test the importance of individual cues with respect to how important they are for the task.

Appendix 4.1: Online questionnaire

What is your gender?

- ☐ Male
- ☐ Female

Which degree program are you currently studying?

- ☐ Bachelor (Undergraduate)
- ☐ Postgraduate (Coursework)
- ☐ Postgraduate (Research)

What is your major?

- ☐ Accounting
- ☐ Finance
- ☐ Marketing
- ☐ Management
- ☐ Economics

Instructions for Phase 1

You will be shown a chairman's report from the annual report of OZ Vintage, an Australian vintage wine maker. This company currently produces two main brands of wine, namely Vintage X and Vintage Y. This report is a summary of the company's previous year performance, operational strategies, financial indicators and market outlook. After reading the chairman's report, you will be requested to make performance evaluations of this company. Notice: You CANNOT go back to a previous page once you clicked "Next"

[Experiment stimulus shown on the screen]

How would you evaluate the future performance of this firm?

- ☐ Very negative
- ☐
- ☐
- ☐
- ☐
- ☐
- ☐
- ☐
- ☐
- ☐ Very positive

How confident are you towards your evaluation of future performance? 0 means "Not confident at all", 50 means "Moderately confident" and 100 means "Completely confident"

_____ Confidence

Would you recommend this firm to your friends?

- ☐ Very unlikely
- ☐ Unlikely
- ☐ Somewhat unlikely
- ☐ Undecided
- ☐ Somewhat likely
- ☐ Likely
- ☐ Very likely

Instructions for a break

You have completed Phase 1. Could you please notify the investigator for further instructions?

[A set of GEFTs are introduced as distractions]

Instructions for Phase 2

Please complete the following questions based on what you REMEMBER from Phase 1 ONLY. You will be compensated based on your ability to recall the correct amount of information (Up to \$15).

Assuming this company has been highly ranked by other investors, based on the information you have read, please state all the positive reasons that you can remember to support their views (One reason each line).

Reason 1

Reason 2

Reason 3

Reason 4

Reason 5

Reason 6

Other reasons, please list and number them one by one

How confident are you in recalling the positive factors identified above? 0 means "Not confident at all", 50 means "Moderately confident" and 100 means "Completely confident"

_____ Confidence

Assuming this company has been poorly ranked by other investors. Based on the information you have read, please state all the negative reasons that you can remember to support their views (one reason each line).

Reason 1

Reason 2

Reason 3

Reason 4

Reason 5

Reason 6

Other reasons, please list and number them one by one

How confident are you in recalling the negative factors identified above? 0 means "Not confident at all", 50 means "Moderately confident" and 100 means "Completely confident"

_____ Confidence

How would you evaluate the future performance of this firm based on the memory of your previous rating?

- ☐ Very negative
- ☐
- ☐
- ☐
- ☐
- ☐
- ☐
- ☐
- ☐
- ☐ Very positive

How confident are you towards your evaluation of future performance? 0 means "Not confident at all", 50 means "Moderately confident" and 100 means "Completely confident"

_____ Confidence

Please make a probability judgment for the following statement: "OZ Vintage's earnings are likely to be at least 5% higher for next year" 0 means "Absolutely no chance", and 100 means "Absolutely certain"

_____ Probability

Appendix 4.2: Stimulus with favourable cues highlighted

Dear shareholder

I am pleased to report that OZ Vintage both **grew net profit** and **reduced debt** in the year ending 30 June 2014. This represents a **good result** in context of the continuing industry challenges and economic headwinds, which are outside our control. With the market now at a lower level and a positive upturn not yet evident, it became necessary for us to make a number of operational changes to improve our profitability as a manufacturer of differentiated consumable and products.

A good result

In the year ending 30 June 2014, the Company's net profit after tax **rose to \$10.5 million**, representing an **11% increase** over the 2013 result. This may attribute to our effective cost management. Total revenue (excluding sale of asset) was down by 7% to \$214.8 million due to the lower production of grapes compared to last year.

The business continues to reduce its cost base and focus on the most profitable assets, and at the same time improve the reputation and value of its brands and wines. We have announced the closure of a number of our Australian operations to date including the Maralinga, Madura, and Augusta facilities. In July this year the company announced the sale of the underutilized Yaldara winery for \$15.5 million. This represents another important step in driving the company's strategy to be the lowest cost premium wine maker in current competitive market.

Our brands have continued to **grow** in both the **domestic** and **overseas markets**. This growth is on the back of a number of international awards recognising the ability of the company to consistently deliver outstanding quality wines. Sales of the Vintage X brand **grew** in the domestic market by **10%**, following on from 8% growth in the previous financial year.

