Fifty-year overview of judgment and decision-making research in accounting

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Abstract

As part of the celebration of the fiftieth anniversary of AFAANZ, we consider the breadth of judgment and decision-making (JDM) experimental research in accounting over that 50-year period. Our review is divided by decade and between auditing, financial accounting and management accounting. In four major journals, we found 5745 papers between 1970 and 2009, which we consider impressive and strong support for the opportunity to publish in this field. Our aim is to encourage more JDM research from Australians and New Zealanders, and to allow researchers in particular specialisations to get a better understanding of the JDM research in other specialisations.

Key words: Judgment and decision making; Experiments; Financial accounting; Management accounting; Auditing

JEL classification: M41, M42, M48

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As part of the celebrations of the fiftieth anniversary of the Accounting and Finance Association of Australia and New Zealand (AFAANZ), we have written an overview of judgment and decision-making (JDM) research in accounting concentrating on auditing, financial accounting and management accounting.

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1 Accounting research can be more broadly defined to include information systems and taxation (both areas are typically part of the accounting department in many USA schools). There are established JDM literatures in both these areas. More recently the whole field of behavioural finance has been developed including new journals (e.g. Journal of Behavioral Finance). These areas are not included in this review. We have also excluded papers on government accounting, and laboratory markets.

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Judgment and decision-making research is undertaken to understand individual and group judgments and decisions.\(^2\) So who makes these judgments in accounting? First, auditors, given that the whole process of auditing is permeated by professional judgments as evidenced by the very common references to the need for judgments in International Auditing Standards. Second, preparers of both financial statements and management accounting reports make judgments about what to include in the report, what accounting treatments to use (e.g. consolidated or not), dollar estimates to include (provision for warranty) and the likelihood of future events (e.g. whether ‘it is more likely than not’ that a company will earn enough taxable income in the future to include deferred tax assets in the balance sheet). Management accountants also face measurement issues and judgments about what to include in the report. Third, users of financial statements including investors, analysts and bankers who make judgments about future earnings and future cash flows and decisions concerning investments and lending. Fourth, managers who use management accounting reports for such purposes as planning decisions, performance evaluation and resource allocation. Of interest is the impact of the design and content of these management accounting reports on managers’ judgments.

The aims of JDM research in accounting include evaluating the quality of the judgments of auditors, preparers and users of accounting reports; describing how the judgments are made; determining which factors impact these judgments and why; developing and testing theories of the underlying cognitive processes by which judgments are made; and improving the judgments of auditors, preparers and users of accounting information (Libby, 1981; Trotman, 1996). Answering these questions provides insights for suggesting remedies for any discovered deficiencies, as it is necessary to understand a decision process to improve it. Possible methods of improving decision-making that have been addressed include providing feedback, using groups, changing group structures, providing decision aids, changing the format of the information provided, changing how the question is framed, decomposing the judgments made, etc.

Judgment and decision-making research in accounting has a long history beginning in the 1960s (see Ashton (2010) plus later discussion). The first study to systematically examine auditor judgments was Ashton (1974a), which considered consensus, stability and cue usage of individual auditor judgments. At the same time, there was judgment research in financial accounting using the Brunswik Lens Model by Libby (1975), who looked at individual predictions of corporate

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\(^2\) Following Libby (1981) we note that the terms JDM are often used interchangeably. When distinguished, judgment usually refers to the process of estimating outcomes and their consequences (e.g. likelihood of a material misstatement, risk assessment, estimate of an account balance, estimate of future cash flows), while decision-making involves an evaluation of these consequences which leads to a choice among the alternatives (e.g. qualify/not qualify audit report, invest/not invest). Judgments are an important input for decisions.
failures and research on accounting information systems (Driver andMock, 1975). While generally referred to as JDM research, this literature was previously referred to as human information processing (Libby, 1981) and behavioural decision-making (Einhorn and Hogarth, 1981). Often when research is categorised by research methods by journals (e.g. The Accounting Review), conferences and research grants, JDM research is referred to as experimental psychology.3

The importance of the experimental method in JDM research is noted. While some JDM research is based in the field (see Hunton and Gold, 2010), JDM research generally involves an experiment. The key questions addressed by an experiment are as follows: whether there is an effect; when there is an effect (i.e. under what circumstances); how and why there is an effect (e.g. cognitive processes). A major benefit of experiments is that the researcher creates the setting in which the experiment is carried out. The researcher manipulates the independent variables of their choice and examines the effect on the dependent variable while at the same time controlling for any potential confounding factors. The researcher can also measure intervening variables (including information search and cue usage) and the knowledge of participants. Experiments have the advantage of testing the effects of conditions that do not presently exist in practice (e.g. proposed new standards, new audit methods), as well as conditions that already exist but not in sufficient volume to examine archivally. Experiments can also be used to disentangle inter-related factors that co-exist in the natural environment to examine which of a number of factors cause a change in the dependent variable (Joe, 2003; Ng and Tan, 2007). A key strength of experiments is that they allow strong causal inferences to be made.4 That is, we should be thinking of experiments as a complement to archival research, not as an alternative.

Throughout the period 1970–2009, JDM research has been an important research paradigm. In auditing, it was the predominant research method throughout the 1970s and 1980s (Gibbins and Swieringa, 1995), but during the 1990s and 2000s there has been more archival research, with the development of new databases related to audit fees and important regulatory changes such as S404 of the Sarbanes-Oxley Act in the USA. Judgment and decision-making research has been an important part of financial accounting across the last four decades although less prolific than capital markets and positive accounting research. Further, while field studies have been a very commonly used research method in management accounting, there has been a constant flow of JDM management accounting papers, with a substantial increase since 2000.

3 This distinguishes from experimental economics. However, note that some JDM research, particularly in management accounting, relies heavily on economic theory in addition to psychology theory (e.g. Luft, 1994; Farrell et al., 2007).

4 For further insights on the experimentalists’ comparative advantage refer to Libby and Luft (1993) and Libby et al. (2002).
Table 1
Publications of JDM experiments in AOS, CAR, JAR and TAR from 1970 to 2009

<table>
<thead>
<tr>
<th>Discipline</th>
<th>Journal</th>
<th>1970s</th>
<th>1980s</th>
<th>1990s</th>
<th>2000s</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Panel A: publications by decade</td>
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<tr>
<td>Audit</td>
<td>AOS</td>
<td>3</td>
<td>23</td>
<td>21</td>
<td>11</td>
<td>58</td>
</tr>
<tr>
<td></td>
<td>CAR</td>
<td>0</td>
<td>3</td>
<td>22</td>
<td>22</td>
<td>47</td>
</tr>
<tr>
<td></td>
<td>JAR</td>
<td>8</td>
<td>54</td>
<td>28</td>
<td>8</td>
<td>98</td>
</tr>
<tr>
<td></td>
<td>TAR</td>
<td>5</td>
<td>29</td>
<td>38</td>
<td>28</td>
<td>100</td>
</tr>
<tr>
<td></td>
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<td>109</td>
<td>109</td>
<td>69</td>
<td>303</td>
</tr>
<tr>
<td>Financial accounting</td>
<td>AOS</td>
<td>5</td>
<td>18</td>
<td>7</td>
<td>1</td>
<td>31</td>
</tr>
<tr>
<td></td>
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<td>–</td>
<td>–</td>
<td>2</td>
<td>5</td>
<td>7</td>
</tr>
<tr>
<td></td>
<td>JAR</td>
<td>14</td>
<td>11</td>
<td>9</td>
<td>5</td>
<td>39</td>
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<tr>
<td></td>
<td>TAR</td>
<td>14</td>
<td>11</td>
<td>3</td>
<td>20</td>
<td>48</td>
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<tr>
<td></td>
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<td>40</td>
<td>21</td>
<td>31</td>
<td>125</td>
</tr>
<tr>
<td>Management accounting</td>
<td>AOS</td>
<td>1</td>
<td>12</td>
<td>14</td>
<td>17</td>
<td>44</td>
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<tr>
<td></td>
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<td>3</td>
<td>6</td>
<td>16</td>
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<tr>
<td></td>
<td>JAR</td>
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<td>4</td>
<td>27</td>
</tr>
<tr>
<td></td>
<td>TAR</td>
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<td>12</td>
<td>9</td>
<td>26</td>
<td>51</td>
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<tr>
<td></td>
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<td></td>
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<tr>
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</tr>
<tr>
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<td>43</td>
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</tr>
<tr>
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<td>164</td>
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</tr>
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<td>74</td>
<td>199</td>
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</tr>
<tr>
<td></td>
<td>Total</td>
<td>64</td>
<td>188</td>
<td>160</td>
<td>163</td>
<td>575</td>
</tr>
</tbody>
</table>


Table 1 divides up JDM experiments conducted from 1970 to 2009 by decade, discipline and the following four journals: Accounting, Organizations and Society (AOS), Contemporary Accounting Research (CAR), Journal of Accounting Research (JAR) and The Accounting Review (TAR). These journals, together with Journal of Accounting and Economics (JAE), are generally considered the top five accounting journals worldwide. To keep the task to a manageable level, we have not included the major specialist journals that also include a number of very high-quality JDM research, e.g. Auditing: A Journal of Practice & Theory, Journal of Management Accounting Research, and Behavioral Research in Accounting. Table 1 includes 575 papers across the four journals over four decades (although our references only
include papers specifically discussed). This suggests that this is an important research paradigm. We note the prominent role of Australians and New Zealanders in the earlier years. During the 1970s and 1980s, the list of contributors include Peter Brownell, Freddie Choo, Ian Eggleton, Michael Firth, Ferdi Gul, Mark Hirst, Keith Houghton, Errol Iselin, Peter Luckett, Garry Marchant, Roger Simnett, Ken Trotman, Ron Weber, Trevor Wilkins and Ian Zimmer. While the number of contributors is much less in 2000s, we hope that this paper will encourage new researchers in Australia/New Zealand to conduct research in this field.

The remainder of this paper will be structured around the four decades and then further divided between auditing, financial accounting and management accounting. Judgment and decision-making research, as we know it today, effectively commenced in the 1970s; however, the 1960s will also receive a very quick summary as insightful details have recently been published (Ashton, 2010).

It should be noted that this paper is not a comprehensive literature review of 50 years of accounting JDM research. Such a task could not be accomplished within the page length any editor would consider reasonable. In fact, there are numerous review articles across the period. Some cover JDM accounting research, others restrict themselves to auditing, financial accounting or management accounting research, while others are more specialised, e.g. group decision-making in audit research. Our paper is more descriptive of the themes of the research that has been carried out over the 50 years rather than a summary of the results of all the papers. Particularly, in decades or areas where there is a much research, we have provided examples rather than try to be comprehensive. Often our biases relate to our training, the institutions we have visited, who we have worked with, etc., and these factors influence the papers one reads.

1. 1960s

Here, we make a number of observations based on the insightful comments of Ashton (2010).

- Judgment and decision-making research is a subfield of behavioural accounting research that began in the 1960s. As a field of research, behavioural accounting is concerned with ‘the influence of management control systems on the behaviour of organisational participants, the influence of accounting information on internal and external users, and the behaviour of accountants themselves (including auditors)’ (Ashton, 2010, p. 5).
- The field grew quickly with 90 behavioural accounting articles appearing in three research journals from 1964 to 1975 (Hofstedt, 1975).

Ashton (2010) notes that it is not possible to trace the inception of behavioural accounting to a single study but if a choice needed to be made the experiments on budgeting by Stedry (1960) would be a strong candidate.
• Early experimental studies on JDM in accounting settings included Bruns (1965, 1966), Dyckman (1964a,b) and Jensen (1966). These papers generally manipulated the accounting treatment and examined the effect on decisions made.
• Ashton (2010) notes that the early studies were severely criticised for the lack of experimental controls and ‘a near-complete detachment from any theory which would enable one to generalise beyond the immediate experiment’ (Hofstedt, 1975).

2. 1970s – auditing

Accounting and auditing researchers became aware of the Brunswik Lens Model in the early 1970s (see American Accounting Association, 1972; Ashton, 1974b; Libby, 1975). The model has been widely used to examine judgments of auditors, bankers, stockbrokers, clinical psychologists and radiologists based on a set of environmental cues (pieces of information) that are probabilistically related to a particular environmental event.

The Brunswik Lens model recognised that human judgment occurs in a world of considerable environmental uncertainty based on sets of informational cues that are only probabilistically related to the event of interest. This approach has been used to model the relationship between cues (e.g. ratios) and the object of interest (e.g. company failure) and/or a person’s judgments (judgment of whether the company would fail or not) (Trotman, 1996; Ashton, 2010). Prior to the early 1970s, there was little audit judgment research. Ashton (1974a) published an experimental research study on auditor judgments which has had a major impact on the literature. Ashton noted that while the professional literature in auditing made frequent reference to the importance of professional judgment, no systematic research on audit judgment had been carried out. Ashton applied the theoretical framework of the Brunswik Lens Model to study auditors’ evaluation of the strength of internal control systems. In Ashton (1974a), auditors judged the strength of the internal control in a payroll subsystem on the basis of six cues that indicated strengths and weaknesses of the system. Thirty-two combinations of ‘yes’ and ‘no’ answers were chosen according to a one-half fractional replication of $2^6$ (64 cases) factorial design. A descriptive model of each auditor’s judgments was constructed to explain the extent of inconsistent internal control judgments that might be observed. Average correlation between the ratings of all pairs of auditors and the consistency of the individual auditor’s judgments over time was high. The six main effects (representing linear cue combinations)

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6 The material on auditing in the 1970s, 1980s and 1990s relies heavily on previous summaries of the literature made by Ken Trotman, in particular Trotman (1996) which was an AFAANZ monograph.
explained 80 per cent of judgment variance on average, while the two cue interactions (representing configural cue processing) explained only 6 per cent on average. Differences in the extent of utilisation of the six cues were directly related to the extent of inconsistency in the overall judgments made by the auditor, particularly judgment consensus, as more or less consensus was related to differences in auditors’ use of the cues.

Joyce (1976) examined the extent and nature of differences in judgments on audit programme planning and found a substantially lower level of consensus than found in Ashton (1974a). One explanation for the differences is the nature of the task differences between the two studies. As we will see in our discussion of the early part of the 1980s, there was considerable subsequent research that examined the generalisability of the Ashton (1974a) results to changes in task, participants, number of cues, cue order, etc. and to a reconciliation of the differences between the results of Ashton (1974a) and Joyce (1976).

Both Ashton (1974a) and Joyce (1976) are examples of policy capturing research, which was one of the dominant research paradigms in auditing in the 1970s and 1980s. The main objective of this type of research is to develop mathematical representations of auditors’ judgment policies to reveal judgment strategy. This is generally carried out by providing participants with a series of judgment situations in which various combinations of cues are presented. Various statistical methods (usually ANOVA or regression) are used to infer the judgment strategy based on the relationships between the cues presented and the judgments made. Policy capturing research addresses the following issues: consensus among auditors, the relative importance of individual cues for the auditors, the functional form of the judgment policy (e.g. linear, non-linear), the stability of judgments over time and the level of self-insight auditors have into their own judgment policies (Trotman, 1996).

Judgment policies developed through this policy capturing research do not represent relationships between inputs and outputs. All modelling approaches provide only surface statistical representation of relationships between inputs and outputs. They do not explain the actual mode of processing. This is not necessarily problematic because the focus of judgment modelling is to produce representations that are useful for specific purposes, such as providing an initial step towards improving the quality of judgments rather than necessarily understanding cognitive processes (Ashton, 1982b). Methods of understanding cognitive processes are discussed in the 1980s section.

As noted earlier, an important goal of JDM research in auditing is to improve auditor judgments. To do this, it is necessary to understand and evaluate these judgments. While the most obvious criterion to use is accuracy, this has in fact been rarely used because there are a very few audit tasks for which there is an unambiguous correct answer. An important exception was Weber (1978) who used a simulation to provide a ‘correct’ answer. Weber provided participants with a description of the inventory accounting and control systems for a company together with a set of associated audit working papers. Weber used a
simulation programme that modelled the inventory system’s internal controls and accounting procedures and generated transaction data with predefined error frequencies. Weber developed a measure of accuracy by taking the absolute difference between an auditor’s estimates of the expected dollar error in the system and the mean of the distribution.

The policy capturing approach was also used in the 1970s to address judgments on materiality (Boatsman and Robertson, 1974; Moriarity and Barron, 1976, 1979; Ward, 1976; Hofstedt and Hughes, 1977; Newton, 1977; Firth, 1979). These papers used a variety of statistical methods aimed at examining differences in materiality judgments and the cues that impacted their judgments.

A number of probabilistic judgment studies were conducted in the 1970s. These studies generally focused on subjective probability assessments and combinations of probabilities. Early studies examined auditors’ judgments using different elicitation methods (e.g. Corless, 1972; Felix, 1976).

The late 1970s saw the beginning of a number of studies examining judgments made by auditors using probabilistic data (e.g. Swieringa et al., 1976; Uecker and Kinney, 1977). These studies tested the main heuristics identified by Tversky and Kahneman (1974): anchoring and adjustment, representativeness and availability (see Libby, 1981; Trotman, 1996 for descriptions). Tversky and Kahneman suggested that these heuristics reduce the cognitively complex task of assessing probabilities to simpler judgmental operations and that while these heuristics are quite useful, they can lead to severe and systematic errors because they omit several factors that should affect the judgments of subjective probabilities.

We also saw the start of a stream of literature that considers the effect of audit reports on user decisions. Libby (1979a) compared how audit partners and commercial lenders perceived messages communicated by different forms of audit reports. The study considered differences in cue weightings of the cues in the reports. Libby (1979b) considered the effect of uncertainty disclosures and the incremental effect of an auditor’s qualified audit report. The study found that while the uncertainty disclosure had significant effect on the judgments of commercial loan officers, the type of audit report had no effect.

3. 1980s – auditing

The 1980s was an extremely exciting time for JDM research (then called human information processing). A new paradigm had been established in the 1970s, the top US PhD programmes were graduating ‘experimentalists’ in the 1970s (e.g. Bob Libby at the University of Illinois at Urbana-Champaign and Bob Ashton at the University of Minnesota) and large PhD programmes were being established where the students often did joint majors in accounting and psychology. Researchers were now equipped with design skills and theory (or the capability to develop new theories). Large PhD programmes developed at established schools like the University of Michigan. For example, Michigan PhD students in the 1980s included Jane Reimer, Steve Butler, Gary Marchant, Sarah Bonner, Vicky
Hoffman, David Frederick, Linda McDaniel, Steve Salterio and Hun-Tong Tan. Australia and New Zealand also benefited from this training with Peter Brownell (University of California Berkley), Ian Eggleton (University of Chicago) and Rob Weber (University of Minnesota) returning to Australia/New Zealand. All three were extremely encouraging of locally trained researchers.

