The Effects of Accountability Pressure Strength and Decision Aid Availability on Auditors' Materiality Judgments

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November 2003

Acknowledgements: We gratefully acknowledge the generous help we received from the five participating accounting firms. We also appreciate helpful comments from Debbie Archambeault, Dana Hermanson, Karen Maguire, and Jonathan Stanley.

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ABSTRACT

This study investigates the effects of accountability pressure strength and decision aid availability on auditors' materiality judgments. Specifically, we consider whether theoretically different dimensions of accountability pressure (i.e., anonymity, review, justification, and feedback) can be distinguished empirically using measures of judgment conservatism, variability, and effort. We also consider whether a quantitative planning materiality decision aid moderates the effects of accountability pressure. One hundred sixty auditors participated in a 4x2 between-subjects experiment that included a planning materiality task and a proposed audit adjustment task. As predicted, auditors under higher levels of accountability pressure (i.e., justification pressure, feedback pressure) provided more conservative materiality judgments and had less judgment variability than auditors under lower levels of pressure (i.e., review pressure, anonymity). The results also indicate that accountability pressure strength was positively related to effort duration, explanation length, and consideration of qualitative materiality factors. Finally, the results show that the planning materiality decision aid moderated the accountability pressure effects for the planning materiality judgment. We consider implications for research, practice, and policy in the context of the study's limitations.

Key Words: *accountability, review, justification, feedback, decision aid, materiality, proposed audit adjustment*

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INTRODUCTION

This study evaluates the effects of accountability pressure strength and decision aid availability on auditors' materiality judgments. Specifically, we manipulate accountability pressure at four levels (i.e., anonymity, review, justification, and feedback) and test whether incremental pressure increases judgment conservatism and decreases judgment variability on planning materiality and proposed audit adjustment tasks. We also evaluate how accountability pressure strength affects auditors' effort as proxied by the amount of time spent on the task and the length and nature of their justifications. Finally, we consider the moderating effects of a planning materiality decision aid on auditors' judgments under various levels of accountability pressure.

This study is motivated in two primary ways. First, from a research perspective, we seek to specify and disentangle the various types of accountability pressure that can affect professional judgment and decision-making (JDM). While the accountability literature in accounting generally demonstrates that accountability can improve judgments (e.g., Ashton 1992; Cloyd 1997; Johnson and Kaplan 1991; Tan and Kao 1999) and effort (e.g., Chang et al. 1997; Kennedy 1993; Tan 1995), it lacks efforts to clearly distinguish among various types of accountability pressure and their effects on professional JDM. For example, the accounting literature lacks sufficient theoretical and empirical consideration of incremental accountability effects on auditor effectiveness and efficiency. We address this construct validity problem by testing for differences among what Lerner and Tetlock (1999) suggest are empirically distinguishable dimensions of the construct.

Second, we seek to increase understanding of auditors' materiality judgments in a highly scrutinous environment. According to the Financial Accounting Standards Board's Statement of Financial Accounting Concept (SFAC) No. 2, an item is material "if, in the light of surrounding circumstances, the magnitude of the item is such that it is probable that the judgment of a reasonable person relying upon the report would have been changed or influenced by the inclusion or correction of the item." (paragraph 10).[1] For auditors, materiality assessments are risky professional judgments that occur at multiple levels (e.g., financial statement, account balance, class of transactions, disclosure) in changing environments and contexts.[2] Moreover, auditors' materiality judgments are subject to challenge by client management and other stakeholders (e.g., the audit committee) who have potentially divergent interests and incentives.[3]

Scrutiny of auditors' materiality judgments has focused on the methods used to decide whether individual or aggregated misstatements would matter to a "reasonable person." Both auditors and financial statement preparers commonly use quantitative materiality thresholds as rules-of-thumb to assist in the preparation and evaluation of financial statements. However, both the SEC (1999) and the Big Five Audit Materiality Task Force (1998) highlighted the dangers of simple reliance on quantitative measures and the need for careful consideration of qualitative factors that can make even very small misstatements material. For example, the SEC (1999) emphasized in Staff Accounting Bulletin 99, *Materiality*, that "exclusive reliance on certain quantitative benchmarks to assess materiality in preparing financial statements and performing audits of those financial statements is inappropriate; misstatements are not immaterial simply

[1] The SEC and the U.S. Supreme Court provide alternative definitions of materiality, although they also use a "reasonable person" standard.
[2] Each Statement of Financial Accounting Standard adopted by the FASB states, "The provisions of this Statement need not be applied to immaterial items."
[3] Gibbins et al. (2001) provides evidence that materiality is often a point of negotiation between auditors and client management.

because they fall beneath a numerical threshold" (p. 1).

Despite such strong concerns and warnings, relatively little is known about the materiality judgment process in auditing (Tuttle et al. 2002). The extant literature (e.g., Boatsman and Robertson 1974; Carpenter and Dirsmith 1992; Friedberg et al. 1989; Icerman and Hillison 1991; Krogstad et al. 1984; Messier 1983) provides evidence that auditors rely on income-based measures when assessing materiality. However, the literature lacks research that examines the effects of pressure-based incentives and decision aid use on materiality judgments, effort, and justifications. This study addresses calls for research on the interaction between accountability and decision aid reliance (e.g., Ashton 1990; Messier 1995) and provides evidence on how a quantitative materiality decision aid can affect accountability-based JDM.

One hundred sixty auditors from five public accounting firms participated in a 4x2 between-subjects experiment involving a series of materiality judgments, including a planning materiality recommendation and a materiality assessment for a proposed audit adjustment. We manipulated accountability pressure at four levels: anonymity, review (i.e., general review of performance by a superior), justification (i.e., supervisor review of materiality judgments and accompanying specific judgment explanations), and feedback (i.e., supervisor review of materiality judgments and accompanying specific judgment explanations, with specific supervisor performance feedback). We also evaluated whether the availability of a planning materiality decision aid moderated the accountability pressure effects.