The sales of Vintage Y was down 9% in domestic market from last year to 124,000 tonnes, which has resulted in a reduction in our 2014 processing margin and a reduction in the income we generate from our owned vineyards. The low production of grape has also resulted in our cost per-litre being higher, which will create some short-term challenges.

Sales and Distribution

In August the Company announced that it had signed a long-term strategic China wide distribution agreement with CFCO Wine and Spirits. This exciting development provides the Company a distribution footprint in China and also gives the Company a significant platform from which to **build its brand equity in this important and emerging market**. CFCO has one of the best distribution footprints in China, and the creation of its imported wine division will enable our full portfolio of Vintage X and Y wines to reach consumers across the entire Chinese market.

During the year we have increased our presence in the UK/Europe segment by expanding our customer base to include all major super markets and major banner groups in the independent channel. The benefits of this expanded base are expected to improve the performance of this segment in 2015/2016.

Our emphasis of **growing branded business** and **growing export** has resulted in **increased sales and contribution** in the Australian, Asian, New Zealand and North American markets

The Company's commitment to its mission – to create **great quality wines and brands that our consumers know and love** was again demonstrated during the year with the Company continuing to win major international wine industry awards. These awards are on the back of being named International Winemaker of the Year three times at the International Wine and Spirits Competition.

Financial Position

In October 2013 the company **successfully completed a capital raising** for \$40m (net) with good institutional and retail support. As a result, our gearing (net **debt to equity**) has **decreased** from 59% as at 30 June 2013 to a **comfortable 39%** as at 30 June 2014.

In August 2014 we concluded negotiations with our banker resulting in a new 3 year borrowing facility. This confirms the banks continuing confidence in our business. The Directors announced a fully franked **dividend of 2.2 cents** per share payable on 19 November 2014. Although share price and earning per shares decrease by 13% and 9% respectively, this is the fourth year in which a dividend has been paid and demonstrates that the Board continues to have faith in the Company's ability to continue to perform well under current tough market conditions.

Outlook

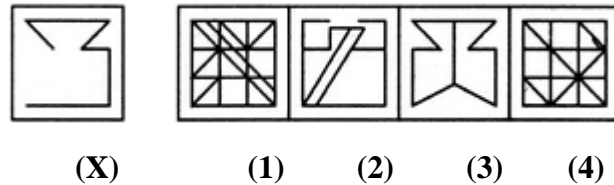
The wine industry continues to face challenges with markets and margins under pressure. The Company continues to respond to these challenges with **on-going cost control**, creating **new distribution partners** and **increasing branded sales**. We remain focused on improving our business in an environment that remains challenging. I have confidence that our branded business will **continue to grow** particularly in the Asia region as a result of our new distribution partnership with COFCO. Based on normal vintage conditions, expected sales (based on historical patterns) and forecasts for the AUD exchange rate, we **expect our 2015 profit to be above the 2014 result**.

On behalf of the Board and shareholders I would like to thank all of our shareholders for your ongoing support.

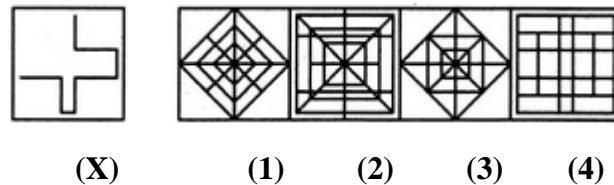
Appendix 4.3: Examples of group embedded figures test (GEFT)

In each of the following questions, you are given a figure (X) followed by four alternative figures (1), (2), (3) and (4) such that figure (X) is embedded in one of them. Trace out the alternative figure that contains figure (X) as its part.

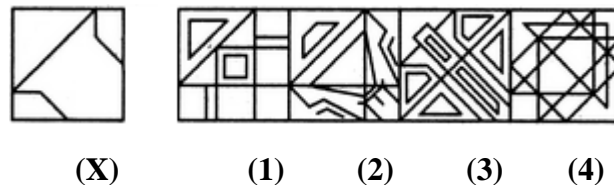
1. Find the alternative figure that contains Figure (X) as its part.



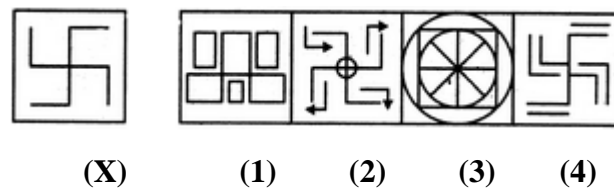
2. Find the alternative figure that contains Figure (X) as its part.