Six important themes dominated the audit research in the early 1980s. First, there was a continuation of the policy capturing research study by Ashton (1974a). In addition, there was probabilistic judgments research on heuristics and biases, predecisional behaviour including information search and hypothesis generation, group decision-making, decision aids and the start of the expertise paradigm.

Much of the research in policy capturing investigated the generalisability of the Ashton (1974a) results to other internal control systems, participants and order of cues given. Researchers also attempted to reconcile the differences between the Ashton (1974a) and Joyce (1976) results to explain why there were lower levels of consensus on the Joyce task, which involved planning audit tests and evaluating results. While many systematic differences were suggested, Trotman and Wood’s (1991) meta-analysis of 16 studies addressing these issues did not support the existence of moderator variables to explain differences across these studies.

The policy capturing research moved beyond internal control systems to include the perception of independence (Shockley, 1981), materiality (Messier, 1983), performance evaluation (Wright, 1982; Kaplan and Reckers, 1985; Luckett and Hirst, 1989), forecasts (Danos and Imhoff, 1983), inherent risk (Colbert, 1988) and internal audit functions (Abdel-khalik et al., 1983; Schneider, 1984). These research studies emphasised the level of consensus between auditors and the information they used (cue usage) to make their judgments. Overall, across the period from 1974 to 1991, 28 experiments modelled auditors’ judgment policies (Solomon and Shields, 1995). In 25 of the 28 studies, cues used were generated using some form of factorial design. Given problems related to the inconsistency with the actual audit environment (e.g. some cues are highly correlated in actual audit environments), this method of developing cues is far less prevalent today.

The use of consensus earlier was made on the premise that an accuracy measure is not normally available in audit situations. However, the reliability of consensus as a surrogate for accuracy has been raised (Ashton, 1985), i.e., there can be high consensus but low accuracy. Four policy capturing studies in the 1980s examined accuracy (Kida, 1980; Ashton, 1985; Libby and Libby, 1989; Simnett and Trotman, 1989). Most common was the company failure prediction task using accounting ratios. Participants were auditors, and there was a correct answer as it was known whether the company had/had not failed. Libby and Libby (1989) used a panel of experts to provide a ‘correct answer’. This method

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7 While Peter Brownell was best known for his field study research in management accounting, he also carried out experiments in management accounting.
is now very common in audit JDM research. Both Simnett and Trotman (1989) and Libby and Libby (1989) were interested in breaking up the total judgment into components (e.g. information selection and information processing) to determine why individuals performed below the level of environmental model and whether judgments could be improved by mechanically combining component judgments to form a global judgment.

Some policy capturing issues were addressed by other methods. For example, Schneider (1985) examined the reliance of external auditors on the internal audit function using an ANOVA factorial design. Schneider (1984) used conjoint measurement to derive the models of auditors’ judgments of overall internal control strength, and Messier and Schneider (1988) used analytic hierarchy process to address this issue.

A second area of research covers probabilistic judgment studies. These early studies focused on identifying differences in auditor probabilistic judgments including judgments obtained using different elicitation methods (Crosby, 1981; Solomon et al., 1982; Shields et al., 1987); the impact of source creditability on probability revision (Bamber, 1983); and the shape of auditors’ utility functions (Lewis, 1980).

While the heuristics and biases literature started in the 1970s, some of the major papers were published in the early 1980s related to the representativeness heuristic. The representativeness heuristic suggests that when individuals make assessments of the probability that A comes from population B, the assessment will often be based on the extent to which A is similar to B. Events that are more representative tend to be judged to have a higher probability of occurrence than less representative events. However, judgments based on the representative heuristic tend to ignore normatively relevant data including base rates, source reliability and sample sizes. Audit studies in the 1980s that have examined attention to base rates include Joyce and Biddle (1981b) and Kida (1984a). Sensitivity to source reliability studies included Joyce and Biddle (1981b), Bamber (1983) and Cohen and Kida (1989). For example, Joyce and Biddle (1981b) tested the effect of source reliability on auditor judgments and found that auditors did not differentially weight the source of information. They concluded that auditors may be insufficiently sensitive to the reliability of data.

The anchoring and adjustment heuristic suggests that under certain conditions individuals make estimates by starting from an initial value and then adjusting that to obtain a final answer. The initial value (anchor) may be suggested by the formulation of the problem or it may be the result of partial computation. The adjustment from this anchor, although in the normatively appropriate direction, is typically insufficient. Auditing studies in the 1980s that have examined this heuristic include Joyce and Biddle (1981a), Kinney and Uecker (1982), Biggs and Wild (1985) and Butler (1986).

In the late 1980s, developments in psychology (later published as Hogarth and Einhorn, 1992) provided a theoretical framework for considering the sequential nature in which information is received. This is particularly important in
auditing as different amounts and types of evidence are accumulated throughout an audit. Hogarth and Einhorn's (1992) belief-adjustment model assumes that belief-adjustment follows an anchoring and adjustment process. The model predicts an order effect when both confirming and disconfirming information is received. If an individual has strongly held initial beliefs regarding a hypothesis, a disconfirming piece of evidence will result in a large decrease in revised beliefs. Subsequent confirmatory evidence is then likely to lead to another substantial upwards belief revision. In comparison, if the same individual obtains positive evidence initially, little revision in beliefs is expected. Later disconfirming evidence leads to significant decreases in beliefs. As a result, the disconfirming/confirming order is hypothesised to lead to higher final beliefs than the confirming/disconfirming order. Ashton and Ashton (1988) were the first to use this model in accounting, and they found a recency effect when auditors place more weight on evidence received most recently. Butt and Campbell (1989) found that the existence of the recency effect was affected by prior beliefs. There was a substantial amount of subsequent research on this topic discussed in the 1990s.

Following some of the early research on policy capturing and heuristics, it was suggested that these studies provided participants with well set out, perfectly reliable data and a well-defined task environment. In practice, many tasks are ill-defined and these tasks involve the need to search for information, lack of perfectly reliable data and the need for hypothesis formation as well as hypotheses confirmation or disconfirmation (Einhorn, 1976; Libby, 1981). Since Libby (1981), an extensive JDM literature on predecisional behaviour has developed. In particular, these studies involve information search (search for and selection of evidence from a wide range of potential evidence) and hypothesis generation (e.g. generation of possible explanations for a change in accounting numbers). Two early studies on information search are Biggs and Mock (1983) and Kida (1984b). Biggs and Mock (1983) examined information acquisition and information use in an internal control case. It was the first study in auditing to use verbal protocol analysis. They examined the auditors’ ‘problem space’, information acquisition and information use. Using verbal protocol, participants were provided with a case and asked to perform certain tasks, such as the extent of audit testing (Biggs and Mock, 1983), the review of a planned audit programme (Biggs et al., 1988) or to provide likely hypotheses about an error that could be caused by unexpected fluctuations in the financial statements (Bedard and Biggs, 1991). In performing these tasks, participants were requested to ‘think aloud’ into a tape recorder and the taped protocol was transcribed and analysed.

Following Biggs and Mock (1983), there were a range of protocol studies including Biggs et al. (1988) who examined the processes involved in auditors performing analytical procedures. Their protocol analysis covered a wide range of questions including the following: What differences and similarities are there in decision performances of experienced and inexperienced auditors? In what order did the auditors acquire information? What components of the audit work papers did the auditors emphasise in information acquisition? What decisions
did auditors make in terms of identifying audit problems and opportunities during analytical reviews? The protocol analysis in Biggs et al. (1988) was followed up experimentally by Cohen and Kida (1989), who addressed the following issues: Do auditors use the results of analytical review to reduce, as well as extend, audit testing? Does the reliability of the data affect auditors’ analytical review judgments? Does experience level affect the type of analytical review judgments made by auditors?

Kida (1984b) examined the effect of hypothesis framing. Participants were assigned to either a failure or viable hypothesis frame and asked whether the firm would fail/remain viable for 2 years. Kida examined the effect of this framing on auditors’ search for and attention to judgmental data. The psychological studies cited by Kida had shown a strong tendency for participants to adopt a confirmatory strategy. In an audit environment, Kida found only limited support for the existence of confirmatory strategies and the effect was less powerful than in the psychology literature. Kida did find that auditors in both the viability and failure conditions attended to significantly more failure items and concluded that this indicated conservatism.

Most of the hypothesis generation studies have involved analytical review tasks. The studies examine situations where the auditor finds an unexpected fluctuation and then needs to develop hypotheses (or likely causes) and obtain additional evidence to determine the correct cause. Hypothesis generation studies were introduced to the auditing literature by Libby (1985) who described it as a ‘diagnostic’ task. The importance of the hypothesis generation stage of the diagnosis process is well documented, and there was some evidence in the medical literature suggesting that hypothesis generation was the key to expertise in diagnosis (Libby, 1985). Libby examined the role of prior knowledge of financial statement errors in the generation of hypotheses. He found that perceived error frequency played a major role in the assessability of error hypothesis. Other early papers addressing hypothesis generation issues included Butt (1988) and Merchant (1989).

Another stream of audit JDM research that started in the early 1980s was the use of group decision-making and the review process. The recognition of the importance of examining group decision-making in auditing dates back at least to Joyce (1976) who noted that psychology research on individual versus group judgments may have implications for audit JDM research. He suggested that the review process often leads to revisions of the original judgments, and therefore, the discrepancies found in his study may not occur in practice. The first studies on group decision-making in auditing considered the choice-shift phenomenon in the context of disclosure judgments (Schultz and Reckers, 1981), individual judgment after group discussion (Abdel-khalik et al., 1983) and two and three person groups and mathematical composites (statistical averages or majority vote) (Solomon, 1982; Trotman et al., 1983). This research was related to probabilistic judgment and policy capturing research in the 1970s. For example, Solomon (1982) compared the prior probability distributions of individuals,
composites and two forms of three person interacting groups (nominal/interacting and interacting/nominal). Trotman et al. (1983) extended the earlier policy capturing literature by examining the cue usage, consensus and consistency of individuals, composite groups and interacting groups.

The other theme related to groups in the 1980s was the early research on the review process (Bamber, 1983; Trotman, 1985; Trotman and Yetton, 1985). Bamber (1983) recognised the sequential and hierarchical nature of the review process and noted that auditors must evaluate the reliability of their subordinates as information sources in the review process. He investigated the extent to which a reviewer would adjust the perceived informativeness of audit evidence collected by a subordinate based on the subordinate’s reliability. Trotman and Yetton (1985) investigated the mechanisms by which differently structured groups could reduce judgment error. The main purpose of this study was to examine whether the aforementioned review process reduced judgment variance and if so, whether it was a more efficient way of doing this. Trotman (1985) examined the benefits of the review process compared to other alternative group structures on a more complex task. Boritz (1985) examined the effect of data structuring techniques on audit planning and review judgments by comparing responses based on information cues arranged in a hierarchical structure with identical content arranged in a simple list.

Earlier, we noted that a basic aim of JDM research is to improve decision-making. One way of doing this is to develop decision aids and greater structure in the design process. This type of research started in the latter 1980s. One type of research examined the performance of decision aids developed to overcome the deficiencies found in auditor judgments in policy capturing research and heuristics and biases research. Based on earlier research that auditors have difficulty in assessing the sampling risk in a substantive test of details, Butler (1985) tested a decision aid that directs attention to potentially underutilised information. Libby and Libby (1989) tested a decision aid for combining three component judgments (process susceptibility to error, control reliance and compliance test strength) to determine the appropriate extent of reliance on the client’s accounting controls. They found greater judgment consensus, and these judgments, on average, were more like the responses of a group of experts. A related line of research considered differences in audit firm structure. This research found that differences in audit structure are associated with differences in sample size judgments (Bamber and Snowball, 1988) and that the degree of structure impacts auditors’ perceptions of their work environment and how auditors approach a sample size judgment task (Bamber et al., 1989).

The last major theme to be discussed in the 1980s is considered by many to be the most important. This is research on the determinants of judgment performance including the research on expertise. In the early 1980s, there was a recognition that experience plays an important role in task assignment in auditing firms and that experienced auditors rely on the wealth of job-related knowledge they bring to tasks (Weber, 1980; Libby, 1981, 1983; Birnberg and Shields, 1984;
Gibbins, 1984; Waller and Felix, 1984). This recognition of the important relationship between experience and tasks and that information used by auditors is retrieved from long-term memory, led to the study of knowledge and memory in auditing. This was one of the most predominant topics studied in JDM research in auditing during the decade from 1985 to 1995. The motivation for research on knowledge and memory is that if we can better understand the knowledge of an expert auditor and how it is acquired, it may be possible to develop training and decision aids that improve the performance of novices. This research studies knowledge structure differences and how they are related to performance differences. Weber (1980) conducted the first memory study in auditing. He examined whether there was evidence of consensus among EDP auditors in the way they cluster internal controls. Another early study on memory was Plumlee (1985) who examined memory and bias effects when internal auditors review their own work.

An important development was the identification of the determinants of judgment performance using the following equation (Einhorn and Hogarth, 1981; Libby, 1983): Performance = f(Ability, Knowledge, Environment, Motivation). Earlier research using the policy capturing framework and research on probabilistic judgments had basically addressed ‘ability’ in the aforementioned equation. Libby (1983) suggested the need for researchers to consider the latter three determinants of performance and suggested that some of the greatest contributions would come from the interactions between the four determinants. Subsequent research emphasised knowledge and memory issues and the importance of experience in task assignment.

Frederick and Libby (1986) presented a series of conditions sufficient for demonstrating a knowledge effect. These three conditions later became known as the ‘expertise paradigm’. The three guidelines are as follows: (i) hypotheses should be developed in advance about the effects of specific knowledge elements or their organisation on observable behaviour; (ii) a demonstration of a hypothesised knowledge difference and/or its effects on performance requires constructing an experimental task where the observable implications of using and not using knowledge are different, e.g. two tasks where for one task an experience effect is expected and another where it is not; and (iii) the existence of a knowledge effect can best be established by manipulating stimuli and/or context factors and comparing individuals with different experiences (see Libby and Luft, 1993 for further details). These guidelines plus the surprising lack of findings of experience effects in earlier studies led to more consideration of the relationship between the task to be performed and the extent of experience differences expected. First, this consideration included the cognitive processes through which knowledge is brought to bear on a decision task (e.g. Frederick and Libby, 1986; Abdolmohammadi and Wright, 1987). Second, earlier studies focused attention on the role of auditors’ task-specific knowledge in areas such as hypothesis generation (e.g. Libby, 1985) and information search (e.g. Kida, 1984b) and the fact that much of the information used is retrieved from long-term memory. Third, there was increased interest in the use of long-term memory to store evidence gathered.
during a particular engagement (e.g. Plumlee, 1985; Moeckel and Plumlee, 1989). This research noted the need for auditors to refer to long-term memory about the engagement when considering further evidence.

Later, Libby (1995) identified some of the insights that can be provided by knowledge and memory studies: In what tasks can the skills of more experienced auditors be most effectively employed? How can university education, firm training, and experience be organised to maximise learning? When will different types of learning aids or decision aids be most beneficial? When will generalists’ or specialists’ performance be superior? Will knowledge increase over the whole range or only a limited range of an auditor’s career? How conducive is the audit environment to necessary learning and what kinds of learning are fostered? When will knowledge differences result in performance differences? (Libby, 1995, p. 177).

4. 1990s – auditing

We finished the 1980s with a discussion of the early research on experience, expertise and memory research. This research continued into the early and mid-1990s.

Many of the policy capturing studies discussed earlier did not find experience effects. Bonner (1990) summarises a number of problems in generalising from these earlier studies that examined experience. First, she suggested that most of these studies selected tasks for which both experienced and inexperienced participants had the knowledge necessary to perform the task. That is, novice tasks were used where there is no reason to expect an experience effect. Second, many of the studies used experimental tasks that did not include task aspects such as cue selection where knowledge is most likely to aid performance. Third, experience effect may have simply shown the superior ability of more senior auditors on all tasks and not the effects of knowledge (i.e., partners could be superior to seniors on all tasks).

In the early 1990s, there was a series of studies that followed the expertise paradigm. These included Bonner (1990), Frederick (1991), Libby and Frederick (1990) and Bonner and Lewis (1990). Bonner separated out the effects of cue selection and cue weighting in an internal control evaluation (novice task) and expert task analytical risk assessment (expert task). Frederick found specific differences between more experienced auditors and less experienced ones. Libby and Frederick found that as auditors became more experienced, their knowledge of financial statement errors became more complete; they learn error occurrence rates and they organise their knowledge of financial statement errors along different dimensions. Bonner and Lewis examined the relationship between components of audit knowledge and performance across four audit tasks and how ability affects performance. They explained the level of performance on the four tasks using more complete measures of task-specific experience and training and more direct measures of knowledge. They demonstrate the difference between
general experience and expertise and that a general experience variable is not a
good proxy for expertise because people with the same general experience have
different specific experiences.\(^8\)

In the early 1990s, there was an increase in research relating to knowledge of
financial statement errors (e.g. Libby and Frederick, 1990; Ashton, 1991; Tubbs,
1992; Nelson, 1993). These studies examined both learning based on experiences
in the laboratory (Nelson, 1993) and experiences accumulated in practice (Libby
and Frederick, 1990). Also Heiman (1990) and Koounce (1992) examine judgment
performance. Moeckel (1990) examined the effect of audit experience on two
types of memory error – failure to integrate and reconstruction. She found that
both types of error were related to experience. Inexperienced auditors failed to
integrate more often and experienced auditors reconstructed more. Choo and
Trotman (1991) adopted a schema-based framework to examine some differences
in the knowledge structures and judgments of experienced and inexperienced
auditors. They found differences between experienced and inexperienced auditors
in the types of items recalled, the clustering of recall, the inferences made and the
correlation between recall inferences and predictive judgments. Bédard (1991)
related expertise to three measures of audit quality: consistency with professional
standards, consistency with firm standards and consensus among auditors. Using
a schema-based framework, Ricchiute (1992) also found that working paper evi-
dence presented in a contextually meaningful causal order has a greater influence
on going concern judgments than the same evidence presented in the usual work-
ing paper order of the audit firm. Nelson \textit{et al.} (1995) found that a mismatch
between knowledge structure and task structure hindered auditors’ ability to
draw on previous experiences when making conditional probability judgments
and when allocating audit hours to various objectives within cycles.

One key issue addressed in the 1970s (e.g. Ashton, 1974a) was whether cues
were processed in a linear or configural way. The latter refers to making judg-
ments based on patterns of cues. The general finding was that cues were pro-
cessed in a linear rather than a configural pattern, which was inconsistent with
expectation and discussions with practitioners. Brown and Solomon (1991) em-
phasised the need to design tasks that lend themselves to the application of
domain-specific knowledge that indicates that configural information processing
is appropriate and the need to specify the form and nature of such configurality.
Brown and Solomon (1991) found that auditors would exhibit configural cue
processing in situations where domain-specific knowledge implies that it is
appropriate.

