Witnessing Your Own Cognitive Bias: A Compendium of Classroom Exercises

Rebecca Fay*
East Carolina University
Slay Hall 331
Greenville, NC 27858
fayr@ecu.edu

Norma R. Montague
School of Business
Wake Forest University
PO Box 7897
Winston-Salem, NC 27109
montagnr@wfu.edu

* Contact author.

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Abstract: Accounting and auditing professors continually stress the importance of effective judgment and decision making (JDM), yet few accounting programs or textbooks discuss the biases that may impact an individual's ability to exercise high-quality professional judgment. In recent years, KPMG (Ranzilla, Chevalier, Herrmann, Glover, and Prawitt 2011) and the Committee of Sponsoring Organizations of the Treadway Commission (KPMG, Glover, and Prawitt 2012) addressed this gap at the corporate level by publishing guidance for accounting professionals and board members on how to identify and mitigate common judgment biases, yet there remain few resources designed for accounting students. This collection of exercises enables instructors to introduce the topic of effective JDM in the classroom. It provides students with the opportunity to identify bias in their own judgments by highlighting five frequently-occurring biases that adversely impact business judgments (i.e., availability, anchoring, overconfidence, confirmation, and rush to solve). This compendium gathers exercises from psychology literature that may be used to pique student interest and encourage discussion of how each bias impacts judgments made by accounting professionals and how individuals may reduce their impact.

Keywords: cognitive bias, case studies, overconfidence, confirmation, anchoring, availability, decision making

INTRODUCTION

Accounting at its core is a product of the judgment and decision making (JDM)[1] of individuals such as investors, managers, and auditors. From valuations to earnings forecasts, fraud detection and litigation to standard setting, effective JDM is one of the most critical tools available to the modern accounting professional. Consequently, low quality judgments can have disastrous and widespread ramifications: for individuals making the judgments and decisions and their firms, low quality judgment can result in greater liability exposure; for third parties who use their work, such as investors who rely upon the judgments, poor JDM can lead to heightened risk of financial losses (Bonner 2008).[1] The quality of an individual's JDM can affect his or her performance evaluation, compensation, job retention, and promotion (Bonner 2008). These risks have the potential to ultimately impact our economy and society, which makes their mitigation a high priority in the accounting profession.

With the move towards more principles-based financial reporting and increased emphasis on fair value measurement, both of which require more judgments (Collins, Pasewark and Riley 2012; Bratten, Gaynor, McDaniel, Montague, and Sierra 2013), the ability of accounting professionals to consistently make high quality professional judgments is of central importance (Ranzilla, Chevalier, Herrmann, Glover, and Prawitt 2011). Further, the effects of challenging economic times and ever-expanding regulations have raised the threshold for what are considered to be effective JDM skills (Ranzilla et

[1] The term judgment refers to "forming an idea, opinion, or estimate about an object, an event, a state, or another type of phenomenon," while the term decision refers to "making up one's mind about the issue at hand and taking a course of action" (Bonner 2008, 2).

al. 2011).[2] Despite claims of well-documented, well-reasoned, and well-supported judgments made during audits, the PCAOB continues to focus on the quality of judgments (Johnson 2009). While the importance of high quality judgments is receiving heavy attention from regulators and practitioners, it has a history of being important to the profession. For instance, the AICPA (1999) highlighted the necessity of this skillset with the inclusion of problem-solving and decision making in the *Core Competency Framework for Entry into the Accounting Profession*.

Despite the critical importance of - and renewed emphasis put upon - high quality JDM, ample evidence exists that accounting-related JDM is often not of the highest quality (see for example, Kinney and Uecker 1982; Kennedy and Peecher 1997; Cloyd and Spilker 1999). In recent years, the PCAOB has expressed concern that the judgments of managers, accountants, and independent auditors reflect bias, whether consciously or unconsciously (PCAOB 2011). Bonner (2008) notes that auditors, in particular, are subject to systematic biases in their judgments, and the effects of these biases may be exacerbated as auditors inherently rely upon evidence that itself may be subject to bias at other points in the information chain. Thus, efforts to enhance JDM are of great importance not only to auditors who examine financial information, but also to the preparers (e.g., managers and tax accountants) and consumers (e.g., investors, creditors, and customers), of this information.

[2] The systematic nature of biased judgments has been blamed for the worldwide economic crisis of 2008 and has caused previous defenders of the efficient market hypothesis to question their beliefs (Hilbert 2012).

The study of cognitive biases[3] in decision making has a solid foundation in both the psychology and accounting literatures; until recently, however, the accounting profession had not formally addressed these impediments to judgment quality. In 2011, Nobel Prize winner Daniel Kahneman attempted to influence "water-cooler conversations" in the workplace by publishing findings from JDM literature in a format accessible to business professionals and the general public; his book *Thinking, Fast and Slow* became a New York Times Best-seller. More recently, accounting researchers have partnered with KPMG and the Committee of Sponsoring Organizations of the Treadway Commission (COSO) to offer guidance for accountants and other professionals (e.g., board members) on how to identify and mitigate judgment biases that commonly impact accounting decisions (see KPMG, Glover, and Prawitt 2012; Ranzilla et al. 2011; West and Cronk 2011). These manuscripts are essential tools for enhancing accounting decisions as the first step toward mitigating bias is to recognize situations in which it might occur (Kahneman 2011).

While there has been a growing emphasis on effective JDM within the accounting profession, accounting education literature to date lacks sufficient instructional resources for accounting faculty desiring to assist students in developing vital professional judgment skills. As a result, accounting students are currently entering the professional realm without essential cognitive and structural tools in place to enable the construction and exercise of consistent high quality judgments. Recent work by Bloch, Brewer, and Stout (2012) begins to fill this void by prompting the development of a leadership

[3] Psychology researchers Daniel Kahneman and Amos Tversky used the term "cognitive bias" to refer to the "tendency of individuals to make systematic judgment errors when making decisions" (Knapp and Knapp 2012).

mindset in accounting students. Their leadership module introduces deficiencies in group decision making processes and recommends use of a decision making framework to enhance ethical decision making.[4] Our paper recognizes the need for a practical framework for enhancing decision making, with the caveat that such a framework is only as effective as the user's recognition of biases that affect the decision making process. We thus provide a collection of classroom exercises that can be used by professors to highlight those biases frequently occurring in the accounting domain (i.e., anchoring, confirmation, overconfidence, availability, and rush to solve), with the ultimate aim of enhancing professional JDM skills among students.

The remainder of this article is organized as follows. The next section provides a more detailed discussion of the importance of JDM skills to accounting practice. This is followed by a brief overview of five common judgment biases and debiasing techniques identified in professional and academic literature. We follow this exploration with a description of classroom exercises that can be used to increase student awareness of each of these biases. Finally, to encourage the use of these exercises, we provide implementation guidance for professors.

BACKGROUND

Low quality decision making by accountants, managers, and members of the board of directors can be "consequential to the continued viability of organizations, the livelihoods of the people employed by them, and the investors who rely on them–not to mention the effectiveness and efficiency of our capital markets" (KPMG et al. 2012, ii).

[4] Lesson 3 of Block, Brewer, and Stout (2012) utilizes a case by Garvin and Roberto (1997) to examine deficiencies in group decision making while Lesson 6 recommends use of a decision making framework when completing Bloom and Cenker's (2005) case consisting of an ethical quandary.