The results provide evidence that accountability pressure strength affects judgment conservatism, variability, and effort. Overall, auditors under higher levels of accountability pressure (i.e., justification pressure, feedback pressure) were more conservative and less variable in their materiality judgments than auditors under lower levels of pressure (i.e., review pressure,

anonymity). Participants in the feedback and justification groups provided planning materiality recommendations that were significantly lower than participants in the review group and the anonymous group. Similarly, participants in the feedback and justification groups indicated a proposed audit adjustment was more material than participants in the review and anonymous groups. The results also indicate that the planning materiality decision aid moderated the accountability pressure effects for auditors' planning materiality judgments. When the decision aid was available, planning materiality judgments tended to be more conservative (i.e., lower) and less variable across the review, justification, and feedback groups. Finally, accountability pressure strength was associated with auditors' effort in the experiment. Auditors under higher levels of accountability pressure spent more time on the tasks, produced longer judgment explanations, and emphasized more qualitative materiality factors than auditors under lower levels of pressure.

The remainder of the paper is organized as follows. The next section develops the study's hypotheses. The third section details the research method. The fourth section presents the study's results. The final section discusses the study's implications and limitations.

HYPOTHESIS DEVELOPMENT

Accountability Pressure

Schlenker (1997) defines accountability as being answerable to audiences for performing up to prescribed standards that are relevant to fulfilling obligations, duties, expectations, and other charges. Different theoretical perspectives exist for explaining why accountability pressure affects individual JDM. For example, Schlenker and Leary (1982) discuss the social anxiety created when accountability pressure exists. They conceptualize accountability-based anxiety using Carver's (1979) model of self-attention, where "self-attention" increases concern about

meeting perceived standards for behavior. As performance importance increases, individuals' motivation to make a positive impression on the evaluative audience increases.

Alternatively, Ashton (1990) uses the Yerkes and Dodson (1908) arousal (inverted-U) model in his study of incentives, feedback, and justification. Arousal theory provides that performance pressures increase individuals' motivation to be attentive and to exert effort. This perspective highlights that such pressure-induced "arousal" can be functional, dysfunctional, or inconsequential. Further, the link between arousal and performance is sensitive to factors such as pressure strength and task difficulty (Ashton 1990).

Tetlock (1992) proposes a social contingency model that suggests accountability pressure can stimulate a politically motivated need to maintain the positive regard of important evaluative constituents. This perspective provides a basis for predicting coping strategies (e.g., the acceptability heuristic, defensive bolstering) and individual and situational moderators (e.g., tolerance for ambiguity, task subjectivity).

While alternative theoretical perspectives exist, we consider them complements. For example, contemporary perspectives emphasize the importance of considering whether the evaluative audience's views are known. When audience views are known, individuals are likely to adopt a least effort (cognitive miser) solution and simply adopt the audience's position. Tetlock (1992) suggests that this use of a conforming strategy (acceptability heuristic) makes justification relatively easy. In contrast, when audience views are unknown, individuals are more likely to engage in "preemptive self-criticism" where they engage in more vigilant, complex, and self-critical thinking (Tetlock 1992; Lerner and Tetlock 1999).

The auditing literature provides evidence supporting these predictions. When audience views were known, professional auditors tailored their message to their specific audience

(Buchman et al. 1996; Cuccia et al. 1995; Hackenbrack and Nelson 1996). Alternatively, when audience views were unknown, auditors in a high (versus low) accountability condition wrote more thorough justifications for their decisions (Koonce et al. 1995).

Contemporary accountability theory also recognizes that the pressure is multidimensional. For example, Lerner and Tetlock (1999) suggest that researchers have commonly mistaken accountability as a unidimensional construct. They note that even the simplest accountability manipulation has several "empirically distinguishable sub manipulations."[4] Schlenker (1997) describes three dimensions of accountability: an *inquiry* facet (where a query may be instituted to evaluate the actor's behavior); an *accounting* facet (where an actor has the opportunity to give their side of the story as it relates to the inquiry), and; a *verdict* facet (where the audience evaluates the action and any justification prior to recommending sanctions). Accordingly, accountability pressure should not be considered a generic construct because it can take numerous forms in numerous contexts.

Our review of the experimental accounting literature reveals four theoretically distinct, but empirically undistinguished, levels of accountability pressure: anonymity, review, justification, and feedback. We distinguish and test these escalating levels of accountability because they theoretically vary in strength and capacity to influence professional JDM. Table 1 provides a summary of the experimental accounting research that has manipulated at least two accountability pressure dimensions. Collectively, these studies generally indicate that accountability pressure decreases judgment variability (e.g., Ashton 1992; Johnson and Kaplan 1991) and increases judgment conservatism (e.g., Hoffman and Patton 1997; Lord 1992) and

[4] Lerner and Tetlock (1999, 255-256) suggest these submanipulations include the *presence of another* (where participants expect performance observation), *identifiability* (where participants expect to be linked to their performance), *evaluation* (where participants expect performance assessment), and *reason-giving* (where participants can be expected to justify their actions to another).

effort (e.g., Asare et al. 2000; Chang et al. 1997; Cloyd 1997; Koonce et al. 1995; Tan 1995).

[Insert Table 1 here]

Early accountability pressure research in psychology (e.g., Tetlock 1983) and accounting (e.g., Johnson and Kaplan 1991; Lord 1992) was motivated by concerns about providing subjects with anonymity in experimental settings. *Anonymity* is simply the absence of explicit accountability. Tetlock (1983) noted the threat of granting experimental subjects anonymity when he stated, "In everyday life, people do not function in a social vacuum; they work in settings in which implicit or explicit norms of accountability and responsibility regulate the conduct of the participants" (p. 74).