Much of the research on expertise is incorporated in a model developed by
Libby (1995), which looks at the antecedents and consequences of knowledge.

\(^8\) Libby and Luft (1993) provide further detail on the power of the design of the expertise
paradigm including demonstrations of how the Bonner (1990) and Frederick (1991)
papers adopted this design.
This model focuses on the relationship between ability, knowledge, experience and performance. The model has two inputs: ability and experience; these two inputs cause the internal state of knowledge (an intermediary variable); knowledge together with the direct effect of ability affects performance, which is an output variable (Libby, 1995). Libby makes the important conclusion that ‘the key to successful study of knowledge-related determinants of performance is specifying the knowledge needed and cognitive processes involved in performing specific audit tasks’ (p. 179).

Libby and Tan (1994) further extend this model by developing a framework for predicting the structure of the relationships in the model to different judgment settings. The main predictions were that problem-solving ability would directly affect performance only in unstructured tasks and would indirectly affect performance through its effect on knowledge acquisition where learning is limited.

Solomon et al. (1999) extended the expertise paradigm to compare the knowledge of industry specialists with non-specialists. They examined the knowledge implications of both training and direct experiences of specialists. They found that this training and concentrated experiences have a greater effect on non-error knowledge than on financial statement error knowledge.

Group decision-making research, particularly related to the review process, made significant progress during the 1990s by examining review behaviour as well as preparer behaviour. With respect to the former, papers addressed such issues as how the technical competence of preparers is judged by reviewers (Kennedy and Peecher, 1997); the impact of review strategies on reviewer evaluations (Phillips, 1999); how reviewer judgment is impacted by differential audit documentation (Ricchiute, 1999); and how reviewer memory for audit evidence is impacted by audit risk (Sprinkle and Tubbs, 1998).

Other studies on the review process showed that by making the preparer accountable, the review process changes how the preparer performs their task. Kennedy (1993) found that accountability mitigated the effect of recency effects found in earlier research suggesting a preventive effect of the threat of review. Koonce et al. (1995) examine how the anticipation of the review process and the degree to which evidence supporting or refuting management’s explanations influence the justifications of audit planning decisions. Tan (1995) examined how auditors’ decision processes are affected by prior expectations, prior audit involvement and the review process. With respect to the review process, Tan found that awareness of review raises preparers’ vigilance and reduced the consistency effect from prior audit involvement.

While the research on the review process in the 1980s compared the effect of the review process with other group decision processes and began to explain the reasons for the gain (diversification versus an interaction effect), the research on the review process in the 1990s moved on to examine specific process gains attributable to the review process, including the cognitive processes involved. The aim was to describe the underlying cognitive processes in sufficient detail to allow further predictions related to the specific benefits of
review and the circumstances in which these benefits would be enhanced or diminished.

Libby and Trotman (1993) suggest a particular source of gain based on differences between preparers and reviewers in terms of the point at which they enter the judgment process which means preparers have incentives to justify their position while reviewers have incentives to question the judgment. They found that preparers’ relative recall was greater for information consistent with their judgments, while reviewers’ relative recall was found to be greater for information inconsistent with preparer judgments, i.e., a gain from the review process is that it results in an increased likelihood that the implications of inconsistent information will be adequately considered.

Other examples of papers that looked at specific sources of gain that result from the review process include Ramsay (1994), Ismail and Trotman (1995), Asare and McDaniel (1996) and Bamber and Ramsay (1997). Ramsay (1994) distinguished between mechanical and conceptual errors to show that in carrying out the review process managers outperformed seniors in detecting conceptual errors, but the opposite was true for mechanical errors. However, there do not appear to be gains in efficiency and effectiveness by focusing reviewers on conceptual or mechanical errors (Bamber and Ramsay, 1997). Ismail and Trotman (1995) found that discussion as part of the review process increased the number of plausible hypotheses generated in response to an unusual fluctuation found during analytical review. Asare and McDaniel (1996) manipulated both familiarity with the preparer and whether the audit programme was structured or unstructured and evaluated review effectiveness using working papers that were seeded with actual preparer errors.

Koonce (1993) developed a model of the diagnostic, sequential and iterative process of analytical review. The model has five stages: mental representations, hypothesis generation, information search, hypothesis evaluation and decisions about sequential audit actions. Each of these five stages received considerable attention in the JDM literature in the early 1990s. Mental representation refers to the current formulation or understanding of a problem situation including expectations for the financial statement relationship under examination. For example, Bedard and Biggs (1991) constructed a case where they seeded an error in a set of accounts and asked auditors to give their most likely hypothesis about an error that could have caused the discrepancies. As they used verbal protocol analysis, they could measure pattern recognition for the participants. The most common papers in the Koonce model on analytical procedures were those on hypothesis generation. Following Libby (1985), most of these studies have examined auditors’ hypothesis generation after they inherit an initial hypothesis from an external source (e.g. client, superior). Libby and Frederick (1990) found that auditors who inherit a typical error have more difficulty generating additional hypotheses from the same transaction cycle than if they inherit an atypical hypothesised cause. A number of studies have also found that experience has an important effect on the generation of hypotheses (Libby and Frederick, 1990;
Bedard and Biggs, 1991). Heiman (1990) and Koonce (1992) examined the effect of an initial hypothesis after auditors were requested to generate alternative hypotheses. Ismail and Trotman (1995) examined the effect of the review process on the hypotheses generated. Both papers find that the request to generate alternative hypotheses results in a decrease in probability for an inherited hypothesis. Heiman found this when auditors inherit the plausible error hypothesis from an unspecified source, while Koonce also found it for a non-error hypothesis from management. Church and Schneider (1993) extend this to consideration of a superior’s suggestion as well as across different transition cycles. Heiman-Hoffman et al. (1995) consider the effect of the initial hypothesis generation on subsequent performance in identifying actual errors. Asare and Wright (1997) used computerised versions of cases to examine the related effects of hypothesis generation, information search and hypothesis evaluation.

The third stage in the Koonce (1993) model is information search. After generating potential hypotheses, auditors search for information to reduce uncertainty and become more confident in the actual cause of the change. Hypothesis evaluation involves evaluating the validity of particular hypotheses. A range of models have been put forward as descriptive of this evaluation process (see Koonce, 1993), and these models were tested in a wide range of studies in the 1990s including Koonce et al. (1995), Heiman (1990), Heiman-Hoffman et al. (1995), Hirst (1994), Koonce (1992), McMillan and White (1993), Nelson (1993), Asare and Wright (1997) and Brown et al. (1999). As an example of comparing different models of evidence evaluation in analytical procedures, Asare and Wright (1997) answer the question ‘Do auditors use a complementary or an independent revision approach in evaluating multiple hypotheses?’ The final stage of the Koonce framework involves analytical review decisions. This includes judgments about the validity of hypothesised causes, judgments about fair presentation of account balances and decisions about subsequent audit actions (Koonce, 1993). Examples of research in this area include Cohen and Kida (1989), Church (1991), Koonce et al. (1995), Asare and Wright (1997), Heiman-Hoffman et al. (1995).

Previously, we discussed the early research on belief revisions by auditors when they review additional evidence. Based on the anchoring and adjustment heuristic, the Hogarth and Einhorn (1992) model predicts that when auditors receive both positive and negative evidence, there will be a recency effect. Tubbs et al. (1990) extended this research to incorporate content-rich audit scenarios and found that the results were sensitive to the decision process used (step-by-step versus end-of-sequence). Knechel and Messier (1990) extended the research to consider information search and evidence evaluation. One of their key findings was that negative evidence led to greater judgment revision than positive evidence and that auditors searched for corroborating evidence. Later studies found that environmental factors such as accountability (Kennedy, 1993) moderated recency effects. Asare (1992), using partners and managers on a going concern case, found that recency effects in audit judgments impacted audit actions, i.e.,
the type of report issued. Bamber et al. (1997) provide further tests of the
descriptive validity of the belief-adjustment model.

Research on decision aids continued into the 1990s. Kachelmeier and Messier
(1990) examined the use of a sample size decision aid to assist in sample size
determination. Their design broke down the decision into distinct subtasks that
have different knowledge and ability requirements to explain the effects of the
aid. The study illustrated that decision aids can have unintended effects. Auditors
provided with the decision aid exhibited greater variability in their sample sizes
than did auditors in an intuitive judgment group, and there was some evidence
that auditors tried to circumvent the aid by working backwards from their
desired sample sizes. Ashton (1990) examined the effects of a decision aid with a
monetary incentive, feedback and a justification requirement on auditors’ predic-
tions of bond ratings. The study found that the positive effects of financial incen-
tives, performance feedback and the requirement for justification can be
decreased or even reversed by the availability of a decision aid. Nelson et al.
(1995) suggested that auditors encounter difficulty in applying the error frequen-
cies they have experienced to judgments of the probability that an audit objective
is violated given a particular transaction cycle. They suggest that this may occur
because of a mismatch between the organisation of the judgment task and the
organisation of auditors’ knowledge. To overcome these deficiencies in knowl-
dge, they developed and tested a checklist style decision aid, which facilitated
knowledge retrieval, and a decomposition and mechanical aggregate decision aid,
with the latter providing the greatest improvement.

In the mid-1990s, two important research outputs had a major impact on audit
JDM research. First, Libby and Luft (1993) outlined previous and future audit
JDM research using the framework: performance = f(ability, knowledge, envi-
JDM research in accounting included three major audit papers: Libby (1995),
Messier (1995) and Solomon and Shields (1995). Each reviewed important areas
of audit JDM and provided frameworks and models to progress this research.

A number of the environmental factors outlined in the aforementioned
research formed the focus of a considerable amount of audit JDM research in
the 1990s. These environmental factors include justification, accountability, prior
involvement in the audit, time pressure, source credibility and precedents.

Peecher (1996) presents a cognitive model of how justification influences audi-
tors’ decisions and an experiment that focuses on how auditors’ justification pro-
cesses influence their analytical procedures performance. A number of studies
began looking at ways of mitigating biases found in auditors’ judgments as well
as looking at the moderating effects of other variables. For example, as noted
previously, Kennedy (1993) examined the impact of accountability on reducing
the recency bias. Kennedy (1995) considered whether the ‘curse of knowledge’
(when individuals are unable to disregard information already processed) is
mitigated by accountability, experience and counterexplanation. Tan and Kao
(1999) examined how knowledge, problem-solving ability and task complexity

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moderated the relationship between accountability to a superior and auditor performance. An important institutional characteristic of the audit setting is the preponderance of repeat audit engagements. On most audits, staff from prior years are again assigned to that audit, often in a more responsible position in the team. Tan (1995) considered auditors’ prior involvement on an audit. Another factor is task complexity; Simnett (1996) measured task complexity based on information load and examined the effect of information selection, information processing and task complexity on the accuracy of auditors’ going concern judgments.

Another important environmental variable is time pressure. McDaniel (1990) examined the effects of time pressure and audit programme structure on the effectiveness and efficiency of auditors’ test of details. McDaniel found that while the effects of time pressure were significant, the effects of audit structure varied with the level of time pressure. Hackenbrack (1992) examined the influence of non-diagnostic information on auditor judgment. Normatively non-diagnostic information should not influence decisions, but Hackenbrack found that judgments based on a mixture of diagnostic and non-diagnostic information tend to be less extreme than judgments based on diagnostic information only. This is known as the dilution effect. Glover (1997) tested whether this dilution effect existed when auditors were faced with time pressure and accountability and found that while time pressure reduced (but did not eliminate) the dilution effect, accountability did not have a significant effect, which was inconsistent with the results in psychology. Hoffman and Patton (1997) also found that auditors’ judgments exhibited the dilution effect even when held accountable. They attribute the differences to the psychology research to a tendency of auditors to shift their judgments to what they believe is defensible to their superiors. This is a good example of the need to consider the audit environment and how it differs from the environment in psychology.

Evidence is central to the audit process, and an important line of research in the 1990s considered various aspects of evidence. For example, Hirst (1994) notes that the source impacts the influential value of evidence. Hirst, in two experiments, considers both the competency of the source and the objectivity of the source. He finds that, in an analytical review task, auditors considered a report from a fellow auditor more diagnostic than a report from the client, and auditors were sensitive to the competence of the source.

The persuasiveness of evidence is important when the appropriate accounting treatment for a transaction is not obvious (Salterio and Koonce, 1997). In these circumstances, the effects of precedents provided by the national office staff of the audit firm are used. Salterio (1996) examined the content, perceived similarity to the case being considered and source dimensions on auditors’ accounting policy choices. He found the combination of the precedents and the auditor perceived similarity judgment impacted the auditors’ accounting policy judgments. Salterio and Koonce (1997) considered the role of these precedents in accounting situations where authoritative guidance does not exist. They found that auditors respond to the similarity of the precedents to the situational facts and
that auditors only heed the client’s position when available precedents are conflicting.

Following on earlier research in the 1980s on the reliance of external auditors on internal audit work, Maletta (1993) examined the effect of the level of inherent risk on the amount of reliance of external auditors on the work of internal auditors. He found that in high-risk situations, external auditors use more complex configural decision processes to evaluate the internal audit function including the interaction between objectivity and work performed. Further, Maletta and Kida (1993) found that in high-risk situations the external auditors’ reliance on the internal audit function depends on the design of the accounting control policies and procedures.

The 1990s saw a move to audit judgment tasks with a broader range including judgments related to financial statement fraud. Studies include Pincus (1989), Hackenbrack (1992), Hoffman and Patton (1997) and Jamal et al. (1995). With the development of new fraud standards, studies began to look at the separate fraud risk assessments required by the standards. Zimbelman (1997) investigated whether new auditing standards (SAS No. 82) cause auditors to modify their audit plans. He found that separately assessing fraud risk as required in the standards impacts auditors’ attention to fraud cues and increases in audit hours. This is a good example of the power of experiments in testing the effects of changes in standards. Ideally, standard setters should make better use of experiments early in the standard setting processes. Another important task that auditors perform is assessing their own technical knowledge and that of their subordinates. Such assessments impact audit planning, task assignment, rewarding staff and the review process. Kennedy and Peecher (1997) found that auditors are overconfident in both their own assessments and subordinates’ assessments of technical knowledge. Their overestimates of subordinates’ knowledge increase with the knowledge gap between supervisors and subordinates.

Recall that performance is a function of abilities, knowledge, environment and incentives (Libby and Luft, 1993). The first three of these factors have been discussed earlier, and the 1990s saw the first studies related to incentives in auditing. Four examples include Libby and Lipe (1992), Hackenbrack and Nelson (1996), Nelson and Kinney (1997) and Brown et al. (1999). Libby and Lipe examine how performance-related incentive effects of monetary payments depend on cognitive processes (and coding, retrieving and combining information). They suggest that these cognitive processes require varying effort levels and are therefore differentially sensitive to effect increases from the use of incentives. They examine both the relations between extrinsic rewards and the amount and dispersion of effort and then assess the effects of the rewards on cognitive processes. Hackenbrack and Nelson examined auditor judgments on whether to allow a client to adopt an aggressive reporting method when the auditors had an incentive to do this. They also examined whether the auditors justify aggressive reporting by their interpretations of financial accounting standards. Nelson and Kinney find that auditors responded less conservatively to ambiguity (the probability that a
future loss will occur) than did users in their judgments about the appropriate reference to contingent losses in audit reports. They note that auditors may have different incentives to users. Brown et al. investigate how incentives influence the question specification of auditors and the soundness of auditors’ question specification. They consider four types of unsound reasoning: confirmation and disconfirmation proneness, information proneness and affirmation proneness.

5. 2000s – auditing

Two of the most prominent themes of research in the 2000s relate to different interpersonal relationships (Nelson and Tan, 2005): the audit review process and auditor/client negotiations.

While there had been considerable research on the review process throughout the 1980s and 1990s, much of the research on this topic in 2000s examined whether specific features of the audit environment enhance or diminish the process gains from the review process. Turner (2001) examined the influence of reviewer preferences (accountability) on auditors’ evidence search strategy. Another paper to use the accountability literature was Rich (2004) who considered the elaboration stage of the reviewer judgment process in which the reviewer considered strengths and weaknesses of the preparer’s work. He found that the extent of reviewer elaboration was affected by expectations about the client and the preparer, but that the extent of elaboration did not explain a significant proportion of the effect on reviewer judgments. Brazel et al. (2004) compare the effects on preparers of using two different forms of review: electronic versus face to face. They conclude that how a review is conducted impacts preparers’ effectiveness and efficiency as well as their level of perceived accountability.

Wilks (2002) considered whether earlier knowledge of supervisors’ views increased preparers’ tendencies to agree with the views of the reviewer. Wilks found evidence of predecisional distortion of information when subordinates unconsciously interpret evidence in a manner that is consistent with supervisors’ views. Distinguishing between conscious and unconscious bias is important as it affects what decision aids are likely to be most useful.

Some of the aforementioned papers, including Wilks (2002), rely on the ‘motivated reasoning’ literature (also see the discussion in the financial accounting literature). Motivated reasoning research suggests that motivations cause individuals to search for, and overweight, evidence that supports a desired conclusion (Kunda, 1990; Nelson, 2009). In auditing, research has shown that this can be intentional or unintentional. For example, Wilks shows that auditors provide evidence of unintentional bias in the direction of a supervisor’s preferences. Kadous et al. (2003) investigated the effectiveness of regulation designed to curb auditors’ tendency to make reporting judgments consistent with their client’s preferences and found auditors assessment of the quality of the client’s accounting can result in auditors being more likely to permit aggressive
accounting as the assessment encourages auditors to engage in justification of the client’s preferred alternative.

The judgments of preparers and reviewers are impacted by alternative justification memos. A number of papers have looked at the effect of both environmental factors and preparer attributes on review judgments. Agoglia _et al._ (2003) find that the judgments were impacted by alternative justification memos used by the preparers. Yip-Ow and Tan (2000) found that reviewers who read a preparer’s justification for a non-error cause were less likely to generate alternative error hypotheses. Reviewers’ judgments are influenced by memo structure and conclusions documented in audit workpapers (Tan and Yip-Ow, 2001), by anticipated stylisation attempts by preparers (Tan and Trotman, 2003) and by exposure to subsequently invalidated evidence (Tan and Tan, 2008). Another aspect of justification was considered by Shankar and Tan (2006). They examine whether and how the requirements for a preparer to justify to a reviewer who had similar/dis-similar task preferences determined the nature and extent of justification documented in the workpapers.