Further, low quality judgments can expose decision makers to manifold reputational and legal damages. Auditors, for example, in their roles as 'public watchdogs,' face tremendous pressure from all users of their products to make high quality judgments. In light of the highly publicized failings of the industry over the past decade, regulatory bodies have punctuated this expectation by issuing guidance aimed at enhancing the objectivity, judgment, and decision making abilities of accounting professionals. For instance, the Sarbanes-Oxley Act of 2002 aimed to increase the reliability of financial reporting by requiring top management to personally certify the accuracy of its financial statements, augmenting external auditors' independence requirements and increasing audit committees' oversight responsibilities. Despite these requirements, the reliability of financial reporting continues to be undermined, at times, by the exercise of suboptimal judgments by preparers and reviewers of financial information (PCAOB 2011).

Research on JDM provides possible explanations for these deficiencies in judgment. As summarized by Kahneman, research in cognitive and behavioral psychology has found that individuals use two distinct types of thought as they form judgments. The first type is intuitive and "operates automatically and quickly, with little or no effort and no sense of voluntary control" while the second is more deliberate and time-consuming; it "allocates attention to the effortful mental activities that demand it, including complex computations" (2011, 21). The intuitive method is also referred to as heuristics or judgment shortcuts.

Payne, Bettman, and Johnson (1993) explain that individuals are adaptive decision makers, often trading off the desire to make a good decision with the desire to minimize cognitive resources. Thus heuristics are a valuable tool for decision makers to

simplify a complex world and produce more efficient judgments. Heuristics become detrimental when relied upon inappropriately or unconsciously, leading to suboptimal or less than high quality decisions (Kahneman 2011, KPMG et al. 2012). For instance, when managers develop a financial budget for the current year, they may rely heavily on budgeted amounts from the prior year. This shortcut allows managers to prepare a budget more efficiently than starting from scratch, but it may result in a poor decision if the manager fails to account for changing circumstances (e.g., decreased product demand resulting in lower revenue) or deficiencies in the prior year amounts (e.g., large variances between budgeted amounts and actual expenditures). When under pressure such as time constraints, decision makers often forego more thorough thought processes and fail to consider whether heuristics compromise their judgment quality. Fortunately for accounting educators, the most common judgment traps impact decisions in systematic ways (Kahneman 2011, KPMG et al. 2012). It is precisely this element of predictability that can be most instructive for students as they learn to recognize biases affecting their own judgments as well as in the behavior of others around them. This knowledge will help students recognize when others (i.e., managers, clients, etc.) – either intentionally or accidentally – take advantage of biases in an attempt to obfuscate or persuade (Chabris and Simons 2010).[5]

In their monographs aimed at enhancing professional judgment quality of accountants and business professionals, KPMG and COSO have identified five common biases that can result in suboptimal or biased judgments. These biases include:

[5] See Kahneman and Tversky (2000) for a collection of theoretical and empirical articles that offer an introduction to the study of decision making behavior. An important theme of Kahneman and Tversky (2000) as it relates to our paper is the dependence of choices on the descriptions and interpretations of decision problems.

availability bias, in which an information seeker essentially becomes captive to the first (or 'most available') pieces of information stored in memory, precluding a more robust search; *anchoring and adjustment*, in which an information searcher 'anchors' an estimate on a specific point of reference/data and subsequently makes insufficient adjustments from the anchored point; *overconfidence*, in which a decision maker overestimates his/her abilities or judgment quality and may resist the use of aids that may otherwise promote higher quality JDM; *confirmation bias*, which leads an information searcher to seek out evidence that conforms to a previously-determined hypothesis; and *rush to solve*, in which decision makers quickly form a judgment without giving sufficient consideration to all available data. The following section provides a more detailed exploration of each of these tendencies and their impact upon JDM for accounting professionals.

COMMON JUDGMENT BIASES

Availability Bias

The availability heuristic can best be described as "the tendency for decision makers to consider information that is easily retrievable from memory as being more likely, more relevant, and more important for a judgment" (Ranzilla et al. 2011, 23). The result of availability is that *proximity* in a decision maker's memory has the potential to supplant *pertinence* in the retrieval of – and reliance upon – data for JDM. The availability heuristic substitutes one question for another: when wishing to estimate the size of a category or the frequency of an event, an individual actually reports an impression of the ease with which instances come to mind (Kahneman 2011, 130). One of the best-known studies of availability asked spouses "How large was your personal

contribution to keeping the place tidy, in percentages?" Results showed that the self-assessed contributions added up to more than 100%. These results are consistent with availability bias in that both spouses remembered their own individual contributions more readily than those of the other, and the difference in availability led to differences in judged frequency (Kahneman 2011). Examples of this phenomenon in the field of accounting are numerous and may include a tax professional who is researching a tax treatment and may inadvertently gravitate toward cases most available in memory (perhaps due to recent publicity for a similar case) when, in fact, a more thorough search could reveal a more appropriate –and perhaps less favorable – tax position for the client. For auditors, the tendency toward availability is reflected if the auditor simply follows the testing strategy used in a prior period or on a recent engagement even if the approach is not the best for the current engagement (Ranzilla et al. 2011). According to Kahneman (2011), availability bias can contribute to the common observation that members of a collaborative team feel as though they have done more work than others. This observation has implications for accounting professionals, particularly auditors, who perform most duties as part of an engagement team.

Anchoring and Adjustment Bias

There are two complementary components at play in the manifestation of anchoring and adjustment bias. The first is the actual anchoring process, whereby decision-makers make assessments by starting from an initial anchor. The second piece is the adjustment process, in which decision makers make insufficient adjustments away from the initial anchor. Together, these factors may often threaten the judgment quality of

accounting decision-makers, given the pervasiveness of anchors (e.g., numerical values) to the field of accounting (see Bonner 2008 for a review).

Many accounting decisions are based on beliefs relating to uncertainties such as estimates and likelihoods of uncertain events. Oftentimes, decision-makers generate an estimate by starting from an initial value (i.e., the anchor) that is then adjusted to arrive at a final value. In a famous anchoring experiment, Amos and Tversky rigged a wheel of fortune that was marked from zero to 100 to stop only on 10 or 65. In the study, Amos and Tversky would spin the wheel which landed on either 10 or 65, and then ask students to answer the following two questions: (1) Is the percentage of African nations among UN members larger or smaller than the number you just wrote?, and (2) What is your best guess of the percentage of African nations in the UN? They found that the average estimates of those who saw 10 and 65 were 25% and 45%, respectively. These results not only provided evidence of an anchoring effect, but also of its absurdity: people's judgments were influenced by an uninformative number (Kahneman 2011).

Kahneman (2011) describes anchoring effects in a variety of scenarios including how people make decisions about money, valuations and estimations, and willingness to pay. These scenarios can be easily translated to accounting scenarios including manager decisions about budgeting and spending, fair value and other estimations, and tax compliance. For instance, managers frequently use prior period income (the anchor) to estimate future earnings (the final value). Academic research has found however, that people tend to adjust insufficiently from the anchor (see Tversky and Kahneman 1974). In the example given above, management forecasts in a declining economy may fail to

adjust sufficiently away from prior year income, and ultimately communicate to investors an overly optimistic estimate of future performance.