Once anonymity is eliminated, accountability in its weakest form is simple *review* pressure. Review pressure emerges when individuals realize they can be linked to their performance. This "identifiability" (Lerner and Tetlock 1999) should provide additional motivation to avoid negative consequences (e.g., criticism, embarrassment) and/or pursue positive consequences (e.g., promotion, praise). Accounting researchers have operationalized simple review pressure by either assuring participants that their work will be reviewed (e.g., Koonce et al. 1995; Lord 1992) or by telling participants that there is a chance of review (e.g., Tan 1995; Tan and Kao 1999).[5]

Justification pressure results from individuals knowing they will have to provide an explicit justification for their judgment to evaluative others (e.g., peers, superiors). As a relatively common accountability manipulation in the accounting literature (e.g., Agoglia et al. 2003; Johnson and Kaplan 1991; Tan and Kao 1999), this pressure amplifies simple review pressure and highlights accountability for both judgments and their attendant explanations.

[5] While imposing only a "chance" of review lessens the burden placed on reviewers, the possibility of significant pressure dilution exists. Future research involving simple review pressure should consider the extent that participants perceive pressure when told about possible review.

While simple review pressure may lead to speculation about the possible need to justify a decision, outcome uncertainty exists. Justification pressure removes ambiguity and makes the demand for justification explicit. For example, Peecher (1996) noted that justification "involves activating a justification goal followed by strategically searching for and evaluating information" (p. 126). Accordingly, this form of accountability pressure should be more salient and influential than simple review pressure.

Feedback pressure emerges in situations where individuals expect formal evaluation of their decisions and/or justifications. In the accounting literature, feedback typically has been evaluated for its ability to stimulate learning among professionals (see DeZoort and Lord [1997] for a review). However, Ashton (1990) first highlighted that the anticipation of a feedback event constitutes a performance pressure that can affect individual JDM. We posit that decision and justification feedback represents the strongest form of accountability pressure because it specifies a consequential feedback event where explicit direct audience reaction is forthcoming.

As suggested by Lerner and Tetlock (1999) and Schlenker (1997), we consider these accountability dimensions to be distinct pressure stimuli that can affect individual JDM. Our study considers materiality judgments in settings where the evaluative audiences' views are not known and no objective "right" answers exist. Increased accountability pressure strength should increase auditor caution and motivation to make a positive impression on the evaluative audience. Asare et al. (2000) found that justification pressure increased cautious behavior among auditors in an analytical procedures task when the evaluative audience's views were unknown. Similarly, Hoffman and Patton (1997) found that justification pressure led to more conservative fraud risk assessments. We predict that incremental accountability pressure should increase caution among auditors and make them more sensitive to embedded risks in the setting,

leading to more conservative materiality judgments. Stated formally:

H1: Accountability pressure strength will be positively related to the amount of *conservatism* in auditors' materiality judgments.

We also expect increases in accountability pressure to affect the variability in auditors' materiality judgments. As with judgment conservatism, increased caution and motivation to impress resulting from heightened accountability should reduce judgment variability. Ashton (1990) found that justification and feedback pressure (imposed without an available decision aid) reduced decision variability among auditors in a bond ratings task. Similarly, Johnson and Kaplan (1991) found higher judgment consensus and lower variation among auditors under justification pressure during an inventory obsolescence task. We predict that the amount of materiality judgment variation among auditors will decrease as they become more conservative under escalating accountability. Stated formally:

H2: Accountability pressure strength will be inversely related to the amount of *variability* in auditors' materiality judgments.

Finally, we predict that increases in accountability pressure strength will motivate higher levels of effort among auditors making materiality judgments. For subjective tasks where the evaluative audience's views are not known, increased accountability pressure should motivate increasingly vigilant, critical processing to identify a preferred solution, develop a defensible justification, and make a positive impression. The accountability literature in accounting generally suggests that accountable subjects exert more effort than anonymous subjects. For example, Chang et al. (1997) found that justification pressure increased the amount of time students spent trying to solve accounting problems, although it did not improve their performance. Similarly, Cloyd (1997) found that feedback pressure increased the amount of time tax professionals searched for and evaluated information in a tax research task.

Accordingly, we test the following hypothesis:

H3: Accountability pressure strength will be positively related to the amount of *effort* auditors exert in making their materiality judgments.

Decision Aid Effects

We also consider the moderating effects of a planning materiality decision aid on auditors' responses to differential accountability pressure. The extant literature involving the use of decision aids in professional JDM generally suggests that decision aid use should increase judgment quality because it imposes structure, increases consistency, and inspires confidence.[6] However, a number of studies (Arkes et al. 1986; Ashton 1990; Boatsman et al. 1997; Kachelmeier and Messier 1990) challenge presumed decision aid benefits and demonstrate the need to consider decision aid effects in context.

For example, Ashton (1990) studied the joint effects of decision aids and performance pressures (e.g., financial incentives, justification requirement, and feedback) on auditors' bond ratings. His results indicated that when performance pressures were combined with a decision aid, reliance on the decision aid decreased, mean decision accuracy decreased, and decision variability increased. Similarly, Arkes et al. (1986) found that increases in performance incentives and decision consequences led to increased reluctance to rely on decision aids. Boatsman et al. (1997) found similar results in their study of audit planning judgments and concluded "auditors, like other decision makers, are very hesitant to rely on the judgment output of mechanical decision aids for decisions that are highly judgmental" (p. 231).

We extend this line of research by considering the effect of a simple mechanical planning materiality decision aid on auditors' materiality judgments under varied levels of accountability pressure. Given the varied (and sometimes "paradoxical") effects of decision aids on auditor

[6] See Messier (1995) for a review of decision aid research in accounting.

JDM and lack of clear theory in the area, we question whether a planning materiality decision aid will affect judgment conservatism, variability, and effort under varied levels of accountability pressure. Asked formally:

RQ: To what extent will a planning materiality decision aid affect auditors' materiality judgments under differing levels of accountability pressure?

METHOD

Design and Instrument

We employ a 4x2 between-subjects design with accountability level and decision aid availability manipulated randomly between subjects. Accountability pressure was manipulated at four levels: anonymity, review, justification, and feedback. Decision aid availability was manipulated at two levels: available and not available. The computer-based instrument (see Appendix, Panel A) described a hypothetical audit client that manufactured pharmaceutical products. After providing client background, the instrument provided summary financial information and an overview of a proposed audit adjustment to the client's estimate for the Allowance for Uncollectible Accounts.