Issues such as nominal versus interacting groups (Trotman and Yetton, 1985) and detection of mechanical versus conceptual errors (Ramsay, 1994; Bamber and Ramsay, 1997) had been discussed in the literature in earlier decades. Owhosho _et al._ (2002) built on these literatures by examining error detection by industry specialised teams working on the sequential and hierarchical audit review process. They found differences in the identification of mechanical and conceptual errors by seniors and managers depending on whether they were working within or outside specialisation.

One issue that is important part of the review process is the ability of reviewers to evaluate the work of preparers and to predict preparers’ ability to detect errors (Kennedy and Peecher, 1997). Jamal and Tan (2001) investigate whether auditors can predict the choices made by other auditors. Tan and Jamal (2001) investigate whether audit managers’ assessments of the quality of the work of preparers are influenced by their prior impressions of these preparers. Interestingly, they obtained actual performance evaluation information on whether a senior was outstanding or average. They match each manager with two seniors with whom the manager is familiar; one of these seniors is an average performer and the other an outstanding performer. They find that managers accord better evaluations to memos written by outstanding seniors than average seniors but this only occurs when they know the identity of the senior. Messier _et al._ (2008) investigate audit partners’ predictions of the ability of audit managers and audit seniors to detect specific types of errors. They find that partners are generally significantly overconfident in their ability to detect errors. They are more accurate in predicting managers’ performance than seniors.

Negotiations between auditors and management often arise with respect to disagreements over accounting policies, financial statement disclosures and accounting estimates. There have been a substantial number of experiments during the 2000s looking at the judgments of both auditors and financial officers largely
based on a model developed by Gibbins et al. (2001) in which they identify a three element accounting negotiation model: accounting issue, auditor/client process and accounting outcome as well as the various context factors. They collected data from audit partners to support their model, and later, Gibbins et al. (2005) extended this model by collecting similar data from financial managers (e.g. CFOs, financial controllers). Ng and Tan (2003) focus on auditors and obtain the initial recommendations about potential accounting writedowns and the eventual outcomes of negotiations with clients. Sanchez et al. (2007) investigate how auditor strategies during negotiations with the client affect the posting of significant audit adjustments, client satisfaction and client retention. Trotman et al. (2005) compare the efficacy of three intervention methods that could be used by auditors to improve negotiation outcomes. Hatfield et al. (2008) investigate the conditions under which auditors are likely to use a reciprocity approach strategy for the resolution of audit differences and whether both client management negotiations style and client retention risk increase this effect. Bame-Aldred and Kida (2007) identify the negotiation tactics used by both auditors and financial managers.

One line of research in 2000s has been in reaction to changes in accounting standards. Of particular importance has been the new fraud standards including ISA 240. Two examples of papers on this topic are Asare and Wright (2004) and Wilks and Zimbelman (2004). Asare and Wright investigate two forms of tools/decision aids on the quality of audit procedures and the propensity to consult fraud experts. They examined standard risk assessments programmes versus no checklist and standard programmes versus no programmes. Their results call into question the effectiveness of the standard audit tools tested. Wilks and Zimbelman investigate whether decomposition of fraud risk assessments into opportunity, incentive and attitude assessments, leads to better fraud judgments than a global judgment. They find that auditors who make decomposed fraud risk assessments are more sensitive to opportunity and incentive cues when making an overall assessment than those who just make the overall assessment. This effect only held when the cues suggest low fraud risk.

Following major financial frauds, new auditing standards were written both internationally and in Australia (ISA 240 and ASA 240) which require that an auditor be responsible for obtaining reasonable assurance that the financial statements taken as a whole are free from material misstatement, whether caused by fraud or error. One requirement is related to team discussions early in the audit on the potential for fraud. Both ISA 315 and ISA 240 require this discussion ‘to place particular emphasis on how and where the entity’s financial statements may be susceptible to material misstatement caused by fraud, including how fraud might occur’ (ISA 240.15). The aim of this standard is to increase the likelihood that auditors will detect material misstatements caused by fraud. US auditing standards have the same requirement but instead of using the word ‘discussion’ they use the term ‘brainstorming’. Recent JDM experiments that have examined this process have adopted this label of brainstorming (Carpenter,
2007; Hoffman and Zimbelman, 2009; Trotman et al., 2009; Hunton and Gold, 2010). Carpenter (2007) compares nominal groups (combinations of individuals who have not met face to face) and interacting groups on a brainstorming task and finds that face-to-face brainstorming does not increase the quantity of frauds listed but does increase the quality of the items listed. Trotman et al. (2009) extended this research to examine three forms of interacting groups: an interacting group without specific brainstorming instructions, interacting group with brainstorming instructions and a premortem instruction group. They found that the brainstorming guidance and premortem interacting groups list more total fraud risks and more quality fraud risks than do the no guidance interacting groups. Hunton and Gold (2010) compare three brainstorming techniques (nominal group, round robin and open discussion) using 150 teams of auditors on real clients and found that their round robin and nominal groups list more unique fraud risks, plan larger average increases in planned audit hours than face-to-face open discussion groups. Both the latter two studies show that adding some form of structure improves performance. Given the wide use of electronic meetings, Lynch et al. (2009) compare the performance of interacting electronic groups, nominal electronic and face-to-face interacting groups. They find that both forms of electronic groups (interacting and nominal) list more fraud risks than do face-to-face brainstorming groups. While the aforementioned studies consider the effect of brainstorming on the generation of lists of potential frauds and fraud risk, Hoffman and Zimbelman (2009) examine the effect on planning effective audit procedures in response to higher fraud risk. They manipulate the presence or absence of two interventions: brainstorming in groups and strategic reasoning.

Another type of audit JDM research to start in the 2000s is the evaluation of auditor performance/audit quality on the judgments of jurors. In the USA, jurors evaluate auditors in negligence lawsuits and are asked to compare the audit performed with what others would have done in the circumstances (Kadous, 2000). Kadous investigated whether providing higher-quality audits increases auditors’ chances of avoiding legal liability but found this will not necessarily protect auditors when the consequences of audit failure are very high. Kadous (2001) considered the methods of improving jurors’ evaluations in negligence cases.

Peecher and Piercey (2008) consider the judging of audit quality when adverse outcomes exist (e.g. undetected material misstatement of earnings). They note the concern that adverse outcomes could bias individual judgments resulting in overly harsh conclusions regarding auditing negligence. They predict, based on prospect theory, and find outcome bias effects for low individual Bayesian probabilities of auditor negligence, but reverse outcome bias for higher individual Bayesian probabilities.

Four examples of knowledge papers in the 2000s follow. First, Hoffman et al. (2003) emphasised the importance of considering how experienced auditors process evidence. They examined the effect of constraining experienced
auditors in how they process information by having them process evidence in a predetermined sequence rather than use their usual processing patterns. They found experienced auditors only performed better than inexperienced auditors when they were unconstrained in their processing. Second, Hammersley (2006) studied how well auditors interpret incomplete patterns of cues. She found that industry specialists working in their own industry developed problem representations that enable them to interpret and fill in partial cue patterns, but when working outside their industry they did not recognise implications of partial or full patterns. Third, Earley et al. (2008) were motivated by earlier research on the curse of knowledge bias (Kennedy, 1995) and new US auditing standards on internal control over financial reporting (ICFR). They examined whether cognitively restructuring the ICFR assessment task would reduce management’s influence on auditors’ assessments of the ICFR problem. Fourth, Joe and Vandervelde (2007) investigated the cognitive effects of the auditor providing non-auditor services on the transfer of knowledge from the non-audit task to audit tasks.

Given the move towards strategic systems audits (Bell et al., 1997, 2002) and the requirement by all Big 4 firms to assess strategic risks earlier in the audit process (O’Donnell and Schultz, 2005), research has commenced on understanding these judgments. O’Donnell and Schultz examine whether developing a holistic perspective in making strategic risk assessments impacts the misstatement risk that auditors attribute to patterns of fluctuations. They suggest that the halo effect generated during strategic assessments impacts judgments by altering the tolerance of auditors for inconsistent fluctuations. With recent model building papers (e.g. Bell et al., 2005; Knechel, 2007; Peecher et al., 2007), research on the business risk approach to auditing is likely to receive increased attention from experimentalists.

Another aspect of the audit JDM research in the 2000s is the advances in the range of environmental factors examined and the type of audit judgment made. Many of these new environmental issues were original and widened our knowledge of the environmental factors that impact auditor judgment. Examples include press coverage of a client (Joe, 2003), complex accounting information systems environment (Brazel and Agoglia, 2007), multiple client audit environments where information of a previous decision is compared to information on another client (Bhattacharjee et al., 2007), different assessment techniques (Nelson et al., 2005), the source of the internal audit work relied on (internal versus outsourced) (Glover et al., 2008), incremental levels of accountability (review, justification, feedback) (DeZoort et al., 2006). These studies addressed a wide range of audit judgments: bankrupt prediction and audit opinions (Joe, 2003), control risk and planned scope of substantive testing (Brazel and Agoglia, 2007), materiality judgments including booking a misstatement (Nelson et al., 2005) and planning materiality (DeZoort et al., 2006), detecting a seeded error using analytical procedures (Moreno et al., 2007), external audit reliance of internal audit (Bhattacharjee et al., 2007; Glover et al., 2008).
While most audit JDM studies use auditors as participants, we have also seen a range of research looking at the impact of the audit on other parties. While previous research had considered auditors’ acceptance of client preferred accounting methods (Salterio and Koonce, 1997; Kadous et al., 2003), recent research has looked at the judgments of audit committee members. Hunton and Rose (2008) investigated the effects on the likelihood of accepting an auditor’s recommendation of an audit issue (adjustment versus restatement) and whether the directors held a single directorship or multiple directorships. The latter item relates to directors’ reputational capital, with those with multiple directorships less likely to recommend a restatement. Gaynor et al. (2006) examine audit committee decisions on hiring auditors for non-audit services. They consider the impact of changes in audit quality and the need to disclose non-audit fees.

6. 1970s – financial accounting

The 1970s was a relatively prolific period for JDM researchers in financial accounting. The central focus of the research was the effect of different types of information on decisions related to bankruptcy predictions, loan default predictions and stock evaluation. A significant number of studies focused on whether financial ratios affected these decisions. During this period, several studies in the archival literature (e.g. Beaver, 1966, 1968; Altman, 1968) demonstrated the importance of financial ratios in the models of bankruptcy prediction. These findings motivated JDM researchers to test whether individual decision-makers actually utilised the ratios in the manner predicted by the statistical models.

The availability of two research approaches, namely the lens model and probabilistic judgment, also contributed to the growth in this area of research. Both approaches were particularly suited to investigating the utilisation of cues in decision-making. The lens model is a statistical technique that maps cues (e.g. financial ratios) to an environmental event (such as bankruptcy). The model is used to study cue utilisation, consistency in judgment, consensus among decision-makers and their self-insight into the decision processes (Libby, 1981). The lens model approach was introduced to the financial accounting literature by Libby (1975) who investigated the decisions of loan officers. Libby’s study had a major impact on JDM research in financial accounting: the lens model approach was widely adopted in research on stock analysis and bankruptcy prediction in the 1970s. The other research approach, probabilistic judgment, investigates whether the successive provision of information cues results in a revision of a prior probability assessment. This subjective posterior probability is then compared with the optimal posterior probability, determined using Bayes’ theorem. Its introduction to the financial accounting literature can be traced to Kennedy (1975), who investigated the effect of financial ratios on the subjective probability judgments of bank officers.

In general, studies during this period demonstrated that financial ratios were useful in bankruptcy prediction and stock evaluation. Libby (1975) used the lens
model to evaluate the accuracy, temporal consistency and consensus judgment of loan officers in terms of their business failure predictions. Information on ratios was assumed to be useful if it enabled users to correctly predict an event (in this case, the failure of a firm). He found that participants were able to achieve a prediction accuracy of 74 per cent, even though their decisions were based solely on financial ratios. There was also consistency of their predictions over time and across participants. Libby concluded that the results in his experiment provided support for the importance of ratios in bankruptcy predictions.

Decision-makers were also found to have a high degree of understanding (self-insight) about their use of financial ratios for investment decisions (Wright, 1977a). The cues used in Wright’s experiment included previous earnings per share, dividends and debt/equity ratio. Wright compared the subjective cue weights assigned to the financial information items with the cue weights derived statistically from the judgments of all the participants. The degree of self-insight into his student participants was close to that reported in prior psychological studies. However, Wright (1977b) also observed that his student participants demonstrated substantial heterogeneity in their use of financial information.

Kennedy (1975) utilised the probabilistic judgment approach to investigate the importance of financial ratios in the prediction of bankruptcy. The likelihood ratio (the ratio form of Bayes’ theorem) was computed from the subjective probability judgments of a sample of bankers. Debt-equity ratios, especially those with extreme values, were found to be important to bankers in bankruptcy prediction.

Abdel-Khalik (1973) compared the usefulness of aggregated versus non-aggregated financial information on the lending decisions of bankers. Aggregated information included financial ratios, while non-aggregated data included financial statements. He found that an increase in the level of aggregation of financial information lowered the participants’ assessment of a firm’s bankruptcy risk. Participants required more detailed information when the borrowing firm was a marginal or bad risk.

In addition to financial ratios, a significant amount of research effort was directed at studying the types of disclosures that would influence investment decisions. The most active area of research was on human resource (or human asset) accounting. In the late 1960s, R. G. Barry Corporation in the United States pioneered the development and installation of a human resource accounting system to provide human resource information to shareholders. In anticipation of the proliferation of human resource accounting systems in other firms, Brummet et al. (1969) proposed that issues associated with the provision of human resource accounting information (including recognition, measurement and its behavioural impact) within conventional financial statements should be properly investigated. Using an experiment, Elias (1972) found that the disclosure of human resource information enabled investors to make more accurate assessments of a firm’s performance. The investment decisions of three types of
investors (CPAs, CFAs and accounting students) were similarly affected by the human resource information.

In 1976, AOS published a collection of papers that offered a range of perspectives on the impact of human resource accounting on attitudes and action within a firm. Several studies in this special issue and in other journals used experiments to test whether the provision of human resource information (financial or non-financial) influenced the decisions of investors and creditors. Hendricks (1976), for example, investigated whether the provision of quantitative human resource information was useful for investment decisions. He found that student participants invested a larger sum of money in the firm with increasing human asset investment, provided that the human asset information was reported in the financial statements. Acland (1976) examined the effect of non-financial indicators of human resources on investment decisions. Five sociopsychological indicators (such as organisational environment, employee morale, management achievement motivation, employee turnover and job satisfaction) were found to affect the investment decisions of financial analysts. Flamholtz (1976) found that both monetary and non-monetary human resource accounting information also influenced staff allocation decisions.

The effect of accounting policy choices and the disclosure of estimates of an uncertain outcome also received a moderate level of attention during this period. Falk and Ophir (1973b) examined the effect of conservative versus non-conservative accounting policies on investment decisions. In their study, the accounting policy choices that lowered a firm’s net worth were considered more conservative. Eight accounting policies including depreciation, deferred taxes, inventory valuation were examined in their study. They found that participants increased (decreased) their investments in firms with conservative (non-conservative) accounting policies and that effect of accounting choice was greater for stock investment than bond investments. Dopuch and Ronen (1973) observed that the relationship between accounting policy choices and investment decisions depended on the criteria used to evaluate the firms. When participants used earnings or earnings-related ratios to evaluate the firms, they were more inclined to invest in firms that adopted FIFO. However, when the current ratio was used, they favoured LIFO firms. In contrast to Falk and Ophir (1973b) and Dopuch and Ronen (1973), Barrett (1971) found that the choice of accounting method did not affect investment decisions when supplementary information was available for recasting of financial statements in terms of the alternative method. He found that analysts preferred the equity method for intercorporate investments and would adjust the financial statement to reflect this method if the firm had chosen the cost method to report its investments.

Other studies investigated whether the reporting of an uncertain outcome influenced investment decisions. Oliver (1972) found that the disclosure of confidence intervals for an uncertain outcome did not affect lending decisions. Keys (1978) extended Oliver (1972) by manipulating the width of the confidence interval (Oliver used a 90 per cent confidence interval) across companies and over
time but did not find evidence on the effect of uncertainty information on loan decisions. However, Libby (1979b) demonstrated that the perceived riskiness of a firm was affected when the disclosure of an uncertain outcome was accompanied by supplementary information. He found that the combination of an uncertainty disclosure (litigation) and supplementary information with a negative assessment of the outcome led to a significant increase in the perceived riskiness of a firm.

There were also a few studies (e.g. Heintz, 1973; McIntyre, 1973) that investigated the effect of non-historical cost information on investment decisions. However, they did not find any significant differences in the predictions based on price-level-adjusted financial statements and those based on conventional financial statements.

Instead of focusing on specific types of disclosures, there were also studies that investigated the factors that influenced the demand for financial information and non-financial information in investment decisions. Harvey et al. (1979) found that investors preferred financial statements that had less aggregated information. Using bank officers as participants, Falk and Ophir (1973a) found that an increase in the riskiness of the investment was associated with an increased frequency in the use of financial statement information. The personality of the investors had no effect on the demand for financial information. McGhee et al. (1978) investigated the effect of two personality variables (decision style and tolerance for ambiguity) on the use of financial information to make investment decisions. They did not find support for the effect of personality in ‘describing, understanding or predicting’ how financial information was processed.

Non-financial information was also important in investment decisions. Pankoff and Virgil (1970), for example, observed that analysts found non-financial information to be more useful than financial information in the forecasting of future earnings. There was a greater demand for information about the general economy and the firm’s industry than specific types of accounting information. Similarly, Acland (1976) found that analysts incorporated information contained in behavioural indicators, such as organisational environment, and employee morale, in their investment decisions. Hofstedt (1972) also found a similar reliance on non-financial information by investors in their forecasting of earnings. Hofstedt found that the message contained in the president’s letter appeared particularly significant and the impact varied depending on the consistency of the message from the firm’s president and the trend in earnings, as revealed in the financial statements.

A growing area of research focused on the effect of the form of presentation of financial information on investment decisions. Lusk (1973) investigated whether the presentation formats for annual reports influenced investment decisions. Two presentation formats, namely high analytic and low analytic, were investigated. High-analytic financial reports contained more detailed and more specific financial information. Low-analytic financial reports contained brief and general information about the firm’s performance. Participants were classified as either
field dependent or field independent using an Embedded Figures Test (Witkin, 1971). Lusk found that field-independent (dependent) participants were more likely to make investments in firms with high (low)-analytic reports.

Moriarity (1979) devised an experiment to examine whether unsophisticated users of financial information could make better decisions if they were presented with schematic faces instead of financial ratios. The use of schematic faces was evaluated in the context of bankruptcy prediction. He found that schematic faces provided a useful means of communicating financial information especially for investors who did not have ample knowledge about financial numbers.