3. Find the alternative figure that contains Figure (X) as its part.



4. Find the alternative figure that contains Figure (X) as its part.



Chapter 5: Conclusions

The aim of the thesis was to provide theoretical suggestions and empirical evidence for the effect of memory on accounting JDM and impression management. To achieve this aim, this thesis had the following objectives: (1) to highlight the effect of human memory systems on accounting JDM; (2) to provide a comprehensive understanding of possible memory biases and errors in judgements that may direct future accounting and finance JDM studies; (3) to provide empirical evidence about how memory biases may influence accounting-information readers' JDM in an impression management context. Chapter 2 considered the first two objectives by developing a framework which combined two-pathway judgement-making with possible biases and errors in memory. Chapters 3 and 4 achieved the third objective. Specifically, the framework developed in Chapter 2 suggests that general judgements in accounting should be categorised into on-line judgements and memory-based judgements. Chapter 3 contributed to the third objective by examining the effect of memory biases and errors in on-line judgements under an impression management context. Chapter 4 contributed to the third objective by examining the effect of memory biases and errors on memory-based judgements under an impression management context. The summary and findings of this thesis and the contributions and implications of the findings are presented below, followed by the limitations and suggestions for further research.

5.1 Summary and Findings

The thesis showed that communication, which is a fundamental element of financial reporting, requires thorough investigation based on the integral interaction between 'external' information and 'internal' cognitive functions. One cognitive function—the human memory system—plays an important role in accounting-information processing and JDM. Similar to other cognitive functions, the human memory involves substantial biases and errors, such as information encoding and memory reconstruction biases, which may unconsciously influence decision-makers' rationality in JDM. Nonetheless, these biases and errors have received limited attention in previous impression management studies.

Therefore, to achieve Objectives 1 and 2, Chapter 2 considers literature from psychology, cognitive science, finance and accounting and identifies the theoretical and methodological strengths and limitations of this previous literature that relate to the impact of memory on JDM

in an accounting and finance context. It further develops a comprehensive framework by combining two pathways for judgement-making (i.e., on-line judgements and memory-based judgements), considering possible biases and errors in the memory system. This framework suggests that biases may exist in all memory functions and that memory-based judgements are significantly different from on-line judgements because they rely on different memory functions, thereby involving different biases.

Chapters 3 and 4 are developed based on the framework of Chapter 2. Specifically, both papers examined the effects of biases in memory on impression management. Impression management in accounting refers to management strategically disclosing information to manipulate reader interpretations of accounting information to achieve an enhanced impression of company performance. Recent studies suggest the voluminous increase in usage of unregulated accounting narratives may potentially be susceptible to impression management, which highlights the importance of impression management in an accounting context. However, previous impression management studies have mainly focussed on manipulations that are embedded in ‘external’ information, such as annual reports and narratives, rather than focussing on how the ‘external’ information is processed through ‘internal’ cognitive functions. Examining how ‘internal’ cognitive functions, such as memory, may influence the impression management process is one of the main motivations for Chapters 3 and 4.

Chapter 3 examined how biases and errors from memory may influence accounting-information users’ on-line judgements. Specifically, it examined the effect of textual salience and personal mood, which are two biases identified in the framework, on investors’ perceptions and on-line judgements about a company after reading its chairman’s letter embedded with impression management. The findings suggest that on-line judgements may be influenced by biases that occur in the stage of information encoding (which is the first function of the human memory). Salient visual cues (e.g., bolded favourable cues) embedded in the chairman’s letter can easily attract more visual attention from readers, while readers’ positive moods may enhance their perceptions of those positive cues and, therefore, lead to a more positive performance evaluation of the company after reading the chairman’s letter.

Chapter 4 examined how biases and errors from memory may influence accounting-information users’ memory-based judgements. Specifically, it examined the effect of textual salience and memory-recall order on investors’ memory and memory-based judgements about a company after a short time delay following the reading of its chairman’s letter embedded

with impression management. The findings suggest that memory-based judgements can be influenced by biases that occur at the stage of memory retrieval (which is the third memory function of the human memory). The salient cues embedded in the chairman's letter (e.g., bolded favourable cues) may be encoded profoundly and, therefore, are more memorisable than other cues in plain text. In addition, altering recall orders from positive-to-negative to negative-to-positive influences the number of negative cues one can recall. The joint effect of textual salience and recall order may explain how companies can achieve impression management in memory-based performance evaluation by distorting the memories of a target firm.

Overall, the findings suggest that biases and errors in the human memory system are widely applicable to accounting JDM studies and that they are closely related to impression management in accounting. These biases in memory help to explain how information users' impressions are manipulated in both on-line and memory-based judgements. This thesis raises a new direction for impression management studies departing from a focus on traditional 'external' stimulus, such as the focus on annual reports, and moving to address individuals' 'internal' cognitive functions, such as memory. With more psychology theories and methodologies applied to accounting JDM studies, the question of how accounting information is interpreted will be more thoroughly and successfully addressed.

