

Error management in public accounting firms: Error climate, type and originator*

Anna Gold

Associate Professor
Faculty of Economics and Business Administration
VU University Amsterdam (The Netherlands)

Ulfert Gronewold

Professor
Chair of Accounting and Auditing in the Private and Public Sectors
University of Potsdam (Germany)

Steven E. Salterio

Professor and PricewaterhouseCoopers/Thomas O'Neill Faculty Fellow in Accounting
School Of Business
Queen's University (Canada)

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ABSTRACT

We examine the effects of error-management climate on auditors reporting post-initial review errors in working papers to those within the firm in positions of authority. An error-management climate is said to be open when errors and mistakes are accepted as part of everyday life as long as they are learned from and not repeated. Alternatively, in a blame error-management climate errors are not tolerated and blame gets attached to those admitting to or found committing such errors. Prior research in other contexts finds an open error-management climate promotes the reporting of errors and enhances organizational performance. We examine error-management climate in the context of the two general types of audit errors (conceptual/mechanical) found in previous audit research and who (the individual or a peer) committed the discovered error. The importance of the latter feature is based on norms against being a “tattle tale” or “snitch” that underlies much of the whistle-blowing research literature. We find that an open error-management climate plays a more complex role in reporting of errors in the audit arena than might be expected based on the research in other domains. Specifically, error-management climate is involved with two significant interactions, resulting in three effects: (1) an open error-management climate promotes reporting of mechanical errors to the same relatively high level as conceptual errors are reported; (2) an open error-management climate results in greater willingness to report a peer’s errors; and (3) in a blame climate, auditors are more willing to report their own errors than their peers’ errors. In addition, auditors are more likely to report their own mechanical errors than their own conceptual errors irrespective of error-management climate. Our findings suggest that the error-management climate of an audit firm is an important factor in promoting higher quality auditing but it is not a panacea.

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I. INTRODUCTION

The within audit firm review process is designed to detect errors as part of the firm's quality control process; however, auditors may discover errors made by themselves or their peers in the working papers, even after the initial review process is completed. Evidence from PCAOB inspection reports demonstrates that audit errors are not always discovered until after the audit report is issued (PCAOB 2008). For example, the 2003 inspection reports of all Big-4 audit firms and several of the 2004 inspection reports describe errors in the application of GAAP and GAAS, which resulted in multiple clients having to restate their financial statements, and revealing many instances of non-application or misapplication of audit procedures (PCAOB 2004a; 2004b; 2004c; 2004d; 2005).¹

Audit practice provides many potential reasons for auditors to revisit the working papers post file review. Some examples include preparing for next year's audit, tidying up audit files for archiving (paper or electronic), preparing files for in-house quality assurance (e.g., national office peer review) or, as used in our study, preparing the files for second partner review, as mandated by ISA 230 (IAASB 2010b) and PCAOB AS No. 3 (PCAOB 2004e). Auditors may have reasons to refrain from reporting discovered errors to superiors (loss of professional reputation, added workload, poor relationships with peers, etc.). Hence, the goal of the current study is to examine factors that affect auditors in reporting the discovery of these post-initial review discovered errors. This research is important as encouraging auditors to report discovered

¹ This observation also holds for smaller accounting firms (Hermanson et al. 2007; PCAOB 2007) and in other countries that publish reports on their audit inspections (e.g., CPAB 2004; 2005 in Canada).

errors improves the quality of the audit and potentially the quality of the client's financial reporting.

We introduce to the audit literature the concept of error-management climate to help us understand how individuals react to discovered errors. Error-management climate comprises shared beliefs, norms, and common practices regarding the management of discovered errors and mistakes in an organization (Van Dyck et al. 2005). This literature presents two archetypes of error-management climate, an open one where individuals are supported upon reporting errors and the errors are used to enhance organizational learning, whereas a blame climate seeks to find and sanction the individual who committed the error or mistake. The strong normative implication from this line of research is that an open error climate results in reporting errors routinely, better learning from errors and overall better organization performance. Hence, our primary research question examines to what extent error-management climate in public accounting firms affects the auditor reporting of errors.