Participants in the anonymous group provided no personal information and were told that no effort would be made to link them to their responses. Participants in the review, justification, and feedback groups provided their names, social security numbers, and e-mail addresses. Review group participants were told that an audit partner would review their responses, although they would not receive specific feedback. Justification group participants were told that an audit partner would review their materiality judgments and their justifications, although they would receive no specific feedback. Feedback group participants were told an audit partner would provide them with specific feedback on their materiality judgments and justifications. To avoid

deception, we provided contact partners with summaries of the accountable participants' responses as a basis for review and feedback.[7]

Participants in the decision aid available group received a planning materiality calculation form (see Appendix, Panel B). The aid provided a range of planning materiality values from $42,940 to $95,600 based on calculations involving operating results (e.g., % of revenue, % of pretax income) and financial position (e.g., % of total assets).

After considering background information and the relevant treatments, participants were asked to provide a planning materiality amount for the engagement. Next, they were asked to assess the materiality of the proposed adjustment to the Allowance for Uncollectible Accounts. Participants had an opportunity to explain each judgment. Following the materiality judgments, we asked a series of questions related to materiality, the manipulations, and the participants' backgrounds.

Participants and Procedure

Five public accounting firms (three Big 4 firms, one national firm, and one regional firm) provided a total of 167 auditors to participate in the study. The participants included 99 staff auditors (mean experience = 1.61 yrs; SD = 0.82 yrs), 58 seniors (mean experience = 3.02 yrs; SD = 1.00 yrs), and 10 managers (mean experience = 6.85 yrs; SD = 2.04 yrs). A majority of the participants were female (58%) and had earned a graduate degree (58%). Almost half (48%) were CPAs.[8]

We administered the computerized experiment at training sessions within each of the participating firms. Contact partners from each accounting firm reviewed and approved the

[7] The summaries were developed with the assistance of two of our contact partners to ensure that the information was clear and that the participants were not subjected to unnecessary risk.

[8] A marginally significant negative association emerged between audit experience and planning materiality amount ($p = 0.06$). Accordingly, we control for audit experience in subsequent testing. No significant gender, CPA, or firm differences were found ($p > 0.10$ in all cases).

study and the instrument.[9] The introduction, experiment, and debriefing took approximately 30 minutes to complete.

RESULTS

Manipulation Checks

Two manipulation checks were used to assess the efficacy of the accountability pressure treatments. First, we asked the participants to report the amount of pressure they felt to make appropriate materiality judgments in the case. Using an 11-point scale anchored "No Pressure" (coded as 0) and "A Great Deal of Pressure" (coded as 10), the results indicate that the levels of perceived pressure increased significantly in step with the increased levels of pressure applied. Specifically, anonymous participants felt the least pressure (mean = 3.31), while accountable participants (mean = 6.07), justification participants (mean = 6.78), and feedback participants (mean = 7.24) felt increasingly moderate levels of pressure to make appropriate judgments.[10] Second, we asked the participants to identify their respective pressure treatment with a yes/no statement. Seven participants (4%) did not recognize their specific pressure treatment and were subsequently excluded from the analysis, leaving 160 participant observations for the remainder of the analysis.[11]

Judgment Conservatism (H1)

The ANOVA results in Table 2 (planning materiality judgment) and Table 3 (proposed adjustment materiality) provide partial support for H1. The planning materiality results in Table 2 reveal significant differences among the four accountability (ACCTBLTY) pressure groups'

[9] We obtained Human Subjects Committee approval for the study and research materials.
[10] While most of the between group differences are significant ($p < 0.01$), post hoc comparisons indicate marginal significance for the review vs. justification ($p = 0.07$, one-tailed) and justification vs. feedback ($p = 0.10$, one-tailed) differences.
[11] The study's results are not affected by including the seven participants who failed the manipulation check.

mean planning materiality amounts ($F = 9.28; p < 0.001$).[12] As expected, the anonymity group's mean ($94,480) was significantly higher than the other three groups' means ($p < 0.001$ for all post hoc comparisons), suggesting that accountability induced judgment conservatism. In addition, the review group's mean ($57,918) was significantly higher than the means for the justification group ($44,851) and the feedback group ($45,399) ($p = 0.02$ for both comparisons). No significant difference emerged between the justification group and the feedback group ($p = 0.95$).

The significant decision aid (AID) effect in Table 2 indicates that the planning materiality decision aid moderated the accountability pressure effects ($F = 4.85$, $p = 0.03$). Planning materiality judgments were more conservative when the decision aid was available (mean = $53,037) than when the aid was not available (mean = $67,935). The results also reveal a significant ACCTBLTY x AID interaction ($F = 3.47$, $p = 0.02$), indicating greater judgment consistency among the treatment groups' planning materiality judgments when the decision aid was available.[13]

[Insert Table 2 here.]

For the proposed adjustment task, the results in Table 3 again reveal a significant ACCTBLTY effect ($F = 8.26$, $p < 0.001$). Using a scale anchored with "very immaterial" (coded as -10) and "very material" (coded as 10), the review, justification, and feedback groups all found the proposed adjustment to be material (means = 1.50, 3.41, and 4.21, respectively).[14]

[12] Two-tailed p-values are reported throughout the paper unless indicated otherwise.
[13] To address the possibility that inexperienced participants would rely more on the decision aid than experienced participants, we evaluated the interaction between experience and decision aid availability for both the planning material judgment and the proposed adjustment judgment. The interaction results were insignificant for both judgments ($p = 0.64$ and $p = 0.85$, respectively).
[14] The 95% confidence intervals for the review, justification, and feedback groups had positive ("material") lower bounds. In addition, all three groups' means were significantly higher than the scale's indifference (zero) midpoint ($p < 0.05$).

Alternatively, the anonymous participants were relatively indecisive about the proposed adjustment's materiality (mean = -0.55). Post hoc comparisons reveal that the anonymous group's materiality assessment was significantly lower than the other three groups ($p < 0.04$ for all comparisons). In addition, the review group's assessment was significantly lower than the feedback and justification groups' assessments ($p \leq 0.03$ for both comparisons). Finally, the justification group's materiality assessment was lower than the feedback groups' assessment, although the difference was only marginally significant ($p = 0.10$, one-tailed).