Auditors are inherently exposed to the anchoring and adjustment bias because of the nature of their roles and the centrality of numerical "anchors" to their work. In practice, auditors typically receive financial information from management in the form of financial statements, and auditors must then gather evidence to provide an independent opinion regarding the fairness of the financial statements. In this process, the auditor inherits an entire collection of numerical "anchors" from management, making the auditor susceptible to anchoring and adjustment bias and subsequently making it more difficult for the auditor to make objective evaluations. This effect is magnified when management's reported values (anchors) are inherently biased, as in the previous example. Thaler and Sustein (2008) cite the use of anchoring as a very successful tool for lawyers who sue cigarette companies. These lawyers often win astronomical sums for their clients, in part because they have induced juries to anchor on multimillion-dollar figures. Therefore, the exorbitant opening claims presented by clever litigants often lead to quite favorable settlements for their clients, even when the defendant is ultimately forced to pay only a portion of the initial amount. If managers are to also exploit the anchoring bias, it is possible that others reviewing and/or relying on their work will also insufficiently adjust, allowing a portion of management's bias to persist in reported numbers.

Overconfidence Bias

Overconfidence is rooted in "the tendency for decision makers to overestimate their own abilities to perform tasks or to make accurate diagnoses or other judgments or

decisions" (KPMG et al. 2012, 25; see also Alpert and Raiffa 1982).[6] "Unrealistic optimism is a pervasive feature of human life; it characterizes most people in most social categories" (Thaler and Sustein 2008, 33). According to Kahneman and Tversky (2000), many psychological studies demonstrate that most individuals are overconfident about their own abilities compared with others (e.g., intelligence, driving ability, ability to get along with others), as well as unreasonably optimistic about their futures (e.g., income prospects). Further, according to Thaler and Sustein (2008), when people overestimate their personal immunity from harm, they may fail to take sensible steps: unrealistic optimism can explain a great deal of individual risk taking. For instance when asked to envision their futures, students report that they are less likely to be fired from a job or get divorced than their classmates. They also believe they are less likely than their classmates to have a heart attack, a drinking problem, or cancer.

Overconfidence can have detrimental effects for accounting professionals when they overestimate their abilities to perform tasks and make decisions.[7] For instance, managers may unknowingly inflate earnings forecasts due to overconfidence in their abilities to increase earnings. They may also overstate their abilities to complete projects within allocated time and financial constraints. Tax professionals may overestimate their abilities to support a client's overly aggressive tax position, potentially exposing themselves and the client to litigation risk. Similarly, auditors can compromise audit quality if they overestimate their ability to conduct procedures requiring highly

[6] Overconfidence can be quantified as a measure of confidence rating relative to accuracy, where confidence is greater than accuracy.

[7] In psychology, Lichtenstein, Fischhoff, and Phillips (1982) find that people tend to be overconfident when making probability assessments, meaning they overestimate probabilities. This tendency can impact accounting professionals in a variety of tasks including the development of estimates and forecasts, as well as ratio analysis.

specialized expertise (e.g., valuation of high-tech inventory or precious gems) and elect to forego the use of a consultant.

Confidence is critical to success, yet overconfidence can prove a serious impediment to effective JDM. Plous (1993, 217) makes the claim that "no problem in judgment and decision making is more prevalent and more potentially catastrophic than overconfidence." KPMG et al. (2012, 29) adds that overconfidence in accounting "can lead to suboptimal behavior in every step of the judgment process," including "underinvesting in clarifying issues and objectives, considering too few alternatives, truncating the information search, or skipping evidence gathering altogether."

Confirmation Bias

Confirmation bias is a significant and pervasive impediment to high-quality JDM in accounting. Defined as "the seeking of or interpreting of evidence in ways that are partial to existing beliefs, expectations, or a hypothesis in hand" (Nickerson 1998, 175), confirmation bias can corrupt any and all phases of the decision making process, from the framing of the initial issue, to the information search, to the interpretation of the data, and eventually the judgments reached.

This bias may be subconsciously reflected by managers serving their own interests or those of their stockholders. For instance, underestimating expenses and reporting inflated net income may give the appearance of meeting analysts' forecasts for the company or performance-based criteria for management compensation. Auditors and tax professionals are also susceptible to this bias as they may be subconsciously

influenced by management preferences, particularly as they begin their judgments with management-provided information.[8]

Rush to Solve

As discussed above, there are numerous judgment traps to which accounting professionals may fall prey. The last of those traps to be explored in this paper is all too common in the modern field of accounting: the rush to solve trap. This tendency occurs when individuals desire an immediate solution to a problem such that they under-invest in the judgment process and often settle with the first workable alternative (KPMG et al. 2012). When a premium is placed on efficiency and higher productivity, the rush to solve trap becomes increasingly prevalent. For example, an accounting professional, under a pressing deadline as he reviews his subordinate's work, may correct an error in the invoice amount that his subordinate recorded but fail to recognize that the amount was inappropriately capitalized. Similarly, an auditor may accept her client's explanation for fluctuations in revenue and expenses as logical without fully considering all possible alternatives.

A group of decision makers may also fall prey to the rush to solve trap if they reach a quick consensus and seek to avoid conflict by minimizing discussion of opposing viewpoints. This is an important consideration for auditors who are required to brainstorm as a team to consider the risk of fraud on every audit engagement. Whether at the individual or group level, the rush to solve tendency may lead to incomplete analyses of the evidence, failure to consider all alternatives when solving a problem, or perhaps

[8] Recall that the auditor's primary evidence is often comprised of financial materials selectively interpreted and presented to maximize both perceptions of company performance and also incentivized performance pay or bonuses. Thus, the auditor may be confronted with biased information before beginning the audit.

even solving the *wrong* problem. The rush to solve tendency, similarly to the previously discussed four biases, is clearly detrimental to judgment and decision making. In the next section we consider methods of debiasing accounting judgments.

MITIGATING COGNITIVE BIAS

While it may be disconcerting to realize the frequency with which decisions are impacted by cognitive bias, this case is not intended to suggest that all use of heuristics is undesirable. To the contrary, the intuitive form of judgment "is also the origin of most of what we do right – which is most of what we do," (Kahneman 2011, 410). The problem arises when a decision maker relies on a heuristic without realizing it (Simons 2014). Thus, it is critical to educate future professionals about the specific types of biases that frequently impact accounting judgments. After decades of research in this field, Kahneman proposes the way to improve judgments is to recognize the signs that you are in a cognitive minefield, slow down, and ask for reinforcement from the more deliberate thought process.

By completing this case study, students will take the first step toward improving judgment quality by learning to recognize some of the common minefields, or biases, they may encounter. One way to implement the remainder of Kahneman's advice is to utilize a framework when making important decisions to aide them in slowing down and engaging in a more deliberate thought process. The professional judgment framework developed by KPMG includes five steps: 1) Clarify Issues and Objectives, 2) Consider Alternatives, 3) Gather and Evaluate Information, 4) Reach Conclusion, and 5) Articulate and Document Rationale (Ranzilla et al. 2011, 5).[9] While the five common judgment

[9] While there are countless decision making frameworks available, we have presented the one developed by KPMG to maintain consistency with the guidance published by COSO. Decision making guidance from

biases presented in this collection of classroom exercises can manifest across any of the five steps in the judgment process, maintaining an awareness of potential biases and an attitude of professional skepticism while thoughtfully applying each step of the framework may often debias judgments (KPMG et al. 2012). Professional skepticism, defined as "an objective attitude that includes a questioning mind and a critical assessment of audit evidence," (AICPA 2002) is embedded in auditing standards but is also essential for evaluating data used in the decisions of managers, accountants, and tax professionals.