We consider this theoretical perspective in light of audit research on the types of errors that reviewers frequently find in auditing (e.g., Ramsay 1994) as that research suggests that error type is an important factor in whether the error is discovered or not. Hence, we examine the effects of error-management climate in the context of the two common types of errors committed in the audit environment, mechanical and conceptual (e.g., Ramsay 1994). Further as auditors work in teams (e.g., Rich et al. 1997) an auditor may discover an error that he/she created or one that a peer on the audit team made. Social psychology research (e.g., Ross 1977) shows that individuals attribute personal failings and others similar problems differently in many contexts. Further, the whistle-blowing research literature (e.g., Miceli and Near 1992) focuses, in part, on ways of encouraging people to go against well-known norms that one should not be a "tattle tale"

or “a snitch,” albeit it focuses on intentional errors. Hence, we also investigate the interaction of error-management climate with who committed the error, the person discovering it or a peer.

We examine the interactions among these three factors via an experiment with 190 auditors who learn of an error in the working papers that is suggestive of a material misstatement in the client’s financial statements. We use the scenario of auditor-detected errors discovered *after* all detailed file review has been completed but *before* the financial statements have been released (see SQCS10 (AICPA 2009) and ISQC1 (IAASB 2010a)), so we can set aside issues of external reputation effects from recalling or restating published financial statements and potential litigation or regulator actions that are frequently associated with restatements (e.g., Palmrose et al. 2004; Palmrose and Scholz 2004). Hence, in our setting the discovered errors, if reported to those within the audit firm in authority, could be dealt with by additional audit work to either determine whether an adjustment is necessary (ISA 230.11 (IAASB 2010b)) or whether negotiation need be entered into with the client firm to adjust the financial statements prior to their release (Gibbins et al. 2001).²

Our results show that an open error-management climate increases an auditor’s willingness to report post-initial review discovered errors versus a blame climate under certain contextual conditions. Specifically, an open error-management climate promotes increased reporting of mechanical errors to the same relatively high level at which conceptual errors are reported and a greater willingness to report peers’ errors, bringing the reporting rate equal to that for own errors. Further, in a blame climate, auditors are less willing to report peer errors than their own errors. Finally, we find that auditors are more likely to report their own mechanical

² In the extreme, the audit firm could issue a modified audit opinion if the client firm declines additional auditing or correction of the financial statements (ISA 705 (IAASB 2010b)). Antle and Nalebuff (1991) model these possibilities.

errors than their own conceptual errors, irrespective of error-management climate. Hence, it appears that promoting an open error-management climate, while not a panacea for all error reporting problems, results in propensity to report more errors than before and does not reduce reporting propensity in any of our settings.

The remainder of this paper is organized as follows: the next section provides background information about the review process and self-monitoring leading to the development of five hypotheses. We then present the research design for an experiment to test these hypotheses. Results including manipulation checks and robustness checks are reported. The paper concludes with a discussion of results and their implications for audit practice and future research in the final section.

II. BACKGROUND AND HYPOTHESES DEVELOPMENT

Error Reporting

While the working paper review process results in detecting errors in working papers, previous research has demonstrated that overall error detection rates rarely exceed 50 percent of errors seeded in the working papers (e.g., Asare and McDaniel 1996; Bamber and Ramsay 1997; Tan and Trotman 2003).³ This experimental evidence that suggests errors can remain undetected is confirmed by evidence in PCAOB inspection reports (and other countries' reports, e.g., CPAB 2004; 2005) that identify GAAP and GAAS errors discovered during the PCAOB inspection process (e.g., PCAOB 2004a; 2004b; 2004c; 2004d; 2005; Hermanson et al. 2007), which takes place after all levels of within firm review are completed and the audited financial statements are released.

³ We note that experimental settings are not meant to determine levels of actual detection but rather relative effects. Nonetheless, none of the reported experiments come close to having all seeded errors being discovered by the review process, strongly suggesting the possibility of errors being discovered post-initial review.