While significant decision aid effects emerged for the planning materiality judgment, the planning materiality decision aid did not affect the proposed adjustment judgment. However, the insignificant ACCTBLTY x AID interaction ($F = 0.57$, $p = 0.63$) and AID main effect ($F = 0.04$, $p = 0.95$) are not surprising because the decision aid was not designed for a proposed audit adjustment task.[15]

[Insert Table 3 here.]

Judgment Variability (H2)

The results also provide evidence that accountability pressure strength is inversely related to materiality judgment variability. Overall, Levene's test for variance equality revealed significant differences in judgment variability among the accountability groups for both judgments (planning materiality $F = 7.37$, $p < 0.001$; proposed adjustment $F = 7.80$, $p < 0.001$). As expected, the anonymous group had the highest variance for both judgments ($p < 0.05$ for all

[15] We note the possible practical significance of finding that anonymous participants with the decision aid comprise the only group to find the proposed adjustment immaterial (mean = -1.32). However, this group's mean was not significantly different than the mean for the anonymous participants without the aid (mean = 0.39; $t = 0.96$, $p = 0.34$). Further, both cells' had means that were not significantly different from the scale's indifference midpoint and 95% confidence intervals with negative (immaterial) lower bounds and positive (material) upper bounds.

comparisons).[16] Similarly, the review group had significantly higher variance than the justification group and the feedback group for both judgments ($p \leq 0.09$ for all comparisons). Although the justification and feedback group had similar variance on the planning materiality judgment, the justification group's variance was significantly higher than the feedback group's variance for the proposed audit adjustment ($p = 0.05$).

The impact of the planning materiality decision aid was again strong for the planning materiality judgment. Overall, Levene's test indicated the decision aid significantly reduced judgment variability ($F = 13.17$, $p < 0.001$). Cell comparisons indicate that this overall finding was largely driven by the differences in variation within the anonymous group, where the presence of the decision aid dramatically reduced judgment variation (from SD = \$134,472 to \$17,572, $p < 0.001$). However, the decision aid also reduced variability for the justification group ($p = 0.02$) and the feedback group ($p = 0.03$). The review group's difference was insignificant ($p = 0.33$).

Effort (H3)

We used a number of metrics to test our prediction that effort would be positively associated with the level of accountability pressure. First, we measured the amount of time that participants required to complete the experiment. The results in Table 4 show that the amount of time taken to complete the experiment increased significantly with the level of accountability pressure ($F = 3.95$, $p = 0.01$). The anonymous group had the lowest completion time (mean = 9.33 minutes), followed in turn by the review group (mean = 10.62 minutes), the justification group (mean = 10.92 minutes), and the feedback group (mean = 12.34 minutes). All between-group comparisons were significant in the predicted direction ($p < 0.05$) except for the review-

[16] Levene's test was used to assess overall and between-cell variability after determining that the cell data were not abnormally distributed.

justification group comparison ($p = 0.37$).[17] The decision aid did not affect the amount of time the participants spent on the task ($p = 0.74$).

[Insert Table 4 here]

We also evaluated the length and nature of the participants' judgment explanations. A MANOVA (Wilk's Lambda $F = 7.039$, $p < 0.001$) indicated significant differences in explanation length among the four accountability groups for both materiality judgments. As the results in Panel A of Table 5 indicate, accountability pressure strength was positively related to the length of the participants' explanations. For the planning materiality task, the feedback group's mean explanation length (40.30 words) was significantly longer than the other three groups ($p < 0.01$ for all comparisons). The justification group had the second longest mean explanation length (24.59 words), which was marginally longer ($p < 0.12$) than the review and anonymous groups' means (16.83 and 16.98 words, respectively).

For the proposed adjustment task, the feedback group again provided a mean explanation length (32.19 words) that was significantly longer than the other three groups ($p < 0.01$ for all comparisons). Alternatively, the anonymous group's mean explanation length (9.82 words) was significantly shorter than then other three groups ($p < 0.03$ for all comparisons). No significant difference emerged between the review group (19.03 words) and the justification group (21.70 words).

We also evaluated explanation content. The SEC (1999) and the Big Five Audit Materiality Task Force (1998) emphasized the need to consider qualitative factors (e.g., proximity to analysts' expectations, financial instability, accounting measurement precision) and avoid simple consideration of quantitative rules-of-thumb when assessing materiality.

[17] Similar results emerged when we analyzed times from only the case background and primary judgment screens (post pressure treatment).

Accordingly, we tested whether accountability pressure strength was associated with consideration of qualitative factors that can make quantitatively small misstatements material. We posit that increased accountability pressure should motivate auditors to integrate client-specific qualitative factors into their judgment explanations rather than rely on simple quantitative measures (e.g., 5% of income).

One of the study's researchers and one Ph.D. student independently coded all of the participants' explanations as either "quantitative-only" or "qualitative".[18] The results in Panel B of Table 5 indicate that accountability pressure was positively related to consideration of qualitative factors for both materiality judgments. Overall, less than one-third of the anonymous participants (9/44, 20%) and review pressure participants (18/57, 32%) considered qualitative factors in their explanations. Alternatively, a significantly larger proportion of justification participants (34/55, 62%) and feedback participants (39/54, 72%) included qualitative factors in their explanations ($p < 0.05$).[19]

Comparison of the two materiality judgments reveals that the proportion of qualitative factors considered was consistently higher for the proposed adjustment judgment (range 28%-83%) than for the planning materiality judgment (range 15%-58%). Furthermore, although the types of qualitative factors considered (e.g., declining financial condition, product contingencies, industry volatility) were reasonably consistent across the two materiality judgments, accounting measurement subjectivity (i.e., use of estimates) emerged prominently among the qualitative

[18] Both coders were unaware of the participants' treatment groups during the coding process. Inter-coder reliability was 0.94. All differences were reconciled.
[19] We used the Marascuillo procedure for comparing multiple proportions (NIST 2002).

factors listed for the proposed adjustment judgment.[20]

[Insert Table 5 here.]