5.2 Contribution to the Literature

The thesis contributes to impression management studies in a number of ways. Primarily, it highlights the effects of human memory on accounting JDM and develops a comprehensive framework combining two pathways of judgement-making with possible biases and errors in the memory system. This framework identifies theoretical and methodological strengths and limitations based on a review of previous cognitive psychology, finance and accounting literature. Second, the framework is further tested under an impression management context in accounting. It provides empirical evidence that impression management in accounting can be achieved through manipulating readers' perceptions or memories—thus addressing a research gap in existing literature. Specifically, Chapter 3 examines two biases—namely, textual salience and mood—in non-professional investors' perceptions and on-line judgements; Chapter 4 examines two biases—namely, recall order and textual salience—in non-professional investors' memories and subsequent memory-based judgements. These theoretical suggestions and empirical findings may benefit the preparation and standard setting of accounting information, making those who prepare information aware of the impacts of

potential memory biases on impression management and allowing them to disclose accounting information in an ‘objective, neutral and value free’ way.

Another contribution of this thesis is that it adopts multiple research methodologies to help accounting researchers to better interpret accounting communication. Chapter 3 adopts eye tracking techniques to examine how readers of financial statements process and extract financial information from a chairman’s letter for their JDM. Useful eye tracking functions, such as analysing ‘visual heatmaps’ and ‘areas of interest’, can provide scientific evidence about readers’ allocations of visual attention, which may enhance the validity of the findings of previous JDM studies in accounting. Chapter 4 adopts a cued recall design in the experiment, which is a commonly used method in memory studies. It collects individuals’ memory details by giving certain cues as criteria; for example, asking investors to recall positive cues from a chairman’s letter. This method indirectly reveals the workings of human memory, which have previously been believed to be untouchable and unmeasurable. Other methods, such as free recall or serial recall, may also be adopted in future memory-related JDM studies in accounting.

5.3 Implications

This thesis has provided valuable insights into the context of accounting JDM studies. The framework can be applied to other accounting-judgement studies as long as memory is involved in the process of JDM. The biases and errors in such memory should be examined by other accounting studies in a way that complies with accounting-information users’ own characteristics. For example, the unsophisticated characteristics of non-professional investors determine that they are more susceptible to impression management. Similar studies can be conducted for auditors and financial managers. In addition, the distinguishing of judgements into on-line and memory-based categories may raise questions for future studies—that is, whether accounting judgements are made as memory-based or on-line processes.

Another important implication is that impression management in accounting should not be confined to examining manipulations from ‘external’ accounting narratives, but should also focus on the effects of ‘internal’ cognitive functions on the interpretation of accounting information. Since the results show that simply enhancing one’s mood or altering recall order may influence investors’ perceptions or memories and, thus, their subsequent impressions about a company, future impression management studies should also put more effort into detecting management’s misbehaviour, by considering the possible effects of memory biases

on manipulating decision-makers' perceptions and memories. For example, future studies can examine the disclosure of strategies, such as ordering and the position of stimuli used in annual investor presentations.

5.4 Limitations and Suggestions for Future Studies

The framework developed in this thesis does not include all possible biases and errors in the process of memory, as the exact way in which the human memory system operates remains largely unknown. Only some key biases that have been identified or might be potentially relevant to accounting studies are included. In addition to the impression management scenario examined in this thesis, future research may complement this framework by examining other biases and errors in memory in different accounting-judgement scenarios.

In addition, several limitations in the design of the experiment should be noted. First, business students were examined as non-professional investors in this study. Their potential lack of real investment experience has been discussed in previous literature. Second, participants' moods were collected based on the self-rating of current mood levels. Although this method has been used in previous psychology literature, it is still a subjective evaluation process. Future studies may adopt techniques from neuroscience research to provide objective and scientific measurements of personal moods. Third, highlighting only certain texts is not an approach that is commonly seen in real-world financial reporting. Despite this, this study attempts to provide some prototype theories about the potential impacts of unregulated textual salience on impression management. Further, investors' memory recall depends on many cognitive factors that cannot be controlled, such as an individual's intelligence and concentration levels. In this thesis, we assumed that the business students did not have huge differences in their intelligence. Future research may further test participants' overall memory-recall accuracy and use their findings as a filter to achieve more accurate results.

Additionally, the empirical findings from this thesis mainly focus on the process of investor judgement-making, rather than decision-making. Real-life decisions, such as investment decisions, often involve more complicated factors, such as risk tolerance, past experience or personality, which are out of the range of this thesis. Memory may be one of the links between judgements and final decisions, as it can influence decision-makers' subsequent reasoning and confidence in their final decisions—a process that requires further investigation.

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Appendix (Ethics Approval) of this thesis has been removed as it may contain sensitive/confidential content