Professional standards explicitly recognize that some tidying up of working papers must occur, even after the completion of the audit, and hence documentation standards allow a specified period after the audit report is signed before the files are “frozen” (ISA 230 (IAASB 2010b) – 60 days and PCAOB AS No. 3 (PCAOB (2004e) – 45 days). Hence, it is logical to assume that such activity takes place after initial review but before the audit is completed. Further, audit practice experience suggests that junior auditors are asked to file evidence that has been received by higher level auditors subsequent to initial detailed review, assemble files for second partner review in addition to finalize audit files for archiving in the allowed post-audit completion period.⁴ Payne et al. (2010) document that auditors are sensitive to remaining errors in audit work papers in a setting where “lower” levels of review (manager review) are anticipated post-initial review and when on-line (vis-à-vis paper) review is the first stage review.

Once auditors discover previously committed errors, they then face the question of whether to report such errors. Extant research in psychology, healthcare management and organizational behavior suggests that employees often do not disclose their own errors (e.g., Edmondson 1996; Tax and Brown 1998; Tucker and Edmondson 2003; Uribe et al. 2002), because error reporting may involve serious potential costs (such as damaged reputations, additional work effort, poor peer relationships and financial costs) and negative emotions (e.g., fear, embarrassment, and guilt) (Zhao and Olivera 2006). In the audit context, error reporting may be crucial as it allows for the timely correction of potentially material errors in the audit files or the client financial statements. Extant research shows individuals appear to differentiate among multiple referents during considerations about reporting errors, such as their own

⁴ Post-initial review working paper consultation is likely to be more common where review occurs real-time rather than being carried out in a strict sequential manner after all field work by preparers is finalized (e.g., Barrett et al. 2005; Brazel et al. 2004; Winograd et al. 2000).

interests, the interests of the organization or team they work for, and the effects on potential victims (Zhao and Olivera 2006).

Prior audit research demonstrates that fears of *potential* costs to an auditor who discovers and fixes an error during an audit may turn to *actual* costs in certain situations. For instance, the auditor may exceed the time budget and as a result have negative performance evaluations (e.g., Alderman and Deitrick 1982; Kelley and Margheim 1990; Malone and Roberts 1996; McNair 1991; Pierce and Sweeney 2006; Willett and Page 1996). We suggest that reasons for not reporting are particularly pronounced *after* the initial review process has been completed. First, time budget pressure is even greater at this time of the audit process (Peytcheva and Gillett 2010). Second, the costs of reporting these errors would be higher due to their greater visibility affecting auditors' own performance evaluations (Peytcheva and Gillett 2010).

Error-Management Climate

Organizational error-management climate comprises shared beliefs, norms, and common practices regarding the management of errors in the organization (Van Dyck et al. 2005). Research has shown that organizations differ in their climates, which can be characterized by different degrees of "error management" (Van Dyck 1997; 2009).

In what we call an *open* climate (denoted in psychology research as "high error-management"), the setting is based on the premise that errors are likely to occur whenever fallible humans carry out tasks. This view recommends that organizations accept this reality and plan to take advantage of the error discovery to improve processes. Therefore, an open climate is characterized by ready discussion of errors with others, upper management being positive toward the communication about errors, obtaining others' help after discovering errors, a thorough analysis of errors and their potential causes, a concern with getting the errors corrected, and

preventing individuals from being punished for reporting such errors (Edmondson 1996; Van Dyck et al. 2005; Van Dyck 2009). Van Dyck et al. (2005), among others, conclude that such a climate can be expected to be beneficial to the overall quality and performance of the organization versus an organization that does not have an open climate.⁵ However, these positive outcomes occur in a context where it is expected that the person who committed the error (and potentially other team members) will learn from the mistake and not repeat the same error again. In contrast, in what we call the *blame* climate (denoted in the psychology literature as “low error management” or “error aversion” climate), the above mentioned practices are perhaps paid “lip service” to in the organization (Van Dyck 1997; 2009; Van Dyck et al. 2005), but people generally believe that any reported error has the possibility to result in sanctions, no matter how small the error (e.g., Rybowskiak et al. 1999; Van Dyck 2009; Van Dyck et al. 2005).