To aid students in developing an awareness of frequently occurring cognitive biases, the next section of our paper presents a compilation of case materials that highlights examples of each of the aforementioned biases and allows students to recognize how these biases affect their own judgments.

CASE MATERIALS

This compendium of classroom exercises is designed to display five common judgment biases to students during the course of one class period. At the onset of the session, the instructor should apprise the class that they will be completing a series of exercises to learn about JDM. An outline of the case sequence and estimated time budget is provided in Table 1.[10] A detailed overview to facilitate classroom implementation is included in the Teaching Notes. After all exercises have been completed, results are

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the remaining Big 4 firms, as well as the resource more recently published by the Center for Audit Quality (CAQ), is available at the following websites:
PWC - http://www.pwc.com/gx/en/ethics-business-conduct/ethical-decision-making-framework.jhtml;
Ernst & Young - http://www.ey.com/GL/en/Services/Advisory/Driver-based-decision-making;
Deloitte - http://www.deloitte.com/view/en_us/us/6f73105713fdf210VgnVCM3000001c56f00aRCRD.htm
CAQ - http://www.thecaq.org/newsroom/2014/08/27/caq-provides-new-tool-to-help-auditors-avoid-judgment-tendencies-traps-and-biases

[10] The schedule provided is for a 50-minute session. Longer class periods allow the opportunity for enhanced discussion.

tabulated and presented to the class as discussed in the implementation section and teaching notes. While the initial exercises are devoid of any accounting context, during the debrief session, the students have the opportunity to discuss how each bias is reflected in the accounting domain.

[Insert Table 1 here]

1. Availability

The first exercise, created by Tversky and Kahneman (1973), demonstrates the availability bias. The instructor should ask students to record their response to the following task. "Consider the letter R. Is R more likely to appear in the first position or the third position of a word? Estimate the ratio of the one you consider most likely in relation to the other as_____ : 1 ." This first exercise is presented orally by the instructor without any corresponding visual presentation as the question includes three words that could influence students' decisions.

2. Anchoring

The second task evidences the anchoring heuristic identified by Tversky and Kahneman (1974), with an exercise previously utilized in university classrooms (Jacowitz and Kahneman 1995; McElroy and Dowd 2007). For this task, the class should be divided into two groups. Figure 1 should be distributed to the first group while Figure 2 is provided to the second group.[11] Students should be instructed to answer the two questions on their handout.

[Insert Figure 1 here]

[Insert Figure 2 here]

[11] To facilitate implementation of this case, a handout of the exercises is available for download as a supplement to the Teaching Notes.

3. Overconfidence

In the third task, students are provided with a copy of Figure 3 which prompts them to rank their intelligence relative to the intelligence of their classmates in the course. Students should respond using a nine-point Likert scale where 1 represents "Far Below Average" and 9 means "Far Above Average." After indicating their self-assessment, students should submit their responses to the instructor. This task is designed to display the overconfidence bias that is present in many areas of self-assessment as noted in both the popular press (Brooks 2011) and prior research studies (Svenson 1981).

[Insert Figure 3 here]

4. Confirmation Bias

The next exercise, developed by Wason (1960), allows students to witness their personal susceptibility to confirmation bias. After Figure 4 is distributed to the class, the professor should paraphrase the following script:

> I have listed a series of numbers "2, 4, 6" on your handout. Your job is to hypothesize the simple rule that I used to develop this series and tell me how confident you are in your proposed rule from 0% to 100% (with 0% having no confidence and 100% reflecting complete confidence). After you have listed your first hypothesis, you have the opportunity to test your theory by offering another series of numbers. You may propose any series of numbers you like. It does not need to be a continuation of my series. I will tell you whether or not your series fits the rule. With this additional information, you may choose to change your proposed hypothesis for the second round or keep your original hypothesis. You will record your level of confidence and have the opportunity to test your current hypothesis with another series of numbers. We will continue this process until you are highly confident you have identified the rule. On your sheet of paper, make your first hypothesis about the rule I used to generate the number series "2 4 6", list your level of confidence, and propose a new series of three numbers to test your hypothesis.

[Insert Figure 4 here]

After allowing time for the students to develop their first hypothesis and propose a number series, the instructor should circulate the room to provide individualized feedback to each student as to whether or not their proposed number series fits the rule. This does not provide any feedback about the hypothesized rule and the instructor may explicitly state that to the class. Additionally, it may be helpful to clarify instructions for individual students as the instructor circulates throughout the room. The instructor can make a general announcement to the class that after he/she has provided feedback on the first proposed number series, the student may move on to the next line and revise or restate their hypothesis, provide their current level of confidence, and propose a new number series for the second round of testing.

The second cycle through the room takes less time as students develop an understanding of the task and the instructor merely indicates "yes" (the number series fits the instructor's rule) or "no" (the number series does not fit the instructor's rule) for each student's proposed number series. After several rounds, the instructor may allow students to opt out of further testing if they are satisfied with their hypothesis. This significantly reduces time on later rounds as many students quickly achieve a high level of confidence and elect to forego further testing.

5. Rush to Solve

The final exercise, created by Asch (1946) may be used to introduce the "rush to solve" trap as it displays how one datum can influence the interpretation of all other information. Distribute Figure 5 to half of the class and Figure 6 to the remaining

students. Ask the students to silently read the description of the individual on their sheet of paper. After approximately one minute, ask them to return the handouts and ponder the individual described to them.

[Insert Figure 5 here]

[Insert Figure 6 here]

After collecting the sheets, distribute Figure 7 to all students and ask them to select the one word from each pair that best describes the person they read about.

[Insert Figure 7 here]

CASE LEARNING OBJECTIVES AND IMPLEMENTATION

Learning Objectives

This case was developed to introduce students to five common judgment biases that may impede high-quality JDM in the accounting domain. As noted in monographs by both KPMG (Ranzilla et al. 2011) and COSO (KPMG et al. 2012), the first step toward improving professional judgment is to develop an awareness of subconscious biases in the decision making process. This compendium of exercises is designed for professors desiring to further develop professional JDM skills in their students. The objectives of the case are threefold:

1. Increase students' knowledge of cognitive biases.
2. Strengthen students' ability to identify specific biases.
3. Enable students to identify biases in their own decision making process.

We implemented this case near the end of the semester in three different auditing courses at two universities (two sections of an undergraduate external auditing course, two sections of an undergraduate internal auditing course, and two sections of a graduate external auditing course). Inclusion of the case late in the semester allowed informed discussion of specific auditing judgments that are subject to bias. While we utilized these exercises in auditing courses at the undergraduate or graduate level, they may easily be incorporated into a variety of accounting courses (e.g., corporate governance, tax, managerial accounting, financial accounting, accounting for decision making, intermediate and advanced accounting) as an introduction to cognitive biases. Table 2 provides a sampling of accounting judgments subject to the five common cognitive biases exhibited in this collection, as well as a listing of potential debiasing techniques that can be applied to enhance the quality of the accounting judgments. The accounting judgments

are organized into three broad areas in which professional judgment is often used: (1) evaluation of evidence, (2) estimation/likelihood projections, and (3) choosing between options. For example, an evaluation of evidence decision might include an auditor who must decide how much evidence is needed and which evidence is more valuable. An estimation or likelihood projection might include a tax preparer who must decide the likelihood of successfully defending a tax treatment to the Internal Revenue Service. A choice between options might include an auditor's decision to use analytical procedures versus test of details when evaluating an account. Finally, as noted in the table, multiple debiasing techniques can be applied to the various accounting judgments, therefore we do not map each technique to a specific bias or judgment.