DISCUSSION

Overall, the results provide evidence that accountability pressure strength affected auditors' materiality judgments and effort. As accountability pressure increased to relatively high levels (i.e., justification and feedback pressure), planning materiality judgments and proposed audit adjustment judgments became more conservative and judgment variability decreased. Increased accountability pressure also led to more vigilant information processing. Auditors under higher levels of accountability pressure required more time to complete the task, provided longer explanations for their judgments, and emphasized more qualitative materiality factors than auditors under lower levels of pressure.

These results have a number of implications for research and practice. From a research perspective, our findings of discriminant validity among review, justification, and feedback pressure are consistent with Lerner and Tetlock's (1999) assertion that accountability should not be considered a unidimensional construct. Increasing levels of accountability pressure differentially affected professional JDM among our auditor participants. Accordingly, we assert that future studies that impose accountability pressure on participants should carefully consider the specific dimension of accountability used and how operational choices can affect professional JDM, construct validity, and external validity. In addition, this study provided evidence of functional decision aid effects in the face of performance pressure rather than the paradoxical effects highlighted in Ashton (1990) and Arkes et al. (1986). Specifically, the

[20] Regression analysis was used to evaluate whether audit experience affected explanation length or consideration of qualitative factors. The results indicate that experience level did not affect explanation length for the planning materiality and proposed adjustment tasks ($p = 0.79$ and $p = 0.56$, respectively). Similarly, experience level did not affect consideration of qualitative factors for the two materiality judgments ($p = 0.35$ and $p = 0.89$, respectively).

planning materiality decision aid reduced planning materiality judgment variation across accountability pressure level and particularly for lower levels of pressure. These findings reinforce the notion that decision aid effects are context dependent.

From a practice perspective, we suggest a number of possible implications for audit effectiveness and efficiency. If different forms of accountability affect professional JDM (e.g., conservatism, variability, effort) differently, accounting firms should consider the specific types of accountability they implement throughout their hierarchies and how alternative amounts of pressure can affect performance. For example, to the extent that accountability-based conservatism induces additional audit testing and evidence evaluation, higher levels of accountability pressure have the potential to increase audit effectiveness by increasing the likelihood of detecting and deposing material misstatements. The proposed adjustment results highlight this point well. While participants in the anonymous group were uncertain about the materiality of the proposed adjustment, the review, justification, and feedback pressure groups found the adjustment to be clearly and increasingly material. Although we did not test possible intervening controls (e.g., group processing, peer review) that might prevent passing on the adjustment, the results suggest an inverse relation between accountability pressure strength and willingness to pass on a proposed adjustment. Although future research is needed to clarify these issues, the potential for accountability-based improvement in individual auditor performance seems particularly important in high-risk areas subject to professional judgment (e.g., materiality, fraud risk).

From an efficiency standpoint, our findings suggest that incremental accountability pressure has the potential to induce unnecessary effort and audit inefficiency. If pressure motivates individuals to spend additional time on a task without measurable differences in

judgment, increased audit costs are relatively difficult to justify. However, we assert that the results also raise the possibility that additional effort (e.g., time) spent considering qualitative materiality factors (as promoted by the SEC's SAB 99 and the Big Five Audit Materiality Task Force) may be time well spent. Ultimately, future research is needed to examine trade-offs between accountability-based effectiveness and efficiency issues.

The results should be considered in the context of the study's unique limitations. First, our accountability manipulation only involved simple internal accountability to a superior with unknown views. Our study did not implement more complex and perhaps conflicting internal and external accountabilities that arise in practice. In the real world, auditors have to deal with multiple sources of accountability (i.e., superiors, audit committees, client management, SEC, etc.) (Gibbins and Newton 1994). Auditors in practice also may know the views and tendencies (e.g., conservative vs. aggressive) of their superiors, which could facilitate the use of judgmental biases and heuristics.

Second, our ability to infer effectiveness is limited to the extent that the experimental tasks lacked clear "right" or "wrong" answers. In this study, our primary focus was on treatment-induced variation in participants' professional materiality judgments. Future research could more directly examine auditor effectiveness by providing relatively objective tasks in domains with unambiguous accuracy measures.

Third, this study does not test the effects of task characteristics (e.g., structure, complexity). However, we recognize that performance pressure effects and decision aid reliance are likely contingent on the task difficulty (Ashton, 1990). Future research should investigate and/or control for task characteristics that can influence individual performance.

Finally, we note the use of a generic planning materiality decision aid. The participating

firms had their own specific methods and aids for evaluating and documenting materiality. We used a simple quantitative decision aid to transcend firm-specific differences in the various firms' approaches. Although pretests and consultation with firm contacts indicated that the experimental aid was both reasonable and representative, the use of firm-specific methods for assessing materiality could affect the results documented here.

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TABLE 1
Summary of Accounting Studies that Manipulated Accountability Pressure

Study	Specific Pressure Treatment(s)*	Subjects and Task Domain	Findings
Asare, Trompeter, and Wright (2000)	anonymous, justification	91 auditors (avg exp = 2.9 yrs); substantive analytical procedures to determine cause of unexpected fluctuation in gross margin	Justification pressure increased the extent and breadth of testing, but not the depth of testing. Justification pressure also increased (decreased) the testing of errors (non-errors).
Tan and Kao (1999)	anonymous, (possible) review	105 auditors (varying exp levels); internal control evaluations, error identification, and ratio analysis	Review pressure did not affect performance on a low-complexity task. Review pressure did improve performance on a medium-complexity task when individual knowledge was high and on a high-complexity task when both knowledge and problem-solving ability were high.
Chang, Ho, and Liao (1997)	anonymous, justification	312 students (145 MBA and 167 undergraduate students); problem-solving tasks involving basic comprehension problems and complex application problems.	Justification pressure increased effort but did not significantly improve performance, regardless of task complexity.
Cloyd (1997)	anonymous, feedback	63 tax professionals (avg exp = 2 yrs); computer-based information search and argument for a client's tax position.	Feedback pressure increased search effectiveness (high knowledge subjects only) and the amount of time subjects spent on the task.
Glover (1997)	anonymous, justification	156 auditors (avg exp = 24 mos); risk assessment for year end A/R balance	Time pressure reduced the dilution effect, but justification pressure did not.
Hoffman and Patton (1997)	anonymous, justification	44 advanced in-charge auditors; fraud risk assessment	Justification pressure led to more conservative fraud risk assessments, although it did not exacerbate the dilution effect.