There was a limited investigation into the decision-making process of managers during this period. Two studies studied the managers’ assessment of materiality of information. Boatsman and Robertson (1974) created thirty hypothetical cases from a common set of eight situational variables considered relevant in a materiality judgment. Participants decided on whether the cases were material enough for disclosure and the type of disclosure. Their results suggested that the participants’ materiality evaluation of the situational variables lacked consensus. This lack of consensus on what constituted material information was also reported in Hofstedt and Hughes (1977) and Firth (1979). Firth concluded that more guidance on materiality was required to ensure consistency in disclosures.

In summary, the studies in the 1970s provided several insights into the importance of accounting information for decision-making. Financial ratios were generally useful in the prediction of bankruptcy. The choice of accounting policies had an impact on investment decisions, but the availability of supplementary information to adjust the financial statement for the chosen accounting policy ameliorated the impact of the accounting policy choice. Investors showed a high degree of self-insight about their use of financial information for investment decisions. Non-accounting information (particularly the president’s letter) was found to be useful when the financial statement information conflicted with the non-accounting information. Other significant findings in the 1970s included the lack of consistency in the interpretation of materiality among producers of financial information.

A major shortcoming of the studies in the 1970s was that researchers generally adopted a stimulus-response approach to experimental design. As a consequence, these studies provided little evidence on how decision-makers traded-off competing pieces of information and how they eliminated alternatives before making their final decision. Although the lens model provided a richer and more robust model to calibrate a decision-maker’s use of financial information, the lens model was essentially a stimulus-response type model. Weights assigned to each cue in a decision were obtained statistically, and cues were preselected by the researcher. As we will see in the next section, developments in protocol analysis (process-tracing technique) in the 1980s provided accounting researchers with opportunities to observe in more detail the decision-making process of users of financial information.

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The 1980s saw an increase in the number of JDM papers in financial accounting. Table 1 shows that the increase was largely attributed to the significant number of papers published in AOS compared to the previous decade (18 versus 5). In contrast, the other two journals (JAR and TAR) showed a decline in the number of papers. Research that utilised the lens model approach and probabilistic judgments continued to proliferate in the 1980s. A majority of studies continued to focus on bankruptcy prediction and stock evaluation. However, new findings emerged during this decade. Mear and Firth (1987), for example, found that analysts displayed a high level of insight into their use of financial information and had a more ‘highly differential cue utilisation pattern’ for return judgment task than a risk judgment task. Chalos (1985) found that the predictions of loan committees were more accurate than a linear model of loan default, but were inferior to the Bayesian optimum. Kessler and Ashton (1981) found that task properties feedback was more effective than cognitive feedback for improving an individual’s performance in a bond-rating task. Cognitive feedback provided periodic information about the participant’s prediction strategy, including the number (per cent) of ratings that were correct and the number (per cent) that were incorrect by one rating category. Task properties feedback provided participants periodic information about statistical properties of the task, such as the correlations between the cue and the ratings by a rating agency.

During this period, JDM researchers were increasingly concerned about the limitations of the lens model in studying stock selection, bankruptcy prediction and default prediction tasks. For example, the lens model was more suited to the analysis of tasks with clearly defined objectives and information cues. The tasks associated with stock selection, bankruptcy and default predictions lacked these essential elements. Further, the lens model was useful in identifying cues that were important to the decision, but not the processes involved in arriving at the decisions (Larcker and Lessig, 1983; Dillard, 1984). Protocol analysis (or process-tracing technique) traces the actual decision-making process of users of financial information and is suited to studying ill-structured tasks. Protocol analysis allows the researcher to ‘identify cues, the sequence in which the cues are

9 There were a small number of studies that examined issues other than bankruptcy and stock price prediction. Koch (1981), for example, examined a manager’s decision to smooth earnings. He manipulated the cost of smoothing, the type of ownership and the type of smoothing (real versus artificial). He found that income smoothing was more prevalent with more diverse firm ownership, lower cost of smoothing, and greater use of accounting variables. Another study by Faircloth and Ricchiute (1981) examined the accountant’s desire for alternatives in financial reporting. Faircloth and Ricchiute found that the level of tolerance for ambiguity of accountants did not have a significant effect on their desire for alternative accounting treatment in the standards. However, they found that demographic information (such as the educational level of the accountant) was an important variable in explaining the desire for alternatives in financial reporting.
utilised and determine their relative importance by the frequency of their use or process modification accounted for by the cue (Dillard, 1984). As a consequence, during this period, consistent with the audit literature, there were several studies that utilised the protocol analysis approach to study bankruptcy and default prediction and stock selection.

Biggs (1984), for example, used verbal protocol to trace analysts’ information search behaviour in the assessment of a firm’s earnings power. The individual analysts demonstrated similarity in preferring income statement information to balance sheet information. However, they differed in their information search strategy. Some analysts used a predictive strategy, while others used a historical strategy, or a combination of both strategies to predict the firm’s future earnings power. Bouwman et al. (1987) also observed that analysts used checklists and templates of task-specific knowledge to make their initial screening of firms. Other studies found that information search behaviour in equity screening tasks differed among different types of analysts. Anderson (1988), for example, found that professional analysts and novices differed in their data selection, weights assigned to cues, effort expended on the task and conclusions. The findings from the protocol analysis studies provided additional valuable descriptions of the search strategies and decision aids used by different types of decision-makers.

Several studies addressed the deficiencies in the experimental designs of previous studies. The deficiencies include (i) preselection of financial information cues, (ii) unrepresentative financial data, (iii) the revelation of the base rate of bankruptcy and (iv) the use of an unrealistic base rate. In experiments conducted in the 1970s, the researcher often preselected a set of financial information for the participants to evaluate. These studies had assumed that the chosen set of financial information was similar to that required by participants in their actual decision-making. Abdel-Khalik and El-Sheshai (1980) argued that, in practice, analysts and loan officers generally had the opportunity to select the financial information for performing their tasks. An experiment was conducted to investigate whether the choice or use of information affected the prediction of loan defaults. Consistent with their hypothesis, they found that the choice of information cues, and not the processing of cues, affected the participant’s prediction of a firm’s default rate.

Previous experiments that investigated bankruptcy or default predictions (e.g. Libby, 1975) generally provided participants with a single year of financial data. However, in practice, loan officers would use time-series data for evaluating a firm’s solvency. Zimmer (1980) provided a time series of ratios to loan officers in their experiment and found that his participants made accurate predictions and

10 A predictive strategy is used when participants make a prediction of the firms’ future earning power based on an evaluation of the financial information. A historical strategy refers to the assessment of the firms’ earning power on the basis of the financial information without any explicit predictions of earning power.
that the intersubject agreement was high. These results were consistent with those of Libby (1975), who used data for a single year in his experiment. Casey (1980a) addressed both the length and age of data in his study. Casey (1980a) presented bank officers with ratios for the period 3–5 years prior to bankruptcy. Notwithstanding the use of a more representative set of time-series data, his results for subjective perceived weights on the cues and intersubject agreement for the cue weights were similar to those obtained in Libby (1975).

Evidence in the psychology literature (e.g. Kahneman and Tversky, 1973) suggested that participants ignored base rates in generic decision-making situations. Early studies on bankruptcy prediction made the assumption that financial experts also behaved in a similar fashion. Hence, the revelation of base rates (albeit unrealistic) in an experiment would be trivial. Several studies investigated the impact of revelation of base rates on predictive accuracy. Houghton (1984) investigated whether the difference in predictive accuracy of participants in Zimmer (1980) and Casey (1980a) was because of the revelation of base rates by Zimmer but not by Casey. Despite the similarity in both experiments, the participants in these two studies obtained different predictive accuracy (77 per cent and 57 per cent, respectively). Casey’s participants had poorer overall predictive achievement because of their inferior predictive performance on bankrupt firms. Houghton found that both the revelation of base rates and the age of the data affected the predictive ability of loan officers.

Johnson (1983) investigated the relationship between the use of base rate and the use of representativeness heuristic in the prediction of firm bankruptcy. Research in the psychology literature showed that decision-makers used heuristics to reduce the cognitive effort associated with making probability judgments (Slovic and Lichtenstein, 1971; Hogarth, 1975; Slovic et al., 1977; Einhorn and Hogarth, 1981). The representative heuristic referred to the use of stereotypical and salient characteristics of group of objects (e.g. bankrupt firms) to decide whether an object of interest (e.g. firm ABC) would belong to the same group. Johnson found that participants appeared to adopt the representativeness heuristic in their assessment of a firm’s probability of bankruptcy. However, base rates were not completely ignored. The base rate appeared important when participants perceived that they could not use a firm’s financial profile to discriminate between the bankrupt and non-bankrupt firms. In contrast, Abdel-Khalik and El-Sheshai (1980), Casey (1983) and Casey and Selling (1986) found that the revelation of base rates did not affect the prediction of bankruptcy or default rates. Other factors appeared to be more important in these decisions. A further issue with the base rates in prior studies was that the researcher usually chose a base rate (e.g. 50–50 split between bankrupt and non-bankrupt cases) that was significantly higher than the actual rate of bankruptcy experienced by participants. Houghton and Sengupta (1984) investigated whether a lower base rate (33 per cent) than that used in the existing literature (50 per cent) affected the predictions of firm failures and found that participants had a better predictive accuracy when the base rate was lower.
In summary, the evidence from these studies on revelation of base rates showed that base rates were not completely ignored by participants in a financial setting. Base rates were important when they were not unrealistically high, when task predictability was low and when the available financial information was not suitable.

There were a few studies that investigated other types of disclosures including non-historical cost information, forward-looking information and socio-economic information. The provision of non-historical cost information did not lead to improved decisions (Enis, 1988). In contrast, the provision of forward-looking information and socio-economic information contributed to an improvement in decisions. Danos et al. (1989) found that additional disclosure on forward-looking information affected the initial judgments of bank officers. They found that bank officers demonstrated a very high level of confidence in their decisions in the initial stages of their decision-making process, despite being provided with limited information on the company’s background and historical financial position. However, these bank officers were willing to deviate from their initial decision when provided with additional forward-looking information that indicated that their initial position was erroneous. This result was inconsistent with findings in the psychology literature that showed that judges did not alter their initial decision when provided with contradictory subsequent evidence (Koriat et al., 1980). Belkaoui (1980) found that the disclosure of socio-economic information (pollution abatement costs) in the financial statements had an impact on investment decisions of bankers and accountants. The impact of the disclosure of pollution abatement costs on decision-making was greatest for bankers.

Other studies investigated the effect of accounting treatments on lending decisions. Wilkins and Zimmer (1983), for example, found that lenders were concerned about the economic level of leverage of the firm and not the accounting treatment of leases (recognition versus disclosure).

Individuals may use heuristic procedures that simplify cognitive processing (Tversky and Kahneman, 1974). Moser (1989) conducted an experiment to investigate whether two psychological aspects of prediction, namely output interference and availability, influenced the investors’ prediction of earnings. Output interference occurs when the items recalled first from memory can influence the subsequent recall or subsequent decisions of individuals. Availability refers to the ease with which similar instances about an event or possible reasons about the event can be brought to mind. He found that both output interference and availability affected the assessment of the firm’s future earnings. The effect of output interference and availability persisted even though additional financial information was given.

There were also studies that investigated the impact of information overload on the predictive accuracy of loan officers. Casey (1980b), for example, varied the information load by providing participants with ratios (low information load), ratios and financial statements (medium load) and ratios, financial statements and notes (high load). The availability of more information did not lead
to a greater predictive accuracy, which contrasted with the findings in Abdel-Khalik (1973).

As noted earlier, research on presentation format in the 1970s demonstrated that decision-makers were influenced by the type of presentation format. The two studies on presentation format during this decade did not find evidence of improved decision-making. Desanctis and Jarvenpaa (1989) investigated the effectiveness of the form of disclosure on the forecasting of future earnings. Two commonly used reporting formats (numeric versus graphical presentation of accounting data) were compared in the experiment. Similarly, Davis (1989) examined the impact of presentation format (line graph, bar chart, pie chart or table) on performance accuracy.

In summary, the 1980s can be characterised as a period of consolidation for JDM research in financial accounting. Most of the papers were replications or extensions of work conducted in the 1970s. There were few studies that deviated from the mainstream research of analysing lending and investment decisions. An examination of the number of papers published during this period showed that in the second half of 1980s, there was a decline in the number of publications (25 versus 15). The start of this decline can be traced to the criticisms of Gonedes and Dopuch (1974) about the earlier experimental work in financial accounting. Gonedes and Dopuch argued that the experiments in earlier studies were not theory driven and/or poorly designed. Further, the cognitive bias and limitations of individuals, even if present, would be eliminated in a competitive market setting. The results from these studies of individual behaviour offered little guidance to standard setters who were interested in market-level effects. Consequently, when financial databases were available during this period, financial accounting researchers largely abandoned the experimental approach in favour of econometric modelling and analysis (Maines, 1995; Libby et al., 2002). A detailed discussion of these criticisms can be found in Libby et al. (2002).

8. 1990s – financial accounting

The decline in the number of financial accounting publications in JAR and TAR continued into the 1990s. AOS, which had a substantial increase in financial accounting papers in 1980s, also experienced a decline in the 1990s. In the second half of the 1990s, a reversal in this trend was observed. Two factors, namely theoretical advances in the related field of psychology and the discovery of several types of market inefficiencies by archival researchers, had contributed to this revival.

The 1980s and 1990s witnessed a rapid growth in psychological theories. Judgment and decision-making researchers in the 1990s could draw on these fundamental theories to specify the causal link between the variable of interest and the behavioural response. Further, JDM researchers could determine whether the predictions from these general theories were applicable to accounting settings where the decision-maker’s attributes and institutional features were important.
As Gibbins and Swieringa (1995, p. 234) pointed out, ‘[j]udgment research in accounting ... is both theory driven and setting sensitive’. Judgment and decision-making researchers in the 1990s were in a better position to meet both these requirements.

As noted earlier, the availability of financial databases during this period greatly facilitated the use of econometric techniques to investigate financial accounting issues. Several market inefficiencies, including the postannouncement earnings drift, were uncovered using this approach. The prevalence of these inefficiencies challenged the widely held belief that capital markets were semi-strong-form efficient. The difficulty of controlling for all confounding factors in a natural setting made it difficult for archival researchers to identify the causes of these inefficiencies. In contrast, experiments were eminently suited to this form of investigation. The experimental researcher could manipulate variables of interest and could use randomisation to control for potentially influential variables.

Specifically, JDM researchers were motivated to investigate whether the cognitive limitations and bias of individual investors contributed to these observed inefficiencies. Maines and Hand (1996), for example, examined the weights investors assigned to the autoregressive and moving average components of a quarterly earnings series. In contrast, archival studies could only indirectly determine these weights using an analysis of how these predictable components in earnings affected future abnormal returns (e.g. Ball and Bartov, 1996). Maines and Hand found that investors consistently underweighted the moving average component of the time series, but underweighted the autocorrelation component only when the component was large. In addition, investors overweighted the seasonal component of past earnings when a year-to-year comparison of quarterly earnings was provided.

In a similar vein, Libby and Tan (1999) investigated whether the apparent contradiction in behaviour and opinions of analysts regarding management warnings could be reproduced in an experimental setting. Archival studies showed that management warnings were associated with a decline in forecasts (actual behaviour), even though analysts typically indicated that they preferred firms that warn about poorer earnings (stated belief). Libby and Tan found that when management’s warning preceded earnings announcement, analysts made the largest downward revision for their forecasts. Conversely, when the warning was simultaneously issued with earnings announcement, earnings forecasts were higher for these firms than for firms without warnings. Libby and Tan concluded that questions posed to analysts regarding warnings caused analysts to evaluate the warnings and earnings announcement simultaneously, which lead to favourable forecast revisions. However, in practice, analysts evaluated the warning before earnings announcements, which might explain the downward revisions for warnings observed in archival studies.

Two other major research themes during this period can be identified: the presentation of financial information and the timing and disclosures by managers and analysts. The first set of studies examined how presentation of financial
information (including form, type and classification) affected decision accuracy and the confidence in decisions of investors and analysts. The lack of research on presentation of financial information was highlighted in three review studies (Libby, 1981; Libby and Lewis, 1982; Maines, 1995). There were only a few studies prior to the 1990s (e.g. Moriarity, 1979, Desanctis and Jarvenpaa, 1989). Research of this nature was considered important to standard setters because it would help them assess the impact of content and form of disclosures on the decisions of investors.

Most of the research on presentation effects was examined in the context of proposed accounting standards, areas where standards offered less precise guidance, or voluntary disclosures. The types of decisions investigated included stock valuation, detection of earnings management and assessment of a firm’s future liability. Hopkins (1996), for example, demonstrated that the classification of mandatory redeemable preference shares (MRPS) as liability or equity created differences in the valuation of a firm. Hopkins concluded that the classification for the MRPS offering caused participants to access their prior knowledge about the differential effect of equity (debt) issues on valuation.

Research in psychology demonstrates that only clearly presented information will be utilised in decision-making. One study examined whether the provision of easily accessible information in the financial statements would allow users to detect earnings management. Hirst and Hopkins (1998) found that appropriate placement of the gains or losses for available-for-sale securities in the financial statements improved the ability of users to detect earnings management. When the unrealised gains on sales were reported within the reconciliation of comprehensive income and net income, the valuation of the firm was adjusted for the earnings management activity. However, when the unrealised gains were reported in the Statement of Changes of Equity, the stock valuation of a firm with earnings management was significantly higher than that of a firm without earnings management.

Accounting standards provide managers with flexibility in disclosing the value of their firm’s contingent liabilities, including the minimum value, maximum value, best estimate or a range of estimates. Kennedy et al. (1998) demonstrated that participants displayed a cognitive bias by anchoring on a given liability disclosure when making judgments about the remaining parameters of the distribution of potential liability. The bias also influenced participants’ decisions about liability settlements and capital allocation assessment, holding constant the participants’ judgments about risk and management credibility.

Maines et al. (1997) examined the effects of proposed accounting standards on the decisions of investors. They investigated the effect of proposed segment disclosures on the judgment of analysts. Analyst-participants perceived segment reporting to be reliable when the reported segments were congruent with internal segments and when reported segments consisted of businesses with similar products. When the reported segments were different from those used for internal...
reporting purposes, analysts were more confident about their judgments when the reported segment did not have dissimilar products.

Another active area of research examined whether the content and timing of disclosures by managers and analysts influenced the decisions of investors. Managers have incentives to make voluntary disclosures (e.g., forecasts or earnings warnings) to influence analysts’ prediction of earnings. Managers can also present information in the way that obfuscates poor performance and emphasises favourable performance to influence an investor’s valuation of the firm. Analysts may have incentives to bias their forecasts to secure investment banking business with their clients. Whether investors recognise and respond appropriately to the strategic choices of managers and analysts are investigated in several studies.