[Insert Table 2 here]

Student Feedback

Overall, student feedback on the assignment was positive. After completion of the case, 123 students (31 graduate and 92 undergraduate students) provided anonymous feedback indicating their level of agreement with the achievement of case objectives using a five-point scale (strongly disagree, disagree, neutral, agree, strongly agree) as reported in Table 3. First, 98 percent of students expressed agreement (agreed or strongly agreed) that the case increased their knowledge of cognitive biases. Second, 86 percent of students agreed that it strengthened their ability to identify bias. Third, 91 percent of participants indicated the case helped them identify biases in their own decisions. Additionally, 97 percent agreed or strongly agreed that the case was interesting and 97 percent recommended it for use in other classrooms.

[Insert Table 3 here]

Student comments on the feedback survey expressed several recurrent themes. First, the case "opens the eyes of students who think they are making independent and unbiased decisions." Second, it was "an interesting and interactive way to learn about cognitive biases." Many students further expressed that the case method made it "easier to understand the biases when applying them to yourself rather than reading about them" and that it made the information "memorable." They expressed that their favorite part of the case was learning the results of the exercises at the end of class, particularly when judgments were compared across two groups. Students enjoyed the fact that the exercises seemed unrelated to accounting until the second half of the class period when we discussed how the underlying biases manifest in a variety of accounting- and auditing-related judgments.

Implementation

To ease the adoption of this case by professors, we provide tips for implementation in the classroom. To minimize demand or testing effects on student responses, we did not mention the term "bias" or "heuristic" until we began the debriefing in the second half of the class. In addition, we provided students with instructions and visuals aids for one exercise at a time and collected responses at the conclusion of each exercise.

For two of the tasks (anchoring and rush to solve) it is beneficial to divide the class into two groups in order to witness the differences in judgment generated by minor variations in the information provided. To aid in keeping the responses from the two groups divided, we printed the handouts on two different colors of paper. To minimize the salience of differing conditions across groups, we divided the class at the beginning

of the session and always used different colors of paper for the two halves of the room, regardless of whether or not the information differed across groups.

After the class completed all five exercises, we recruited volunteers to aid us in tabulating the results. For Exercise 1, the availability exercise, one student was asked to count the cards that indicated R was more likely to be the first letter of a word, then calculate an average of the provided ratios. A second student was asked to do the same for cards indicating R was more likely to be the third letter of a word. To enhance efficiency, we pre-sorted the cards into the two possible responses while students completed subsequent exercises.

For Exercise 2, the anchoring task, one student received cards from the first group while a second volunteer received responses from the second group. Both students were asked to calculate the average response for their group. An additional student averaged the responses to Exercise 3, the self-assessment of intelligence. Finally, two students were selected to tabulate the responses from Exercise 5, the rush to solve exercise; they were provided with the responses as well as a count sheet (see Figure 8) to tabulate the responses. They counted both the total number of cards in their group and the response for each pair of characteristics. We retained the cards from Exercise 4 on confirmation bias and reviewed them to identify trends in student decisions as discussed in the accompanying Teaching Notes. After all volunteers completed their tabulations, we transitioned into the debriefing and discussion portion of the class period.

Possible modifications

While this collection of exercises was designed to be completed during one class session, it may easily be expanded into several days to incorporate more in-depth

discussion of JDM application.[12] We elected to present the collection of exercises in one class period that focused on the topic of JDM and cognitive biases. Alternately, and in prior years, we have incorporated individual exercises throughout the semester to correspond with related topics (e.g., anchoring bias during the discussion of the planning process, rush to solve in the class period covering the auditor's responsibility regarding fraud).

Additionally, instructors may elect to assign reading on cognitive biases such as KPMG's Professional Judgment Framework (Ranzilla et al. 2011), COSO's guidance on Enhancing Board Oversight (KPMG et al. 2012), or the CAQ's Professional Judgment Resource (CAQ 2014) as we have done in prior semesters.[13] While the incorporation of an advance reading requirement may augment the learning experience from this exercise, prior exposure to the biases has the tendency to prime students before they begin the exercises and minimize the effects seen in class. It does not, however, eliminate the effects completely and students still find the exercises interesting and educational.

We opted to distribute printed response cards to students for all tasks. Alternately, visuals aids could be projected on screen. For Exercises 2 and 5 (anchoring and rush to solve) that provide differing information across cells, you may have one group close their eyes while the second group views information on screen and then alternate to allow the first group to view information. While there are advantages to this option, such as eliminating the time for distributing materials between tasks, we believe it heightens the salience of differences between the groups and increases the tendency for students to

[12] We implemented the exercises in a single class period ranging in length from 50 to 90 minutes.
[13] Other recommended readings include: (1) "Cognitive Biases in Audit Engagements: Errors in Judgment and Strategies for Prevention" (Knapp and Knapp 2012), and (2) "Why Good Accountants Do Bad Audits" (Bazerman, Loewenstein, and Moore 2002).

hypothesize about the purpose of the exercise and modify their responses to avoid perceived traps.

Lastly, Plous (1993) reviews a variety of heuristics, biases, and traps that go beyond those covered in this paper. A unique feature of this book is a reader survey preceding the first chapter which allows students to compare their answers to the responses people gave in the original studies, offering more opportunities for students to "witness" their own biases. For instructors, this book provides additional exercises to use in a more in-depth study of judgment biases in their courses. For students, this book offers a self-study resource to learn more about common biases that manifest in decision making.

REFERENCES

Alpert, M., and H. Raiffa. 1982. A progress report on the training of probability assessors. In D. Kahneman, P. Slovic, and A. Tversky (Eds.), *Judgment under Uncertainty: Heuristics and Biases*. Cambridge: Cambridge University Press.

American Institute of Certified Public Accountants (AICPA). 1999. *AICPA core competency framework for entry into the accounting profession.* Available at: http://www.aicpa.org/interestareas/accountingeducation/resources/pages/corecompetency.aspx

American Institute of Certified Public Accountants (AICPA). 2002. *Consideration of Fraud in a Financial Statement Audit.*AU Section 316. New York, NY: AICPA.

Arkes, H. R. 1991. Costs and benefits of judgment errors: Implications for debiasing. *Psychological Bulletin* 110 (3): 486-489.

Asch, S. E. 1946. Forming impressions of personality. *The Journal of Abnormal and Social Psychology* 41 (3): 258-290.

Ashton, R. H., and J. Kennedy. 2002. Eliminating recency with self-review: The case of auditors' 'going concern' judgments. *Journal of Behavioral Decision Making* 15 (3): 221-231.

Bardolet, D., C. R. Fox, and D. Lovallo. 2011. Corporate capital allocation: A behavioral perspective. *Strategic Management Journal* 32: 1465-1483.

Bazerman, M. H., G. Loewenstein, and D. A. Moore. 2002. Why good accountants do bad audits. *Harvard Business Review* 80 (97): 1-10.

Bloch, J., P. Brewer, and D. Stout. 2012. Responding to the Leadership Needs of the Accounting Profession: A Module for Developing a Leadership Mindset in Accounting Students. *Issues in Accounting Education* 27 (2): 525-554.

Bloom, R., and W. J. Cenker. 2005. The importance of commitments: A case study of a broken promise. *Issues in Accounting Education* 20 (4): 359–364.

Bonner, S. 2008. *Judgment and Decision Making in Accounting*. Upper Saddle River, NJ: Pearson.