TABLE 1 (cont.)
Summary of Accounting Studies that Manipulated Accountability Pressure

Study	Specific Pressure Treatment(s)*	Subjects and Task Domain	Findings
Koonce, Anderson, and Marchant (1995)	anonymous, review	202 advanced in-charge auditors; analytical procedures for audit planning	Auditors under review pressure provided more justifications than auditors who were anonymous.
Tan (1995)	anonymous, (possible) review	Experiment 1 - 80 audit seniors & managers (avg exp = 3.7 yrs & 8.6 yrs) Experiment 2 - 86 auditors (avg exp = 3+ yrs); assess clients' financial viability.	Explicit review pressure increased auditor vigilance in audit evidence recall.
Lord (1992)	anonymous, review	30 audit managers; auditor-client conflict over accounting treatment	Auditors' less likely to issue unqualified opinion when review pressure was present.
Johnson and Kaplan (1991)	anonymous, justification	101 auditors (avg exp = 3 yrs); inventory obsolescence	Auditors who justified their judgments had higher consensus and self-insight than anonymous auditors
Kennedy (1993)	anonymous, justification	171 audit managers & 58 executive MBA students; bankruptcy prediction	Justification pressure did not (did) affect auditors' (MBA students') judgment.
Ashton (1992)	anonymous, justification	59 auditors (avg exp = 3 yrs); prediction of bond ratings	Justification pressure improved judgment accuracy and consistency.
Ashton (1990)	anonymous, justification, feedback	182 auditors (avg exp = 3 yrs); prediction of bond ratings	Justification and feedback pressure increased performance quality in the absence of a decision aid but decreased performance quality when an aid was available.

* We use four categories to capture the range of accountability manipulations that appear in the extant accounting literature:
    1. anonymous = the absence of explicit accountability pressure treatment.
    2. review = subjects are told their performance will be (or could be) reviewed.
    3. justification = subjects are required to provide specific justifications that are subject to review.
    4. feedback = subjects are provided with explicit formal feedback on their performance.

TABLE 2
Planning Materiality Results
(n = 160)

Panel A: ANOVA Results for *PLANMAT*

Variable	*F*	2-tail *p*-value
Model	5.52	<0.001
Test Variables		
ACCTBLTY	9.28	<0.001
AID	4.85	0.03
ACCTBLTY x AID	3.47	0.02
Control Variables		
EXPER	3.90	0.05

Panel B: Descriptive Statistics

		ACCTBLTY				
AID		Anonymous	Review	Justification	Feedback	Overall
Not Available	**Mean**	**126,467**	**64,391**	**46,292**	**42,057**	**67,935**
	SD	134,472	34,699	26,353	25,367	74,137
	n	18	23	21	20	82
Available	**Mean**	**68,309**	**49,159**	**42,961**	**48,306**	**53,037**
	SD	17,572	27,810	17,966	17,656	22,240
	n	22	17	16	23	78
Overall	**Mean**	**94,480**	**57,918**	**44,851**	**45,399**	**60,672**
	SD	94,377	32,475	22,872	21,548	55,635
	n	40	40	37	43	160

Variable Definitions:
PLANMAT = planning materiality amount ($) measured with an open-ended question.
ACCTBLTY = 1 for anonymous, 2 for review, 3 for justification, and 4 for feedback.
AID = 1 if planning materiality decision aid was available (range $42,940-$95,600); 0 otherwise.
EXPER = number of years of audit experience.

TABLE 3
Proposed Adjustment Materiality Results
(n = 160)

Panel A: ANOVA Results for *PAMAT*

Variable	*F*	2-tail *p*-value
Model	3.76	<0.001
Test Variables		
ACCTBLTY	8.26	<0.001
AID	0.04	0.95
ACCTBLTY x AID	0.57	0.63
Control Variables		
EXPER	1.92	0.17

Panel B: Descriptive Statistics

		ACCTBLTY				
AID		Anonymous	Review	Justification	Feedback	Overall
	Mean	**0.39**	**1.17**	**3.05**	**4.05**	**2.18**
Not Available	SD	5.66	4.82	4.90	3.69	4.92
	n	18	23	21	20	82
	Mean	**-1.32**	**1.94**	**3.88**	**4.35**	**2.13**
Available	SD	5.55	4.56	3.76	3.20	4.89
	n	22	17	16	23	78
	Mean	**-0.55**	**1.50**	**3.41**	**4.21**	**2.16**
Overall	SD	5.59	4.67	4.41	3.40	4.89
	n	40	40	37	43	160

Variable Definitions:
PAMAT = materiality of the $30k proposed adjustment measured on a continuous scale anchored "very immaterial" (coded as –10) and "very material" (coded as 10).
ACCTBLTY = 1 for anonymous, 2 for review, 3 for justification, and 4 for feedback.
AID = 1 if planning materiality decision aid was available; 0 otherwise.
EXPER = number of years of audit experience.