Hirst et al. (1999) investigated whether investors’ earnings prediction and confidence in their own prediction were influenced by the form of the manager’s earnings forecast and his/her prior earnings forecast accuracy. The form of the forecast (range of earnings forecasts and point estimate) was manipulated. They found that investors’ earnings predictions were influenced by management’s forecast accuracy, but not the forecast form. However, both the form and accuracy of prior forecast affected the investors’ confidence in their earnings prediction when management was historically more accurate. Two studies examined the effect of analysts’ biased reporting on investors’ decisions. Hirst et al. (1995) investigated whether investors recognised the implications of an analyst’s lack of independence (i.e., having a pre-existing investment banking relationship) when using research reports. They found that favourable reports about a firm were more likely to be issued by non-independent analysts than by independent analysts and that investors who obtained favourable reports placed more emphasis on the independence of the analysts than on the strength of the arguments in the research report in their assessment of the firm. In contrast, participants assigned a lower performance rating to firms evaluated by non-independent analysts when provided with more persuasive arguments for the unfavourable report. Ackert et al. (1996) examined whether forecast bias in the analysts’ reports affected an individual’s decision to acquire the information. They found that the presence of bias in the forecasts did not affect the individual’s decision to acquire the forecasts during economic uncertainty.

Protocol analysis was used by Hunton and McEwen (1997) to determine the cognitive search strategies of a group of analysts. However, they embedded this technique within their broader experiment, which was to investigate whether cognitive search strategies and incentives affected analysts’ forecast accuracy. In their study, more accurate analysts were found to employ a directive information search strategy, rely more on regressive trends in earnings and respond less to recency effects than do less accurate analysts. The presence of incentives also led to more optimistic forecasts.

There were several studies that examined the effect of information load on decisions. Individuals are expected to experience information overload when
their psychological information load exceeded their processing capabilities. These individuals would make lower-quality decisions, and their information usage was predicted to be a concave function of number of information cues (Schroder et al., 1967). Chewning and Harrell (1990) found experimental support for the predictions of Schroder et al.’s model. Tuttle and Burton (1999) extended Chewning and Harrell (1990) and showed that in the presence of monetary rewards, individuals spent more time on information cues and used more cues. In addition, Stocks and Harrell (1995) found that the judgment quality of groups was higher than that of individuals, regardless of the number of information cues provided. These three studies demonstrated that the individuals differed in their use of information cues for decision-making, and given sufficient incentives, they could be motivated to use more information cues.

A few studies also investigated how knowledge affects decisions. Hopkins (1996) showed that analysts mentally access knowledge of similar or related situations based on the accounting classification used in the financial report and used this prior knowledge for decisions. Kida et al. (1998) investigated how encoding and retrieval of numerical data from memory affected decisions. They found that managers were better at retrieving affective reactions to numerical data from memory structures than numerical data. An affective reaction was defined as ‘an evaluative response that represents a positive or negative valence in memory structures’. The manager’s prior affective reactions strongly influenced the manager’s subsequent decisions.

In summary, the late 1990s saw a revival of JDM research in financial accounting. These studies were characterised by stronger theoretical foundations and more robust experimental design. The 1990s also saw a significant decline in studies on lenders’ decisions, but a considerable increase in studies on the decision quality of investors and analysts. There was one study on lenders’ decisions by Beaulieu (1994), who found that inexperienced lenders relied on the borrower’s character facts when accounting facts were negative, but experienced lenders never relied on character information. Two new research themes emerged: whether observed market anomalies had their basis in cognitive limitations and bias of individual investors and the effect of strategic choices by producers of information (such as managers and analysts) on the users of such information.

9. 2000s – financial accounting

The strong revival in JDM research in financial accounting continued into the 2000s. By the end of the decade, there were a total of 31 publications, the majority of which was published in TAR (20). There was one related paper in AOS; JAR and CAR both had five papers, respectively. All these studies focused on the decisions of analysts and investors, except for two papers that examined managerial decisions. There were no studies that investigated the decisions of lenders and creditors.
Two research themes identified in the previous decade, namely the effect of presentation formats and disclosures and the effect of strategic choices of producers of information (such as managers and analysts) on investors’ decisions, continued to be important in this decade. The third stream of research, which focused on whether market inefficiencies had its origins in the cognitive limitations and bias of investors, had largely ceased. Much of the decline can be attributed to the lack of archival evidence on new market anomalies and the success of research in the 1990s in demonstrating the causal link between cognitive limitations of investors and market inefficiencies. Behavioural finance models, for example, now incorporate the tendency of investors and analysts to be optimistic (e.g. Gervais and Odean, 2001). During this decade, there was only one study that investigated an existing market anomaly.\textsuperscript{11} Pinello (2008) examined whether the greater market reaction to positive earnings surprise compared to negative earnings surprise, as observed by archival researchers (e.g. Bartov \textit{et al.}, 2002), was caused by differences in investors’ expectations and analysts’ forecasts. Investor’s expectations were unobservable in practice, and archival studies commonly used analysts’ forecasts as a proxy. The use of an experimental approach enabled Pinello to observe investors’ expectations and measure earnings surprise based on these expectations. She observed that investors adjusted their expectations downwards when they perceived that analysts’ forecasts were optimistic. When the earnings surprise was measured against these expectations, a negative earnings surprise created a greater change in the valuation of the stock compared to a positive earnings surprise. However, an opposite effect (similar to that observed in archival studies) was observed when the surprise was measured against the optimistic analysts’ forecasts.

A new stream of research, which focused on the cognitive limitations of analysts, gained prominence during this period. Since the 1980s, numerous archival studies had demonstrated the persistent bias and inefficiency in analysts’ forecasts. In the review of the analyst forecasting literature, Brown (1993) and Schipper (1991) proposed the use of experiments to provide a greater insight into the decision processes of analysts. Judgment and decision-making researchers appeared to have responded in a significant way to this suggestion. By the end of this decade, there were at least ten papers that examined different aspects of the analysts’ decision-making process, including the effect of cognitive limitations and incentives on forecast bias, methods to reduce analysts’ optimism and the effect of management’s

\textsuperscript{11} Note that there were two papers (Bloomfield \textit{et al.}, 2003; Nelson \textit{et al.}, 2003) that used laboratory markets to examine the existence of market anomalies. These two papers do not fall under the scope of our review. There were also several studies were motivated by the observed bias in forecasting of investors and analysts. However, the objective of these studies was not to explain the bias, but to offer suggestions as to how to overcome the bias. For example, Krische (2005) investigated both presentation effects and reasons for the observed bias in analysts’ forecasts, as reported in archival studies. For these studies, we group them under studies that investigate presentation effects.
strategic choices on analysts’ forecasts. The last two areas will be discussed, respectively, in the sections relating to presentation formats and strategic choices.

Two studies investigated the causes of analysts’ optimism, and one study investigated the techniques for reducing analysts’ optimism. Sedor (2002) found that forecast optimism was an unintentional consequence of analysts’ reactions to the structure of information about managers’ future plans. Sedor observed that analysts made more optimistic earnings forecasts when managers provided scenario-based plans instead of a list of plans. Scenario-induced optimism in the forecasts was greater for firms with prior losses than for firms with prior profits. Kadous et al. (2006) further demonstrated that scenario-induced optimism in analysts’ forecasts could be managed through the use of counterexplanations. They observed that when analysts could effortlessly generate several reasons for why a manager’s plan might fail, forecasts were less optimistic. However, their forecasts remained optimistic when they experienced difficulty in generating counterexplanations. Analysts appeared to use the difficulty in generating reasons as a heuristic cue about the likely success of management’s plan.

Libby et al. (2008) investigated whether analysts’ incentives to maintain relationships with management explained the optimistic and pessimistic patterns in analysts’ forecasts. Several archival studies (e.g. Ke and Yu, 2006) had reported that analysts’ forecasts tended to be optimistic at the beginning of the financial year, but became pessimistic as the earnings announcement date approached. Libby et al. found that analysts in their study deliberately issued lower forecasts prior to earnings announcement because they believed that the action would lead to a greater access to management. Their study was conducted after the Regulation Fair Disclosure (2000), which required management to simultaneously disclose information to all investors. Libby et al.’s finding was particularly interesting because it indicated that the strategic behaviour of analysts was not curtailed by this new regulation.

One of the objectives of financial reporting is to provide information useful to investors in their decision-making. Psychological research demonstrated that information is not used unless the information is presented in an accessible format. Research on the form and presentation of financial information continued to be a dominant theme in the 2000s. Several studies found that presentation effects differed among different groups of decision-makers. Maines and McDaniel (2000), for example, extended Hirst and Hopkins (1998) by investigating the effect of presentation of financial information on non-professional investors. Hirst and Hopkins had found that analysts utilised information about unrealised gains and losses (UGL) in the valuation of a firm when it was presented in the Statement of Comprehensive Income, but not when it was presented in the Statement of Equity. In contrast, Maines and McDaniel found that the presentation format did not affect non-professional investors’ acquisition and evaluation of that information. However, the presentation of UGL information in the Statement of Comprehensive Income significantly influenced the weights assigned to the perceived volatility of the firm.
Frederickson and Miller (2004) found significant differences in the use of pro forma earnings by non-professional investors and analysts. The stock price estimation for non-professional investors who received both pro forma and GAAP earnings was higher than that of non-professional investors who received only GAAP earnings. In contrast, the stock price judgments of financial analysts were not affected by the pro forma disclosures. Elliott (2006) extended Frederickson and Miller (2004) by examining whether emphasis of pro forma earnings and presence of a reconciliation between pro forma and GAAP earnings influenced analysts’ reliance on pro forma disclosures in investment decisions.

By far, the largest group of studies focused on how different types of disclosures and presentation formats reduced the cognitive limitations of investors. Hirst et al. (2003), for example, found that investors could not clearly distinguish between accurate and opportunistic estimators when provided with only the balance sheet effects of the misestimation. However, when additional disclosures of earnings implications were given, investors were able to distinguish between the two groups of estimators. Hirst et al. (2004) investigated whether recognised or disclosed information influenced the decisions of analysts with banking expertise. They found that when gains and losses were partly recognised in the Statement of Comprehensive Income, and partly disclosed in the notes, analysts were unable to distinguish between riskiness of exposed and hedged firms.

Nelson and Tayler (2007) examined the impact of effort on the use of disclosed information. In their experiment, participants were required to capitalise the disclosed future payments of operating leases to evaluate their impact on the firm’s solvency position. Drawing on psychological theories on the pursuit of information, Nelson and Tayler (2007) hypothesised that disclosed information would be useful to investors in their assessment of a firm’s riskiness when they had to expend effort to convert the disclosed (disaggregated) information to an aggregated basis (i.e., similar to recognition format). They found that effort had a positive effect on the usefulness of disclosed information.

Several studies found that appropriate qualitative disclosures and their placement could help reduce the bias in the forecasting by investors. Koonce et al. (2005a), for example, investigated whether the disclosures about financial instruments enabled investors to better assess the riskiness of a firm. They found that investors were affected by the labels used to describe the financial instruments and the provision of additional information about the risk exposure did not alter their initial assessment. Other findings showed that the disclosure of both potential gains and losses (instead of potential losses only) enabled investors to distinguish among firms with different risk management strategies. Krische (2005) found that when financial statements contained a clear description of a prior-period item, investors adjusted their earnings forecast to reflect this disclosure. The addition of an adjusted earnings benchmark in the financial statements did not result in further adjustments to their forecasts. When the descriptive information was obfuscated, the investor’s earnings prediction was not affected, even though the investors were previously informed about the prior-period item. Krische
suggested that memory limitations were responsible for the difference in the forecasting decisions of investors. Tan and Tan (2009) found that erroneous disclosures (even if subsequently corrected) continued to influence an investor’s final assessment of the firm’s earnings potential. The investors’ judgments were less influenced by the erroneous disclosure when the corrected disclosure was placed before the original disclosure.

Prior archival studies (e.g. Sloan, 1996) demonstrated that investors do not fully incorporate the differential persistence of cash flow and accrual components of earnings into their forecasts. Two studies demonstrated that a more transparent cash flow statement would assist investors and analysts in making more accurate earnings prediction. Hewitt (2009) found that earnings forecasts for both analysts and non-professional investors were more accurate when they were required to provide separate forecasts for operating cash flows and accruals and when disaggregated cash and accrual components of earnings were presented in the income statement. Hodder et al. (2008) found that indirect cash flow statements that had operating cash flows presented first, followed by changes in accruals, resulted in lower cash flow forecast error and dispersion. Providing consistent signs in the cash flows and change in accruals also resulted in more accurate cash flow forecasts. In contrast, the reverse form of presentation (which is the mandated presentation form for the indirect cash flow statement) impeded the learning of the time-series behaviour of cash flows and accruals by investors.

In summary, the studies on presentation effects in this decade continued to provide standard setters with the basis to evaluate the behavioural implications of new standards and the modification of existing standards (Maines, 1995). The shift in focus to investigating mechanisms that would alleviate the cognitive limitations of investors and analysts was a significant development in this area of research.

The research that focused on whether strategic choices by managers influenced the behaviour of users of their reports experienced a slow growth during this decade. In the 1990s, several studies demonstrated that investors were ‘fooled’ by the strategic choices of managers and analysts. Tan et al. (2002) provided further evidence that skilled users of financial information such as analysts were also influenced by management’s purposeful under- and overstatement of earnings in their pre-announcement warnings. When management had positive earnings news, an understatement (instead of an exact statement or overstatement) of pre-announcement earnings generated the highest forecast revision after actual earnings announcement. For negative news, an overstatement of the magnitude of the negative news in management’s warning generated the highest forecast revision. Analysts indicated in their debriefing questionnaire that they were aware of pre-announcement earnings bias; nonetheless, the experimental results showed that they did not incorporate the bias in their actual forecast revisions.

Two studies examine the credibility of management’s disclosure. Mercer (2005) found that the disclosure decisions of managers had an impact on the credibility assessment by investors. Managers who were more forthcoming in their disclosure about negative news were considered more credible in the short term.
However, in the long-term assessments of management credibility, investors were more concerned about the type of news (positive or negative) instead of managers’ willingness to make the disclosure. Hirst et al. (2007) investigated whether the disaggregation of management forecasts would lead to an increase in investor’s assessment of their credibility. They found that disaggregated forecasts (i.e., forecasts that included individual line items) affected investors’ perception of the precision of management’s beliefs, clarity of the forecast and financial reporting quality. They also found that disaggregated forecasts reduced the effect of managerial incentives only through its effect on perceived financial reporting quality.

Recent studies demonstrated that there were limits to the effect of strategic managerial choices on investors’ decisions. Hodge et al. (2006) showed that the strength of association between the incentive-consistent disclosures and the perceived credibility of these disclosures was jointly influenced by the level of reporting discretion and management’s reporting reputation. Hodge et al. found that investors tended to rely less on the incentive-consistent classification when the classification was mandatory or when management had a reputation for credible reporting. Clor-Proell (2009) demonstrated that the effect of managerial voluntary choices of accounting methods on investors’ decisions depended on investors’ expectations regarding these choices. She found that the investors’ credibility judgments and investment decisions were influenced by the disparity between the expected accounting choice and the firm’s actual accounting choice. However, judgments about future profitability and information reliability were not affected by this disparity.

There were also studies that investigated the factors that affected investors’ expectations, risk assessment and beliefs. Hales (2007) found that investors’ expectations about a firm’s performance were jointly influenced by the investors’ preferences and the type of news (good versus bad). Investors based their investment decisions on information that suggested that they might profit from the investment and disregarded information that suggested the contrary. Koonce et al. (2005b) demonstrated that both decision theory variables (such as probabilities and potential outcomes) and Slovic’s (1987) behavioural variables (such as dread and unknown) were important in explaining investors’ judgments about the riskiness of financial instruments. They found that potential loss outcome associated with a financial instrument created a greater dread for participants, which led to a greater perceived riskiness of the firm. Kadous et al. (2009) found that both forecast accuracy and forecast boldness influenced investors’ beliefs about the credibility of analysts.

Managerial decisions had traditionally been examined within a management accounting context. A new stream of research investigates how external reporting requirements influenced managerial investment choices. Jackson (2008), for example, found that the adoption of straight-line depreciation, instead of accelerated depreciation, caused non-executive managers to invest in non-value-maximising projects. Bhojraj and Libby (2005) investigated whether an increase in capital market pressure and reporting frequency caused managers to display
‘myopic’ investment behaviour, i.e., the tendency to choose projects that had higher short-term earnings but poorer overall cash flows. They found that pressure from an impending stock issue led to such behaviour. An increase in reporting frequency in the presence of high market pressure exacerbated the tendency of managers to accept this type of projects. Hunton et al. (2006) demonstrated that reporting of gains and losses associated with available-for-sale financial instruments in comprehensive income (instead of the Statement of Equity) reduced the likelihood that managers would engage in earnings management through sales of these investments. Managers believed that the increased transparency would reveal their earnings management actions, which would result in a negative impact on stock prices and their reputation.

As in the 1990s, there are a few studies that investigated how knowledge affected an investor’s decision performance. Han and Tan (2007) investigated whether guidance form had a differential effect on the earnings assessment by high-knowledge and low-knowledge investors. ‘Knowledge’ in their study referred to an understanding of earnings guidance form and the market effects of deviating from analysts’ forecast. The participants were asked to make two estimates: one after the management guidance (known as primary estimates) and the other after the actual earnings were announced (known as re-estimates). They found that the earnings re-estimates of high-knowledge participants were the highest (lowest) when management provided a range (point) estimate. In contrast, the guidance form did not affect the confidence of low-knowledge participants.

In summary, JDM research in financial accounting in the 2000s extended the research conducted in the 1990s. A general picture about the factors that affect the analysts’ and investors’ decision performance is emerging from these studies. The research on analysts’ forecasts demonstrated that both cognitive limitations and incentives can lead to biased earnings forecasts for analysts. Much of the presentation format research indicates that both investors’ and analysts’ judgments and decisions are affected by the amount and placement of information in the financial statement. This research also demonstrates that, with appropriate disclosures and presentation formats, the cognitive limitations of investors and analysts can be avoided. The research on external reporting requirements indicates that reporting standards have an indirect influence on the operational decisions of managers, including their investment and earnings management decisions. These findings, together with those on presentation formats, can benefit standard setters in their deliberations on the appropriate form and content of disclosures.