Bratten, B., L. M. Gaynor, L. McDaniel, N. R. Montague, and G. E. Sierra. 2013. The audit of fair values and other estimate: The effects of underlying environmental, task, and auditor-specific factors. *Auditing: A Journal of Practice & Theory* 32 (1): 7–44.

Braun, R. L. 2000. The effect of time pressure on auditor attention to qualitative aspects of misstatements indicative of potential fraudulent financial reporting. *Accounting Organizations and Society* 25 (3): 243-259.

Brooks, D. 2011. The modesty manifesto. *New York Times* (March 11).

Butler, S. 1986. Anchoring in the judgmental evaluation of audit samples. *The Accounting Review* 61 (1): 101-111.

Butler, S. A. 1985. Application of a decision aid in the judgmental evaluation of substantive test of details samples. *Journal of Accounting Research* 23 (2):513-526.

Butt, J. L., and T. L. Campbell. 1989. The effects of information order and hypothesis-testing strategies on auditors' judgments. *Accounting, Organizations and Society* 14 (5): 471-479.

Cen, L., G. Hilary, and K. C. J. Wei. 2013. The role of anchoring bias in the equity market: Evidence from analysts' earnings forecasts and stock returns. *Journal of Financial and Quantitative Analysis* 48 (1): 47-76.

Center for Audit Quality (CAQ). 2014. *Professional Judgment Resource*. Washington, DC: CAQ.

Chabris, C., and D. Simons. 2010. *The Invisible Gorilla*. New York, NY: MJF Books.

Cloyd, C., and B. Spilker. 1999. The influence of client preferences on tax professionals' search for judicial precedents, subsequent judgments, and recommendations. *The Accounting Review* July: 299-322.

Collins, D. L., W. R. Pasewark, and M. E. Riley. 2012. Financial Reporting outcomes under rules-based and principles-based accounting standards. *Accounting Horizons* 26 (4): 681 – 705.

Cooper, A. C., C. Y. Woo, and W. C. Dunkelberg. 1988. Entrepreneurs' perceived chances for success. *Journal of Business Venturing* 3 (2): 97-108.

Cushing, B. E., and S. S. Ahlawat. 1996. Mitigation of recency bias in audit judgment: The effect of documentation. *Auditing: A Journal of Practice & Theory* 15 (2): 110-122.

Garvin, D. A., and M. A. Roberto. 1997. *Decision Making at the Top: The All-Star Sports Catalog Division.* Harvard Business School Case #9-398-061. Boston, MA: Harvard Business Publishing.

Griffith, E. E., J. S. Hammersley, and K. Kadous. 2013. Audits of Complex Estimates as Verification of Management Numbers: How Institutional Pressures Shape Practice. *Working paper*, University of Georgia. Available at SSRN: http://ssrn.com/abstract=1857175

Hackbarth, D. 2008. Managerial traits and capital structure decisions. *Journal of Financial and Quantitative Analysis* 43 (4): 843-881.

Hackenbrack, K., and M. W. Nelson. 1996. Auditors' incentives and their application of financial accounting standards. *The Accounting Review* 71 (1): 43-59.

Hageman, A. M. 2010. The role of confidence in tax return preparation using tax software. *Advances in Accounting Behavioral Research* 13: 31-57.

Heiman, V. B. 1990. Auditors' assessments of the likelihood of error explanations in analytical review. *The Accounting Review* 65 (4): 875-890.

Heiman-Hoffman, F., D. Moser, and J. Joseph. 1995. The impact of an auditor's initial hypothesis on subsequent performance at identifying actual errors. *Contemporary Accounting Research* Spring: 763-779.

Hilbert, M. 2012. Toward a synthesis of cognitive biases: How noisy information processing can bias human decision making. *Psychological Bulletin* 138 (2): 211-237.

Hoch, S. J. 1985. Counterfactual reasoning and accuracy in predicting personal events. *Journal of Experimental Psychology: Learning, Memory, and Cognition* 11 (4): 719-731.

Hoffman, V. B., and M. F. Zimbelman. 2009. Do strategic reasoning and brainstorming help auditors change their standard audit procedures in response to fraud risk? *The Accounting Review* 84 (3): 811-837.

Hunton, J. E., A. M. Wright, and S. Wright. 2004. Are financial auditors overconfident in their ability to assess risks associated with enterprise resource planning systems? *Journal of Information Systems* 18: 7-28.

Jacowitz, K. E., and D. Kahneman. 1995. Measures of anchoring in estimation tasks. *Personality and Social Psychology Bulletin* 21: 1161- 1166.

Johnson, L. 1993. An empirical investigation of the effects of advocacy on preparers' evaluations of judicial evidence. *Journal of the American Taxation Association* 15 (1): 1-22.

Johnson, S. 2009. Deloitte to PCAOB: Don't Second-Guess Us. April 21. Available at: http://ww2.cfo.com/accounting-tax/2009/04/deloitte-to-pcaob-dont-second-guess-us/

Joyce, E. J., and G. C. Biddle. 1981. Anchoring and adjustment in probabilistic inference in auditing. *Journal of Accounting Research* 19 (1): 120-145

Kahneman, D. 2011. *Thinking, fast and slow*. New York, NY: Farrar, Straus and Giroux.

Kahneman, D., and D. Lovallo. 1993. Timid choices and bold forecasts: A cognitive perspective on risk taking. *Management Science* 39 (1): 17-31.

Kahneman, D., and A. Tversky. 2000. *Choices, Values, and Frames*. New York, NY: Cambridge University Press.

Kennedy, J. 1993. Debiasing audit judgment with accountability: A framework and experimental results. *Journal of Accounting Research* 31 (2): 231-245.

Kennedy, J., and M. Peecher. 1997. Judging auditors' technical knowledge. *Journal of Accounting Researc*h Autumn: 279-93.

Kinney, W., Jr., and W. Uecker. 1982. Mitigating the consequences of anchoring in auditor judgments. *The Accounting Review* January: 55-69.

Knapp, M. C., and C. A. Knapp. 2012. Cognitive biases in audit engagements: Errors in judgment and strategies for prevention. *CPA Journal* (June): 40-45.

Koonce, L. 1992. Explanation and Counterexplanation during Audit Analytical Review. *The Accounting Review* 67 (1): 59-76.

Koriat, A., S. Lichtenstein, and B. Fischhoff. 1980. Reasons for confidence. *Journal of Experimental Psychology: Human Learning and Memory* 6 (2): 107-118.

KPMG, S. M. Glover, and D. F. Prawitt. 2012. *Enhancing Board Oversight: Avoiding Judgment Traps and Biases*. Durham, NC: Committee of Sponsoring Organizations of the Treadway Commission (COSO).

Larrick, R. P. 2004. Debiasing. In D. J. Koehler and N. Harvey (Eds.), *Blackwell Handbook of Judgment and Decision Making*. Oxford, England: Blackwell Publishers.

Lichtenstein, S., B. Fischhoff, and L. Phillips. 1982. "Calibration of Probabilities: The State of the Art to 1980," in *Judgment under Uncertainty: Heuristics and Biases*, edited by D. Kahneman, P. Slovic, and A. Tversky. New York, NY: Cambridge University Press.

Lord, C. G., M. R. Lepper, and E. Preston. 1984. Considering the opposite: A corrective strategy for social judgment. *Journal of Personality and Social Psychology* 47 (6): 1231-1243.