TABLE 4
Time Results
(n = 160)

Panel A: ANOVA Results

Variable	*F*	2-tail *p*-value
Model	1.92	0.06
Test Variables		
ACCTBLTY	3.95	0.01
AID	0.13	0.72
ACCTBLTY x AID	0.78	0.51
Control Variables		
EXPER	0.58	0.45

Panel B: Descriptive Statistics

		ACCTBLTY				
AID		Anonymous	Review	Justification	Feedback	**Overall**
Not Available	**Mean**	**9.58**	**11.33**	**10.83**	**11.81**	**10.93**
	SD	2.64	3.65	4.04	4.27	3.74
	n	18	23	21	20	82
Available	**Mean**	**9.13**	**9.66**	**11.04**	**12.81**	**10.72**
	SD	3.80	3.24	4.45	4.79	4.34
	n	22	17	16	23	78
Overall	**Mean**	**9.33**	**10.62**	**10.92**	**12.34**	**10.83**
	SD	3.30	3.54	4.16	4.53	4.03
	n	40	40	37	43	160

Variable Definitions:
TIME = the number of minutes the participants spent completing the experiment.
ACCTBLTY = 1 for anonymous, 2 for review, 3 for justification, and 4 for feedback.
AID = 1 if planning materiality decision aid was available; 0 otherwise.
EXPER = number of years of audit experience.

TABLE 5
Judgment Explanations

Panel A: Explanation Length (# of Words)

Group	Planning Materiality Mean (SD)	Proposed Adjustment Mean (SD)	Overall
Anonymous (n = 40)	16.98 (19.64)	9.82 (12.52)	13.40 (16.08)
Review (n = 40)	16.83 (19.47)	19.03 (20.23)	17.93 (19.85)
Justification (n = 37)	24.59 (30.06)	21.70 (20.64)	23.15 (25.35)
Feedback (n = 43)	40.30 (29.04)	32.19 (30.81)	36.25 (29.93)

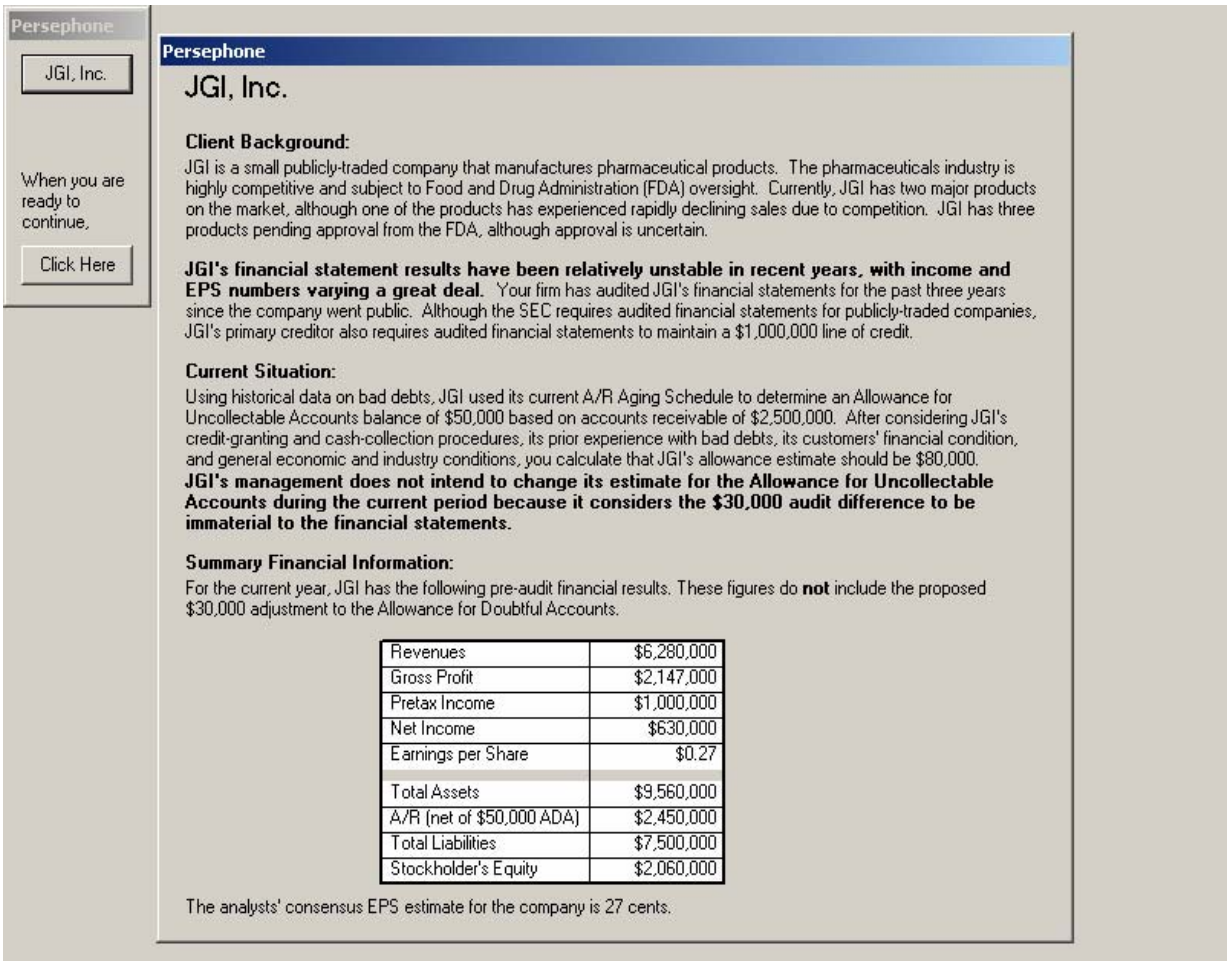
Panel B: Explanation Type

	Planning Materiality		Proposed Adjustment		Overall	
Group	Quant[a]	Qual[b]	Quant	Qual	Quant	Qual
Anonymous	22 85%	4 15%	13 72%	5 28%	35 80%	9 20%
Review	22 73%	8 27%	17 63%	10 37%	39 68%	18 32%
Justification	14 48%	15 52%	7 27%	19 73%	21 38%	34 62%
Feedback	10 42%	14 58%	5 17%	25 83%	15 28%	39 72%

[a] number (%) of explanations that only include quantitative factors.
[b] number (%) of explanations that include consideration of qualitative factors.

APPENDIX – CASE MATERIALS
JGI, Inc.

Panel A: Experimental Scenario (no Decision Aid group)



APPENDIX – CASE MATERIALS (cont.)
JGI, Inc.

Panel B: Planning Materiality Decision Aid