10. 1970s – management accounting

Judgment and decision-making research in management accounting in the 1970s was relatively sparse, and much of it appeared to be motivated around the predictions of normative economic models. However, even at this stage, there
were a few researchers who were embracing psychology research in an effort to better understand the role that accounting might play in motivating decision-makers and addressing cognitive limitations, and there was evidence of interest in understanding the unique decision-making strategies of individuals (see, for example, Dickhaut and Eggleton, 1975; Magee and Dickhaut, 1978). Given that the JDM research in management accounting was both limited in volume and varied in the 1970s, the literature has been very broadly classified into two areas: optimal information provision and motivation.

A key role of management accountants is to provide information that enables employees to make organisationally desirable decisions regarding the use of scarce resources (Sprinkle, 2003, p. 288). Questions researchers in the 1970s were asking included: how information should be provided, for example, level of aggregation (Ronen, 1971; Barefield, 1972); what type of information should be provided, for example, opportunity cost (Becker et al., 1974) and feedback (Mock, 1973); and how much information should be provided to address or avoid problems such as functional fixation (Ashton, 1976) and cognitive overload (San Miguel, 1976).

Management accountants must make decisions regarding how information should be provided; the degree of information aggregation in reports is one such example. Ronen (1971) examined participant responses to two levels of information aggregation, comparing them to the predictions of a subjective expected utility model. He found that aggregation level did affect decisions, with participant responses deviating most from the model when information was disaggregated. In contrast, participants in Barefield’s (1972) study performed better with disaggregated information (contrary to his predictions).

Researchers also considered what type of information should be provided to encourage optimal decisions in a managerial accounting context. For example, opportunity costs are relevant in normative economic models, but are typically not included in accounting reports. Becker et al. (1974) found that participants systematically ignored opportunity costs, or treated them as inferior to outlay costs, regardless of whether they were choosing from projects with equal or unequal margins. Further, it made no difference if the opportunity costs were included with other costs or disclosed as a footnote. Becker et al. (1974) concluded that traditional accounting systems lead to dysfunctional consequences, with individuals ignoring opportunity costs. The conclusions of Becker et al. (1974) served to motivate several follow-up studies (such as Neumann and Friedman (1978) and others in the 1980s and 1990s).

The value of accounting feedback was considered. Mock (1973) found that participants who received budget information had higher performance and showed evidence of learning. His findings indicated that variance information may still be valuable to the learning process of a manager who makes decisions heuristically, even though it is of no value in an information economics sense.

Judgment and decision-making researchers in management accounting also investigated how much information should be provided, in terms of whether and
when information quantity could improve decisions, and whether accountants would be able to determine what the optimal quantity was. For example, Ashton (1976) found that participants’ functional fixation, or inability to factor cost accounting changes into their pricing decisions, was not reduced by providing more information about the accounting change. San Miguel (1976) found evidence consistent with the theory of cognitive overload – that processing reaches a maximum level at some optimal level of environmental complexity, after which performance decreases. Uecker (1978) combined the perspectives of information economics and behavioural research – while normative theory had been used to provide insights about how to make information provision choices, little was known about accountants’ ability to correctly apply that theory. Uecker found that individuals had limited ability to determine how much information to provide to managers, and despite the provision of immediate outcome feedback, this ability did not improve over time.

While the provision of the right quantity of high-quality information should enable better managerial decisions, these decisions may not result if managers are not motivated to act in the best interests of the organisation. While there was relatively limited research on motivation in the 1970s, the research that was conducted covered a broad range of factors, such as reward structures and budget levels, employee involvement and subordinate/supervisor personality. Noticeably, most of the 1970s’ studies involving the effect of control systems on motivation were set within a participative budgeting context.

The importance of appropriate reinforcement (via reward) for maximum performance and satisfaction was highlighted by Cherrington and Cherrington (1973). They found that group performance was highest when appropriate reinforcement was offered in a participative budgeting setting – groups that were rewarded for setting and achieving high targets outperformed those that were given little pressure to perform, as well as groups that attracted heavy penalties for not meeting the budget. Lending support to the importance of appropriate remuneration, Magee and Dickhaut (1978) found that different compensation plans affected the heuristics that managers adopted when faced with cost variance investigations, which ultimately affected the costs incurred by the managers’ department. Last, Rockness (1977) found results supportive of an expectancy theory model of budgetary behaviour, which is based on the assumption that employees will be motivated to exert effort if they believe that there is a high probability that their effort will result in an outcome that they value sufficiently. Higher performance was obtained under difficult budgets and situations of higher expected reward (which was also associated with increased satisfaction).

The impact of personality factors on motivation was also investigated. Foran and deCoster (1974) did not find significant results for the effects of authoritarianism upon attitudes in a participative budget setting, whereas Ansari (1976), who examined the combined influence of variance reports and leadership style on employee satisfaction and productivity, found that supervisory style was the more dominant independent variable over time.
In summary, in the 1970s, the focus of JDM research in management accounting appeared to be on optimal information provision, with decision quality largely being determined with reference to economic theory, i.e., decisions that were closer to theoretical predictions were considered to be better. At the same time, emerging research began to illustrate the gains offered by consideration of behavioural factors and the biases and heuristics that decision-makers may utilise or exhibit in a management accounting context.

11. 1980s – management accounting

The 1980s saw significant expansion in JDM research in management accounting, and while many researchers were still motivating their studies around information economics and agency theory, psychology theories allowing the consideration of individual personality and behavioural variables were gaining popularity. Researchers were taking greater interest in identifying when and why decision-makers might make decisions that deviated from those predicted by rational economic models, whether because of judgement biases or cognitive limitations. Questions relating to optimal information provision were still being investigated, with a greater focus on information system design. In addition, the role of management accounting in motivating performance continued to attract attention, particularly the effects of incentive schemes on budgetary slack and performance. Most of the research reviewed fell into the following three areas: judgement biases and cognitive limitations; information system design; and determinants of slack and performance. These issues are discussed later.

In the 1980s, the interest in judgment biases continued. Research supported earlier findings of the existence of functional fixation in a managerial accounting setting. Using a similar pricing task to Ashton (1976), Dyckman et al. (1982) found that there was no information processing response to an accounting change or to any of the additional information provided about that change. Barnes and Webb (1986) found that participants altered pricing in response to reported costs that were caused by a measurement change alone. Opportunity costs were also investigated further, partly because of the conflicting findings from the 1970s regarding decision-makers’ inclination or ability to incorporate opportunity costs into their decisions. Friedman and Neumann (1980) went some way to reconciling earlier research, finding that opportunity cost information was ignored unless it was explicit and made available at no extra cost, and Hoskin (1983) found that the provision of explicit \textit{ex post} opportunity cost information led to improved responses over time.

The relevance of psychological biases to decision-making in a managerial accounting setting was considered, with researchers examining hindsight bias (see for example Brown and Solomon, 1987) and attribution bias. For example, attribution theory suggests that superiors and subordinates are likely to have different perceptions of what caused subordinate behaviour, when information about that behaviour is incomplete (Shields et al., 1981). The tendency is for the
subordinate to emphasise the role of external, environmental conditions on their behaviour in instances of poor performance and for the superior to emphasise the role of internal properties of the subordinate, such as their personality or attitudes (Harrison et al., 1988). Harrison et al. found support for this, with superiors seeking information of a more internal nature than subordinates when performing performance assessments. In contrast, while Shields et al. did not find significant differences in information search, they did find that superiors and subordinates drew different final conclusions about subordinate performance from that information, because of different initial causal attributions.

Cognitive limitations and their implications for performance in managerial accounting settings were further investigated. There was growing interest in the ways in which situational or individual variables could interact with cognitive limitations (Brown, 1981, 1983). The effects of information complexity (see for example Shields, 1980; Iselin, 1988) and use of interactive groups (Uecker, 1982) on decision quality were examined, as were the usefulness of various decision models and decision aids in identifying and addressing cognitive limitations (Ashton, 1982a; Lewis et al., 1983). Further, Lewis et al. used verbal protocol analysis, which allowed them to analyse the components of decision processes, rather than try to draw inferences from the inputs to and outputs of those processes.

The second key area of managerial accounting research in the 1980s was related to optimal information provision and the implications of human decision-making processes for information system design. For example, Larcker (1981) found that while executives in his experiment had similar information characteristic preferences prior to making a capital budgeting decision, the desired information characteristics depended on the stage of the decision (problem identification, alternative development or selection). Shields (1983, 1984) adopted a ‘predecisional’ research approach to examine the relationship between information supply, demand and performance judgement accuracy. Brown (1987) examined individuals’ estimations of causal likelihoods of labour variances, and Gul (1984) simultaneously considered the effects of personality and cognitive variables on decision confidence. Hilton et al. (1988) and Turner and Hilton (1989) examined the role of accounting product costing information in product quantity decisions.

The third key area of research was related to determinants of slack and performance. Researchers were starting to consider the effects of personality variables on these relationships. Brownell (1981) and Licata et al. (1986) investigated how ‘locus of control’ – a personality variable describing the degree to which individuals accept personal responsibility for what happens to them – affected the relationship between budgetary participation and performance. Brownell found that participation had a positive effect on performance and learning when subordinates felt that they had control over their performance (‘internals’), but a negative effect when they felt that performance was more externally driven (‘externals’). Licata et al. found that supervisors who were internals tended to allow greater participation. Combined, these results suggest that locus of control
may have a relationship with the extent to which a superior is willing to accept subordinate input and the extent to which a subordinate is motivated to learn and perform in a participative budgeting context.

Several studies considered the effect of social or psychological influences in the context of participative budgeting and/or incentive contracts. Young (1985) found that budgetary slack was highly negatively correlated with the extent to which subordinates felt social pressure to reveal their private information, and Belkaoui (1985) found that individuals who had temporarily lowered self-esteem were more likely to build in slack. Daroca (1984) examined the effect of social pressure in groups engaging in participative budgeting, with reference to social influence and informational influence theories. Daroca’s findings indicated that there was polarisation within groups, with a shift in behaviour to be more socially acceptable, but also that people reverted back to their initial positions after group interaction. Baiman and Lewis (1989) assessed whether the disutility that participants experienced from explicitly lying under a communication-based contract would lead to behavioural outcomes different to those predicted under an agency model. Their results supported the agency model – the presence of a very small incentive was enough to overcome any disutility from explicitly lying.

In addition to questions about the impact of different incentive schemes on motivation and performance, two other questions were examined in detail: the potential effect on human resourcing and the ability to induce truthful behaviour. Drawing on expectancy theory and analytical research, Chow (1983) examined the effects of job standard tightness and type of compensation scheme on job performance. Chow (1983), Waller and Chow (1985) and Shields and Waller (1988) all found that participants selected employment contracts based on their performance capabilities. The former two studies examined contract selection from the employees’ viewpoint and found that it could also explain effort effects. From a contract design perspective, the implication is that higher performing individuals may be attracted to organisations that offer contracts with an explicit link between pay and standard-based performance.

The benefits of truth-inducing pay schemes in reducing budgetary slack received particular attention. Chow et al. (1988) compared the effects of truth-inducing or slack-inducing pay schemes, finding that the truth-inducing pay scheme led to superior outcomes in the presence of information asymmetry. However, a key assumption underlying the recommendation of a truth-inducing pay scheme is that workers are risk neutral. Young (1985) and Waller (1988) both found that the scheme did not lead to decreased slack for risk-averse participants, potentially explaining why they were rarely used in practice.

In conclusion, JDM research in management accounting started to flourish in the 1980s. There was growth in the number of studies that utilised cognitive, psychological and social theories to investigate and understand why observed individual behaviour might not conform to that predicted by normative economic theory. Researchers were acknowledging that individuals possessed bounded rationality, which had implications for information search and information
processing behaviours, and therefore optimal accounting information system design. On the methodological front, the use of experimental tasks with greater realism appeared to be gaining popularity, and new ways of capturing the richness of individual thought processes were being explored, such as protocol analysis.

12. 1990s – management accounting

In the 1990s, researchers continued to demonstrate interest in information processing limitations and the role of management accounting in motivating superior performance. There was also interest in the effectiveness and implications of modern manufacturing controls (see for example Chow et al., 1991b) and more advanced product costing systems (Gupta and King, 1997; Callahan and Gabriei, 1998; Drake et al., 1999). The focus, however, was still on investigating how accounting impacts individual decision-making behaviour, and through this, identifying how the predictions of economic models might be improved. A wide range of psychological and social variables were examined, such as cognitive style (Chenhall and Morris, 1991); knowledge structures (Brown and Solomon, 1993; Vera-Muñoz, 1998); social influence (Frederickson, 1992); cooperation (Drake et al., 1999); and fairness (Luft and Libby, 1997; Libby, 1999). For ease of discussion, the research has been classified into the following areas: human information processing and determinants of slack and performance.

The interest in identifying limitations and biases in human information processing continued to be strong in the 1990s. Researchers investigated the extent of functional fixation in a management accounting setting (Moon, 1990), the incorporation of opportunity cost information into decisions (Chenhall and Morris, 1991; Vera-Muñoz, 1998), belief revision (Dillard et al., 1991), decision strategies (Moser et al., 1994) and outcome bias (Brown and Solomon, 1993; Lipe, 1993; Frederickson et al., 1999). The use of opportunity cost information and outcome bias are discussed further in the following paragraphs (being two areas that received relatively more attention).

An important development in the opportunity cost research was the consideration of why there might be differences in the ways individuals process opportunity cost information, for example, because of cognitive characteristics such as cognitive style (Chenhall and Morris, 1991) and knowledge structures built up through prior experience (Vera-Muñoz, 1998). As researchers in the 1980s had recognised, accounting systems do not tend to provide explicit opportunity cost information. Vera-Muñoz (1998) argued that this had implications for decision-makers with more experience in accounting, as they would have more developed accounting knowledge structures. Her results supported this, i.e., participants with high-accounting (as opposed to low-accounting) knowledge ignored more opportunity costs when making a business decision, but not a personal decision. Chenhall and Morris (1991) focussed on the use of implicit opportunity costs, finding that ‘intuitive’ managers, who were capable of perceiving abstract concepts, outperformed ‘sensation’ managers who preferred to focus on hard facts.
Cognitive explanations for outcome bias and their implications for performance evaluation were also examined further. Brown and Solomon (1993) found that outcome effects were reduced in instances where superiors had a well-developed mental representation of a subordinate’s course of action, i.e., when superiors had previously provided investment advice, and the subordinate had followed that advice, appraisals were not affected by project outcome. Lipe (1993) found that managerial variance investigations were viewed more favourably when the outcome suggested there had been an underlying problem, with superiors mentally framing the investigation expenditure as a cost rather than loss. Frederickson et al. (1999) found that outcome effects were exhibited even when the outcomes were completely uninformative about decision quality. Superiors with prior experience working under an outcome-based accounting system exhibited more outcome bias, with frequent outcome feedback increasing this bias.

The second major research area related to determinants of slack and performance. This research experienced real growth in the 1990s, with much of it centred around optimal incentive scheme design, and how it might be impacted by economic, behavioural and cognitive factors. Several studies tested for varying effects of different performance-contingent pay schemes on subordinate misrepresentations. Examples include the following: Waller and Bishop (1990), who examined the effects of misrepresentation on intrafirm resource allocation and usage; Chow et al. (1991a), who found that imposing a minimum standard based on past performance (ratchet) was just as effective in reducing slack as a truth-inducing pay scheme over time; and Chow et al. (1994), who found that a Groves scheme, where pay is determined by the unit manager’s actual profit and other unit’s budgeted profit, resulted in the lowest proportion of direct and indirect misrepresentations.

The impact of various incentive schemes on effort also received much attention. Frederickson (1992) found that a relative performance information (RPE) contract led to higher effort than a profit-sharing contract and that in situations of increased uncertainty, effort increases were only observed under the RPE contract. This result could only be attributed to behavioural factors, as there would be no economic reason for effort to increase in these circumstances. Drake et al. (1999) found that performance was higher under group-based incentives than tournament-based incentives in an Activity Based Costing environment, because group-based incentives encouraged workers to cooperate with one another. While studies have consistently shown that careful selection of monetary incentives can result in increased effort, it is worth noting that Awashti and Pratt (1990) also found that individual cognitive characteristics, such as the ability to perceive familiar relationships from complex settings (perceptual differentiation), were important for that effort to translate into higher performance.

Several other motivators were considered to a lesser extent, including goal setting, feedback and context, and more social or personal factors such as fairness and moral development. For example, Hirst and Yetton (1999) found that
budgetary goals had a positive effect on performance, regardless of the type of
task interdependence, and that establishing specific difficult goals reduced perfor-
mance variance. Kim (1992) and Young et al. (1993) both found that competi-
tive information could affect slack. Young et al. (1993) found that the type of
competitive feedback received by groups affected both their output and slack,
with ‘just ahead/behind’ feedback groups producing more units than other
groups, whereas Kim (1992) also found that competitive information could affect
slack via risk preferences, suggesting that the induction of losing prospects might
be one way of minimising budgetary slack.

In the later 1990s, it was noticeable that researchers were moving towards the
identification of explanatory factors that had been ignored by economic models.
Several of these factors have already been discussed, for example, cooperation
(Drake et al., 1999). Three more studies that deserve mention in this regard are
Luft and Libby (1997) and Libby (1999), which both draw on the concept of
fairness, and Rutledge and Karim (1999), which draws on cognitive moral develop-
ment theory. Luft and Libby (1997) found that fairness concerns affected
transfer price negotiations, while Libby (1999) showed that organisational justice
theory was useful in explaining why increased perceptions of fairness and super-
ior performance were obtained when a fair budgeting process was used. Lastly,
Rutledge and Karim (1999) extended Harrell and Harrison’s (1994) study of
escalation of commitment to demonstrate that ethical considerations are relevant –
managers were only likely to continue with a likely unprofitable investment when
adverse selection conditions were present and moral reasoning level was low, thus
further strengthening the argument that the predictions of economic models may
not be generalisable to accounting-based economic performance.

13. 2000s – management accounting

Judgment and decision-making research in management accounting experi-
enced significant growth in the 2000s. While interest in this research had clearly
been gathering momentum for some time, Sprinkle (2003) provided a compre-
hensive framework to understand and assess experimental managerial account-
ing research, drawing attention to the role of managerial accounting information
in improving judgement and decision performance (decision-facilitating role) and
in motivating effort (decision-influencing role). Following his review, Sprinkle
called for further research on the impact of social motives and values on motiva-
tion and performance, as well as reiterating the importance of considering how
concepts from economics and psychology might be melded to enhance the under-
standing of decision-making behaviour. Extensive discussion was devoted to
research opportunities with respect to performance evaluation, multiperson
issues and multiperiod issues. It is clear that many of the growth areas in JDM
research in management accounting in the 2000s correspond to Sprinkle’s (2003)
recommendations, with the research over the past decade – as well as the theory
on which it is built – becoming noticeably more varied. There has been increasing
acknowledgement that controls can be both formal and informal, and for ease of discussion, the research for this decade has been classified into two broad areas: informing formal control system design and implications of social and informal control mechanisms for that design.