Martin, R. D., J. S. Rich, and T. J. Wilks. 2006. Auditing fair value measurements: A synthesis of relevant research. *Accounting Horizons* 20 (3): 287-303.

McDaniel, L. S. 1990. The effects of time pressure and audit program structure on audit performance. *Journal of Accounting Research* 28 (2): 267-285.

McDaniel, L. S., and W. R. Kinney. 1995. Expectation-formation guidance in the auditor's review of interim financial information. *Journal of Accounting Research* 33 (1): 59-76.

McElroy, T., and K. Dowd. 2007. Susceptibility to anchoring effects: How openness-to-experience influences responses to anchoring cues. *Judgment and Decisions Making* 2 (1): 48-53.

Moser, D. 1989. The effects of output interference, availability, and accounting information on investors' predictive judgments. *The Accounting Review* 64 (3): 433-448.

Mussweiler, T., F. Strack, and T. Pfeiffer. 2000. Overcoming the inevitable anchoring effect: Considering the opposite compensates for selective accessibility. *Personality and Social Psychology Bulletin* 26 (9): 1142-1150.

Nickerson, R. 1998. Confirmation bias: A ubiquitous phenomenon in many guises. *Review of General Psychology* June: 175-200.

Payne, J. W., J. R. Bettman, and E. J. Johnson. 1993. *The Adaptive Decision Maker*. New York, NY: Cambridge University Press.

Peecher, M. E. 1996. The influence of auditors' justification processes on their decisions: A cognitive model and experimental evidence. *Journal of Accounting Research* 34 (1): 125-140.

Peecher, M. E., I. Solomon, and K. T. Trotman. 2013. An accountability framework for financial statement auditors and related research questions. *Accounting, Organizations and Society* 38 (8): 596-620.

Pennington, N., and R. Hastie. 1986. Evidence evaluation in complex decision making. *Journal of Personality and Social Psychology* 51 (2): 242-258.

Plous, S. 1993. *The Psychology of Judgment and Decision Making*. New York, NY: McGraw-Hill.

Public Company Accounting Oversight Board (PCAOB). 2011. *Concept Release on Auditor Independence and Audit Firm Rotation: PCAOB Release No. 2011-006*, Washington, D.C.: PCAOB.

Ranzilla, S., R. Chevalier, G. Herrmann, S. Glover, and D. Prawitt. 2011. *Elevating Professional Judgment in Auditing and Accounting: The KPMG Professional Judgment Framework.* KPMG.

Schneider, A., and W. F. Messier. 2007. Engagement quality review: Insights from the academic literature. *Managerial Auditing Journal* 22 (8): 823-839.

Shields, M., I. Solomon, and W. Waller. 1988. Auditors' usage of unaudited book values when making presampling audit value estimates. *Contemporary Accounting Research* 5 (1): 1-18.

Simons, D. 2014. Plenary session, Audit Midyear Meeting. American Accounting Association. San Antonio, TX. January 18, 2014.

Slovic, P. 1972. Psychological study of human judgment: Implications for investment decision making. *The Journal of Finance* 27 (4): 779-799.

Svenson, O. 1981. Are we all less risky and more skillful than our fellow drivers? *Acta Psychologica* 47: 143-148.

Thaler, R. H., and C. R. Sustein. 2008. *Nudge: Improving Decisions about Health, Wealth, and Happiness*. New Haven, CT: Yale University Press.

Tversky, A., and D. Kahneman. 1974. Judgment under uncertainty: Heuristics and biases. *Science* 185 (4157): 1124-1131.

Tversky, A., and D. Kahneman. 1973. Availability: A heuristic for judging frequency and probability. *Cognitive Psychology* 5: 207-232.

Wason, P. C. 1960. On the failure to eliminate hypotheses in a conceptual task. *Quarterly Journal of Experimental Psychology* 12: 129–140.

West, T., and M. Cronk. 2011. Financial Officers as Leaders: Lessons from Army Medicine. *Strategic Finance* 92 (10): 31-37.

Table 1 - Implementation Schedule

Task	Time (minutes)
Introduction	2
Exercises:	
1 - Availability	5
2 - Anchoring	3
3 - Overconfidence	3
4 - Confirmation bias	10
5 - Rush to solve	5
Calculations	5
Discussion*	17
Total implementation	50

*Time allocated for discussion can vary based on class time.

Table 2 - Identifying and Overcoming Biases that Undermine Accounting Judgments

BIAS	ACCOUNTING JUDGMENTS [a]	DEBIASING TECHNIQUES [b]
Availability Bias *The tendency for decision makers to consider information that is easily retrievable from memory as being more likely, more relevant, and more important for a judgment.*	***Evaluation of Evidence*** Items most easily retrieved by auditors can influence hypothesis generation, information search, and hypothesis/evidence evaluation *(Pennington and Hastie 1988).* ***Estimation/Likelihood Judgments*** An analyst who attempts to evaluate the likelihood of a recession may do so my recalling economic conditions similar to those of the present (Slovic 1972). Investors' predictive earnings judgments can be systematically biased as a consequence of the availability heuristic *(Moser 1989).* ***Choosing Between Options*** An auditor may choose to follow the approach used in a prior period even though it is not the best for the current engagement (*Ranzilla et al. 2012*). Similarly, tax preparers' tax recommendations may be influenced by the availability bias when current year decisions are based on the prior year's tax return.	**Increase awareness of the bias** *(Ranzilla et al. 2011; KPMG et al. 2012)* **Maintain an attitude of professional skepticism** *(Ranzilla et al. 2011; KPMG et al. 2012)* **Utilize a professional judgment framework** *(Ranzilla et al. 2011)* **Document the judgment rationale** *(Cushing and Ahlawat 1996; Koonce 1992; Ranzilla et al. 2011)* **Learn to anticipate and correct mistakes** *(Kahneman 2011)*
Anchoring and Adjustment Bias *The tendency for decision makers to start their decision process from a specific point of reference and subsequently make insufficient adjustments from the anchored point.*	***Evaluation of Evidence*** In assessing the prevalence of management fraud, auditors' estimates were influenced by irrelevant anchors *(Joyce and Biddle 1981).* In a sampling context, auditors' judgments of achieved risk are affected by the allowable risk anchor *(Butler 1986).* Auditors who receive unaudited values with material errors are less accurate than auditors who do not receive these anchors *(Shields et al. 1988).*	

	Estimation/Likelihood Judgments In conducting analytical review procedures, auditors' expectations about the client's audited values were influenced by the recorded book values *(Kinney and Uecker 1982).* In forecasting, analysts anchor their forecasts on the industry norm *(Cen et al. 2013).* ***Choosing Between Options*** In capital allocation decisions, managers anchor on even allocations as a starting point, and subsequently adjust insufficiently resulting in overinvestments in underperforming divisions and underinvestments in overperforming divisions *(Bardolet et al. 2011).* In cost variance analysis, uninformative cost anchors affect investigation decisions *(Brown 1980).*	**Develop your own expectations** *(Kinney and Uecker 1982; McDaniel and Kinney 1995)* **Consider the opposite** *(Koriat et al. 1980; Lord et al. 1984; Hoch 1985; Heiman 1990; Arkes 1991; Kennedy 1995; Mussweiler, Strack, and Pfeiffer 2000; Koonce 1992; Larrick 2004; Bonner 2008)* **Consider an outside perspective** *(Cooper, Woo, and Dunkelberg 1988; Kahneman and Lovallo 1993; Kennedy 1993; Ashton and Kennedy 2002; Schneider and Messier 2007; Simons 2014)* **Ask one more question/use a decision aid to prompt additional questions** *(Butler 1985; Hoffman and Zimbelman 2009; Simons 2014)* **Appreciate your own incentives**
Overconfidence Bias *The tendency for decision makers to overestimate their own abilities to perform tasks or to make accurate diagnoses or other judgments or decisions.*	***Evaluation of Evidence*** Auditors may be overconfidence in their abilities to evaluate fair value estimates *(Martin et al. 2006).* Overconfidence in oneself may also translate into overconfidence in others, leading less experienced colleagues to perform complex tasks *(Kennedy and Peecher 1997).* ***Estimation/Likelihood Judgments*** Auditors are overconfident in their abilities to assess risks associated with enterprise resource planning systems *(Hunton et al. 2004).* Inexperienced tax preparers are overconfident in the accuracy of their performance when using tax decision support systems such as TurboTax (*Hageman 2010).*	