Over the past decade, the control system design issues investigated have been mostly related to performance measurement systems, budgets, incentive schemes, the impact of report information given users’ varying mental models and implications of multiperson settings.

Performance measurement systems play a key role in directing managerial effort and in facilitating performance evaluation. One performance measurement tool that was studied extensively in the 2000s was the Balanced Scorecard (BSC). The argued advantage of the BSC is that when it is properly constructed, strategic goals are translated into a range of performance measures that can be used for both optimal decision-making and performance assessment. However, the argued disadvantage is that multiple performance measures are difficult to process simultaneously. The first researchers to document a cognitive difficulty in using the large numbers of measures contained in the BSC were Lipe and Salterio (2000), who found that managers exhibited a ‘common measures bias’, weighting measures that were common to business units more heavily than unique measures. Later, Lipe and Salterio (2002) also found that managers had difficulties recognising the relations between multiple measures within a BSC category unless those measures were consistent in showing positive performance or consistent in showing negative performance. Several studies examining various means of mitigating biases associated with BSC usage followed. For example, Libby et al. (2004) found that the common measures bias was related to both lack of cognitive effort and concerns about the data quality of unique measures and that invoking process accountability and using independent assurance reduced this bias. Banker et al. (2004) and Wong-On-Wing et al. (2007) both found that encouraging evaluators to consider strategy helped to reduce decision bias. Banker et al. (2004) found that the provision of detailed graphical and verbal information about firm strategy increased managerial use of strategically linked measures in evaluations, and Wong-On-Wing et al. (2007) found that evaluators who were prompted to consider strategy effectiveness exhibited less of a selective-attention bias.

Mental-model theory was used to predict and explain why decision-makers’ weightings might differ from agency theory predictions (for a comprehensive review of this area, see Luft and Shields, 2009). Krishnan et al. (2005) found that decision-makers were significantly influenced by performance measure error variance and covariance and did not adequately adjust for accounting changes affecting measurement error. Mental representations were also considered by Farrell et al. (2007), who found that cost-driver relations with financial performance were mentally represented as more being direct than profit-driver relations, resulting in more accurate judgments when financial performance was measured in terms of cost. Webb (2004) found that strong cause/effect linkages
in strategic performance measurements systems led to higher goal commitment, most likely because they enhanced the understanding of key performance drivers.

Kachelmeier et al. (2008) found that agency theory did not completely explain their results when combining quantity and creativity performance measures. Their findings were consistent with cognitive research, indicating that people simplify multidimensional objectives by prioritising one measure over others and invoking incomplete mental models instead of formal analyses, i.e., participants who were rewarded both on quantity and on quality did significantly worse than those who were just rewarded for quantity, the likely reason being that they prioritised high-creativity output.

Budgets are a second key control system feature that continued to attract attention in the 2000s. Fisher et al. (2000, 2002a, 2006) conducted several studies to investigate the impact of budget negotiation on budgetary outcomes and extended their examination to include the effects of information asymmetry and time. Some of their key findings were that failed negotiations resulted in more slack (Fisher et al., 2000) and that information asymmetry resulted in more concessions by the superior and increased slack when agreements were made (Fisher et al., 2002a). However, the results of Fisher et al. (2006) indicated that an expectation of future budget negotiations led to greater cooperation and subordinate performance, indicating that many of the findings from single-period experimental settings may not generalise to multiperiod settings. A further important finding was that social norms and fairness considerations were important. Both superiors and subordinates made negotiation concessions (real ones on the part of the superior and perceived ones on the part of the subordinate). Further, fairness considerations were found to be significant for subordinate performance, i.e., in situations where no agreement was reached and the superior imposed a budget, subordinates reported less satisfaction and commitment to the budget and also performed at a lower level, despite the budget being below their performance capabilities.

Two other examples of studies in budgeting included those by Fisher et al. (2002b) and Sprinkle et al. (2008). Fisher et al. (2002b) examined the effectiveness of budgets that were used for both performance evaluation and resource allocation. Their results were suggestive of synergies between planning and control functions, indicating that budgets serving these dual roles resulted in the removal of slack, as well as effort and performance improvements. Sprinkle et al. (2008) highlighted the fact that accounting controls can motivate desirable behaviour along one dimension but also undesirable actions on another, documenting a trade-off between individual effort and risk-taking in a budget setting. The effort-risk trade-off was mitigated at low budget levels, but worsened at high budget levels, with participants sacrificing expected wealth to either meet the budget or increase their potential payoffs, thereby reducing firm welfare.

A third control system design feature, incentive scheme design, also continued to attract interest (see, for example, Sprinkle, 2000; Frederickson and Waller,
Sprinkle (2000) found that incentive-based compensation contracts were more motivating than flat-wage compensation contracts, with participants spending more time, increasing effort intensity and doing better on their task. However, performance only improved after several experimental periods, again suggesting that the findings from experiments with single-period settings may not generalise to multiperiod settings. Farrell et al. (2008) conducted a multiperiod experiment, finding that while the use of a forward-looking contract provided benefits to organisations regardless of employees’ time horizons, those benefits differed. Kelly (2007) found that both feedback and incentives on non-financial measures were necessary for better decisions by managers from firms whose competitive advantage was associated with intangible assets.

Frederickson and Waller (2005) examined the effects on workers’ loss aversion when negotiating a contract where the pay was based on a penalty or bonus. They found that employers were better off over time with a bonus frame, as loss aversion led to greater information use by employees, whereas the use of the penalty frame ultimately resulted in higher welfare for employees. Hunton et al. (2008) found that risk aversion was affected by continuous monitoring, with the possibility of either a functional and dysfunctional effect depending on the time horizon of performance-contingent incentives.

A fourth consideration of control system design is the way in which accounting information should be presented for optimal decision-making. While there was continued interest in some of the biases researched in prior decades, such as functional fixation (Luft and Shields, 2001; Arunachalam and Beck, 2002; Dearman and Shields, 2005) and escalation of commitment to an unprofitable investment (Kadous and Sedor, 2004; Denison, 2009) or course of action (Jerimias, 2001), the key development was the growth in interest in mental models.

Researchers in the 2000s began to pay close attention to the combined impact of decision-makers’ knowledge structures – the mental models that they used to process and store information – and accounting information on decision outcomes (some of these papers have already been discussed, see, for example, Krishnan et al., 2005; Farrell et al., 2007). For example, Cardinaels (2008) found a strong relation between presentation format and cost accounting knowledge, with graphical formats improving the performance of users with a low level of cost accounting knowledge and worsening the performance of users with a high level of cost knowledge. Vera-Muñoz et al. (2001) found that task presentation format affected accountants’ problem representation and that experienced accountants had knowledge structures better suited for recognising the most appropriate analysis for completion of the experimental task. Vera-Muñoz et al. (2007) found that accountants prompted with causal business model information were better able to use benchmark data to allocate resources optimally.

Examples of other report variables that were examined are the effect of fixed cost reporting format on pricing decisions (Buchheit, 2004), quantification on persuasion (Kadous et al., 2005) and complexity on choice avoidance (Sawers,
The effect of increased aggregation of costing system activities on measurement error was also considered from an information preparation perspective (Cardinaels and Labro, 2008).

Last, the growth in interest in multiperson studies in the 2000s was marked, with researchers examining internal party negotiation (e.g. Fisher et al., 2000; Kachelmeier and Towry, 2002; Chang et al., 2008), external party negotiation (Drake and Haka, 2008; Van den Abbeele et al., 2009), peer reporting (e.g. Towry, 2003; Zhang, 2008), team effects (e.g. Rankin and Sayre, 2000) and interactive groups (e.g. Towry, 2003; Rankin, 2004; Rowe, 2004). Organisations’ increasing use of interactive groups, in particular, has significant implications for control system design. For example, incentive contracts based on individual performance may not be optimal when there is a possibility of free-riding (Towry, 2003) or where coordination is difficult (Rankin, 2004). Drawing on social identity theory, Towry (2003) examined whether the effectiveness of mutual peer monitoring would be affected by whether group members identified strongly as a team or as individuals. Horizontal incentive systems that relied on team member coordination became more effective in the presence of a strong team identity, whereas vertical incentive systems, which relied on peers reporting to management about each others’ performance, were less effective. Rowe (2004) found that the creation of a ‘group frame’ in teams could induce both a sense of trust and sense of duty to the team (collectivism), which helped to mitigate free-rider problems. Overall, the findings of multiperson studies suggest that social motives are important to decision-making processes and outcomes, which leads to the second broad research area to be discussed: the implications of social and informal control mechanisms for control system design.

An important development in JDM research in management accounting in the last decade has been the consideration of how naturally occurring social or informal control mechanisms interact with economic incentive systems. Collectively, the research to date has shown that managers do not always behave opportunistically when they have the means to do so and that a superior understanding of decision-making behaviour is likely to result from the added consideration of a diverse range of behavioural theories. A recurring question has been whether (and if so, when) these non-pecuniary mechanisms can be seen to be complementary to formal contracting and economic incentives, or even viable control system design alternatives. Fairness, honesty, trust, cooperation, reciprocity, ethics and reputation are among some of the variables that have been examined.

Fairness concerns are likely to be relevant in many settings. As discussed previously, Fisher et al. (2000, 2002a) found that fairness issues caused negotiators to make concessions, even when it was not in their best interests, and that perceptions of procedural fairness affected budgetary performance. Kida et al. (2001) and Moreno et al. (2002) found that perceptions of unfair treatment affected managers’ capital investment decisions, and Williamson (2008) found that employees who perceived their environment to be fair contributed more to firm value. Cohen et al. (2007) found that employees were less likely to invest...
opportunistically when they perceived the action to be unfair, even when they had both the opportunity and incentive to do so.

Ghosh (2000), Kachelmeier and Towry (2002) and Chang et al. (2008) all examined fairness in transfer pricing negotiation settings. Ghosh (2000) found that conflict between trading divisions was reduced when the negotiated transfer pricing policy was considered to be fair. However, Kachelmeier and Towry (2002) found that negotiation outcomes only reflected fairness-based price concessions when participants were allowed unrestricted communication, indicating that social presence was an important factor. The results from Drake and Haka’s (2008) study of the role of ABC information in buyer-seller negotiations indicated that concerns about inequitable outcomes led negotiating pairs to share fine information less often, choosing to minimise fairness-based utility losses rather than maximise monetary gains. Chang et al. (2008) found that while managers exhibited a willingness to take fairness into account, self-serving biases affected their perceptions of what a fair transfer price was, with negotiation outcomes that were framed as losses leading to increased differences between negotiating parties. Thus, while fairness concerns were found to be an important determinant of any type of negotiation process and outcome, the extent to which they were observed depended on decision framing or the nature of the environment in which the parties were interacting.

Honesty was also shown to be an important contextual variable (potentially moderated by perceptions of fairness). For example, Evans et al. (2001) found that preferences for honesty affected managerial reporting. Managers sacrificed wealth to make reports that were more honest than would be expected under a conventional agency model and did not tend to lie more as the payoff to lying increased. However, this honesty was affected by perceptions of the fairness of any surplus allocation between the manager and the firm. Zhang (2008) found that the honesty of agents’ reporting under a peer reporting system was also affected by their perceptions of fairness. When the principal was considered fair (paid a high wage), agents were more honest and less likely to collude; however, when the principal was considered to be unfair, communication between agents led to reduced reporting honesty, again highlighting the importance of contextual factor considerations in incentive design. Rankin et al. (2008) also found that when subordinates were required to make a factual assertion about the budget and had final authorisation over it, the situation was framed as an ethical dilemma, resulting in a greater honesty. Hannan et al. (2006) found that the presence of a ‘coarse’, or less precise, information system increased manager willingness to forgo the benefits of misrepresentation to appear honest, even though there were no financial benefits in doing so.

Trust, cooperation and reciprocity also generated interest. Fisher et al. (2005) examined both employee and employer opportunism in the context of compensation contracting. They found a fairly high level of cooperative behaviour in the absence of controls, suggestive that both parties recognised the benefits of maintaining trust. Coletti et al. (2005) found that trust between collaborators was strengthened in situations where control systems were strong enough to bring
about cooperation and that cooperation was observed. Further, Hannan (2005) found that reciprocity was important in determining worker effort, with workers providing more effort when they were paid more, despite there being no ex post reward. However, this reciprocity was mediated by perceptions of the generosity of wages paid relative to firm profit. More recently, Kuang and Moser (2009) found that contracts incorporating employee preferences for reciprocity were more effective than contracts that are considered optimal under agency theory, with employees either rejecting the latter contracts or accepting them and then reducing effort.

Other informal control mechanisms that have been found to affect behaviour include the ethical environment of the firm and personal reputation. For example, Booth and Schulz (2004) found that a strong ethical environment reduced the tendency for managers to continue failing projects, regardless of whether agency problems were present or absent. Webb (2002) found that reputation concerns and the existence of a variance investigation policy both led to lower budget slack, leading him to suggest that social concerns could also serve as a means of reducing extensive incentive contracting in practice.

In summary, researchers in the 2000s continued to assess the generalisability of agency theory to management accounting decisions. A common theme has been the examination of when and how employees’ behaviour may differ from that predicted by economic models and the determination of whether cognitive or social theories may assist in explaining that difference. Sprinkle’s (2003) review paper motivated and generated new work, and a comprehensive discussion of psychology models in management accounting by Luft and Shields (2009) is likely to provide considerable new impetus. It has become increasingly accepted that employees have utility for social factors such as fairness and reciprocity (not just utility for economic wealth and disutility for effort), that they care about how they are perceived by others and that their social motives are context dependent. Social norms are affected by, and in turn affect, multiple interactions both inside and outside the organisation, over multiple time periods. These social motives and norms have implications for control system effectiveness and design and vice versa. While the findings of several studies have led to the suggestion that social concerns might reduce the need for extensive incentive contracting, other research has shown that control systems can increase informal control mechanisms such as honesty (Hannan et al., 2006) and trust (Coletti et al., 2005).

14. Concluding comments

In writing this paper on JDM research, choices had to be made about the periods to be covered and the breadth of coverage. Given it is AFAANZ’s fiftieth anniversary, we thought that the 50-year period from the 1960s to the 2000s was appropriate, with the caveat that there was little JDM research before the 1970s. We also decided to go for breadth of coverage and include auditing, financial accounting and management accounting. We did this not only to involve a wider audience, but also to enable the researchers to learn from specialisations other than their own.

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We hope that you will now have a better understanding of what JDM experiments can achieve and what their comparative advantage is. Experiments are useful to see whether there is an effect and identify what causes the effect. They are less beneficial if one is trying to determine the amount of an effect. Conducting ‘horse-races’ is usually inappropriate as the results will often be determined by the level at which the variables are set. It should also be noted that experiments can be most useful when we want to test something that does not yet exist in practice. For example, consider the role of experiments in medicine in the testing of new drugs or treatments. In accounting, regardless of the specialisation, new possibilities need to be tested (accounting and auditing standards, presentation alternatives, performance measurement systems, etc.) and experiments are an ideal way of doing this. In experiments, individuals or groups are randomly allocated to a small number of treatments, and other factors are controlled or measured.

Many questions raised in the 1970s and 1980s were further investigated in later decades, often with better theory, better designs and the benefit of what was learnt in the early years. In our discussion of the audit JDM research in the 2000s, we noted the wide range of new environmental and incentive factors that were being investigated. We have also seen progress in the way knowledge and expertise issues have been addressed, from considering years of experience in the 1970s, to measuring knowledge structures and domain-specific experience in the 1980s and 1990s, to considering different types of knowledge in the 2000s (e.g. industry expertise). All of these developments are a sign of a maturing research paradigm across the 40-year period.

As we stated earlier, the aim of this overview was to highlight the breadth of issues covered across the specialisations of auditing, financial accounting and management accounting. There have been many ideas to absorb, and in many cases, you may want to refer back to the original papers for definitions of variables used. There were many common issues addressed across specialisations (e.g. cue usage, expertise, incentives) and the research methods generally progressed similarly across the decades. While policy capturing and the use of the lens model were popular in the 1970s and early 1980s, the research then moved to a much more cognitive focus. In the 2000s, a much wider range of environmental factors were incorporated. Ways to improve performance may vary with task differences, but across the specialisations a commonality is that judgment performance = f(ability, knowledge, environment and motivation) (Libby and Luft, 1993).

One trend that you may have picked up was that it was acceptable in the early days of JDM to ask whether something will have an effect and then to later ask when it will/will not have an effect (i.e., testing for interactions). Today, it is critical that you can also answer the ‘why’ question. Why is the independent variable having an effect under some circumstances but not under others? In sum, experiments need to not only show an effect but also explain when and why that effect occurs. This means appropriately planning the experiment so that you can test your theory of why there is an effect.
Some salient observations about Table 1 can be made. First, while we may have missed some JDM experiments, a total of 575 papers across four decades in four journals are pretty impressive (don’t forget that CAR only started in 1984 and that there were also many outstanding experiments in other leading specialist journals). You can see that the paradigm was beginning to develop in the 1970s (64 papers), with the 1980s having the most papers (188 papers), and the 1990s and 2000s following relatively close behind (160 and 163 papers respectively). Second, over half of the JDM papers (303 papers) were in audit, but there were still high numbers in both financial accounting and management accounting (125 and 147 papers, respectively). Third, there was a surge of management accounting papers in the 2000s, almost closing the gap with auditing. Fourth, while the number of financial accounting papers looks reasonably steady, as noted in the paper, most of the papers from the 1980s were published between 1980 and 1985 and most of the papers from the 1990s were published between 1995 and 1999. There was a general drop in financial accounting JDM research in the late 1980s for JAR and TAR. In fact, only two financial accounting JDM papers were published in JAR from 1986 to 1994. Libby et al. (2002) and Shields (2009) noted that the focus moved from financial accounting issues in the late 1970s and early 1980s because of major criticisms of the early JDM research by Gonedenes and Dopuch (1974), as discussed earlier. Beginning in the mid-1990s, JDM research in financial accounting returned in significant amounts, because of factors discussed in the paper such as better use of theories combining psychology and economics perspectives, which allowed JDM research to specify the mechanisms impacting these judgments (Libby et al., 2002). It can be seen from Panel B of Table 1 (taking into account that CAR commenced in 1984) that all the major journals show a willingness to publish JDM research, although they may differ across specialisations and over the decades.

One ‘take away’ from the above is that there are opportunities for JDM researchers, regardless of their preferred specialisation, to publish in the leading journals (in addition, we have not heard nor seen any bias against international researchers wanting to publish JDM research). However, conducting any high-quality research is challenging and JDM experiments are no exception – the key is to select a research question that provides a sufficient incremental contribution, develop appropriate theory in advance and spend much time on the design to avoid any confounding factors.

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