	Choosing Between Options In capital structuring decisions (debt vs. equity), overconfident managers tend to choose higher debt levels *(Hackbarth 2008).*	*(Simons 2014)*
Confirmation Bias *The tendency for decision makers to seek or interpret evidence in ways which are partial to existing beliefs, expectations, or a hypothesis at hand.*	***Evaluation of Evidence*** Auditors engaging in confirmation bias exploit ambiguity in financial accounting standards to justify client-preferred reporting choices *(Hackenbrack and Nelson 1996).* ***Estimation/Likelihood Judgments*** Tax professionals place more weight on court cases that are supportive of their client's desired tax position, which lead to higher assessed probabilities of success *(Johnson 1993).* Auditors told to confirm prior beliefs about an internal control system make higher probability judgments than those either told to disconfirm or given no instructions *(Butt and Campbell 1989).* ***Choosing Between Options*** Tax professionals engaging in confirmation bias make biased judgments about the support for a client's preferred position and aggressive recommendations to clients *(Cloyd and Spilker 1999).*	**Increase accountability** *(Kennedy 1993 - context was recency bias; Peecher, Solomon, and Trotman 2013)* **Justification of judgments** *Peecher (1996)* **Instruction, practice, and feedback** *Bonner (2008)*
Rush to Solve Trap *The tendency for decision makers to quickly form a judgment without giving sufficient consideration to all available data.*	***Evaluation of Evidence*** In inventory related tasks, auditors under time pressure missed more errors and chose smaller sample sizes *(McDaniel 1990).* Time pressure has a negative effect on the extent to which auditors detect and follow up on indicators of fraud *(Braun 2000).* When auditing fair values and other complex estimates, audit standards allow three approaches: the audit team can develop its own estimate, audit the process, or rely on subsequent events.	

	Auditors overwhelmingly choose to audit the process that management uses to arrive at the estimate (*Griffith, Hammersley, and Kadous 2013).* ***Estimation/Likelihood Judgments*** In their rush to make a judgment, auditors rely on the perceived trustworthiness of a client as one of the strongest indicators of fraud *(Heiman-Hoffman, Moser, and Joseph 1996).* ***Choosing Between Options*** Managers are susceptible to the rush to solve trap if they reach an early consensus on a decision without sufficient deliberation *(KPMG et al. 2012).*	

[a] See Bonner (2008) for a comprehensive literature review of accounting research which examines the manifestation of these five biases in various accounting judgments.
[b] Multiple debiasing techniques can be applied to the various accounting judgments, therefore we do not map each technique to a specific bias.

Table 3

Student Feedback on Case

	All		Undergraduate		Graduate	
Number of students	123		92		31	
Males	70		54		16	
Females	53		38		15	
Percentage recommending use in other classrooms[1]	97%		99%		90%	
	Mean[2]	**% Agree**[3]	**Mean**[2]	**% Agree**[3]	**Mean**[2]	**% Agree**[3]
Increased my knowledge of cognitive biases.	4.33	98%	4.38	99%	4.16	94%
Strengthened my ability to identify bias.	3.99	86%	4.04	90%	3.84	74%
Helped me identify my own biases.	4.20	91%	4.28	96%	3.97	77%
Will help me in future decision making.	4.05	85%	4.10	89%	3.90	74%
Was interesting.	4.57	97%	4.55	97%	4.61	97%
Was realistic.	4.28	90%	4.34	92%	4.10	84%
The instructions were clear.	4.14	81%	4.21	84%	3.94	74%

[1] One graduate student reported a negative response, while two graduate students and eight undergraduate students provided no response.

[2] Scale from 1-Strongly Disagree to 5-Strongly Agree

[3] Percentage of students responding with 4-Agree or 5-Strongly Agree

Figure 1 – Anchoring Exercise (Group 1)

Exercise 2

a) Is the length of the Mississippi River greater or less than 3000 miles?

b) What is the length of the Mississippi River?

Figure 2 – Anchoring Exercise (Group 2)

Exercise 2

a) Is the length of the Mississippi River greater or less than 300 miles?

b) What is the length of the Mississippi River?

Figure 3 – Overconfidence Exercise

Exercise 3

Relative to your classmates in this course, how would you rate your intelligence?

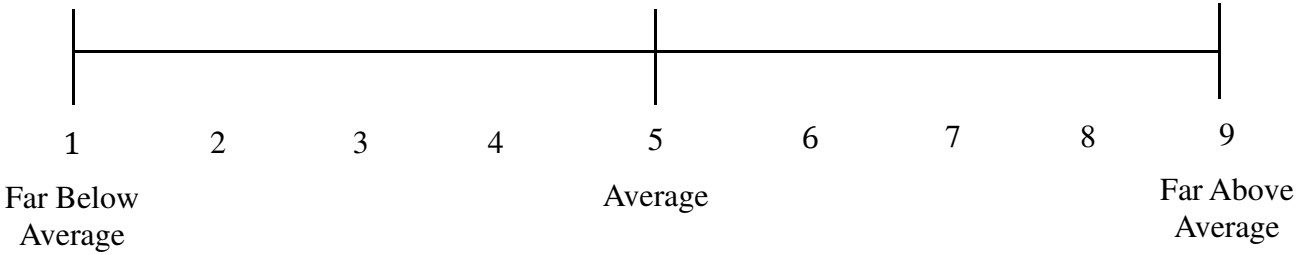

Figure 4 – Confirmation Bias Exercise

Exercise 4:

Number Series	Fits? Y/N	Proposed Rule	% Confidence*
2 4 6	Y		

* 0% = no confidence, 100% = complete confidence

Figure 5 – Rush to Solve: Part 1 (Group 1)

Exercise 5a

Intelligent

Skillful

Industrious

Warm

Determined

Practical

Cautious

Figure 6 – Rush to Solve: Part 1 (Group 2)

Exercise 5a

Intelligent

Skillful

Industrious

Cold

Determined

Practical

Cautious

Figure 7 – Rush to Solve: Part 2 (both groups)

Exercise 5b

1. Generous – Ungenerous
2. Shrewd – Wise
3. Unhappy – Happy
4. Irritable – Good-natured
5. Humorous – Humorless
6. Sociable – Unsociable
7. Popular – Unpopular
8. Unreliable – Reliable
9. Important – Insignificant

Figure 8 – Rush to Solve: Tabulate Responses

	Group 1	Group 2
Total # Cards		
1. Generous		
2. Wise		
3. Happy		
4. Good-natured		
5. Humorous		
6. Sociable		
7. Popular		
8. Reliable		
9. Important		