In an audit firm, error-management climate will likely depend on the local office or even team culture; potentially following the managing partner’s or head of audit practice’s leadership style (see Covalleski et al. 1998; Dirsmith and Covalleski 1985).⁶ Prior audit research has shown that organizational differences affect auditors’ behavior (e.g., Bowrin 1998; Hermanson 1997; Hyatt and Prawitt 2001) and recent archival audit research demonstrates differences in audit quality between audit firm offices (e.g., Ferguson et al. 2003; Francis et al. 1999; Reynolds and Francis 2000), consistent with the premise that if offices have different error-management climates they would show differences in performance. Gronewold and Donle (2011) demonstrate that auditors perceive differences in error-management climates across a variety of audit

⁵ Homsma et al. (2009) also refer to the positive effects of error discussion on organizational learning.

⁶ Peytcheva and Gillett (2010) report that auditors’ willingness to suppress evidence of errors made in internal control evaluations varies across offices of the same firm. These between-office differences indicate that variation can exist in error management between offices of the same firm.

organizations (e.g., Big-4 and smaller audit firms, internal audit departments, government auditing, etc.), providing evidence at a high level of between-audit organization differences.

Auditors engage in impression and reputation management activities aimed at ensuring others (especially superiors) view them as competent (Gibbins and Trotman 2002; King 1996; Mayhew 2001; Rich et al. 1997; Tan and Jamal 2006). Reporting an error may affect superiors' and peers' competence attributions towards the originator of the error and thus may harm the originator's reputation (e.g., Kanodia et al. 1989). Hence, despite the normative view that auditors should always report errors irrespective of situational and environmental conditions, we expect that an open climate in an audit office is more likely to encourage auditors to report errors that they have detected, given less of an emphasis on punishment and blame.⁷ Hence, we posit the following main effect for organizational error-management climate, *ceteris paribus*:

H1: Auditors are more willing to report post-review discovered errors in an open error-management climate than in a blame climate.

Error-Management Climate and Error Type

Prior audit research (e.g., Ramsay 1994) distinguishes between two error types: mechanical and conceptual. Mechanical errors are defined as relatively objective, verifiable, and concrete errors (e.g., Ramsay 1994; Owghoso et al. 2002). An example of a mechanical error would be an erroneous calculation (e.g., an auditor performing an analytical procedure with an arithmetic error in it). In contrast, conceptual errors are relatively subjective, unverifiable, and imprecise (e.g., Ramsay 1994; Owghoso et al. 2002). For example, a conceptual error would be illustrated by not employing the appropriate method for the situation (e.g., an auditor not sending confirmations for material accounts receivables when the need is present to do so). Prior audit

⁷ These norms were thought to be so strong that partners at one of the Big 4 firms we approached believed there was no tension in our research in that their firm's auditors would report all errors discovered.

research suggests that more experienced auditors are typically better at detecting conceptual errors, while less experienced auditors are better at detecting mechanical errors (e.g., Ramsay 1994).⁸

Considering this error type distinction, in a *blame* climate, we expect auditors to be relatively unwilling to report errors, regardless of the error type, due to the likely attribution by superiors of all mistakes to personal incompetence of the error originator. In other words, a culture of “getting it right the first time” does not allow for errors and errors are nearly always punished, leading to great reluctance to report any error regardless of type. In an open climate, mechanical errors (e.g., arithmetical) can be considered “careless” work but can be easily rationalized away because such errors can happen even to a competent auditor and can be explained by engagement-related pressures prevailing during most audits (e.g., time pressure (McDaniel 1990)). Hence, in an open climate, a superior is less likely to attribute a mechanical error committed by an auditor to underlying auditor incompetence.

In contrast, in the conceptual error case, the superior at least has to consider the possibility that the error committed by an auditor may be an indication that the auditor is less competent than what the superior previously thought. The superior might assign the auditor easier tasks until the auditor has gained more experience or encourage the auditor to undertake additional training as part of learning to avoid the mistake in the future. Indeed, while the superior is deliberately not attempting to “punish” the auditor, the auditor may perceive being assigned easier tasks or additional training as punishment even if it is intended to improve performance. Therefore, even in an open climate, where the response is supportive such that learning results from the mistake, the auditor would be worried about the repercussions of

⁸ There is a large literature in accounting on the review process and its ability to detect errors. See Rich et al. (1997) for an early review of this research.

reporting discovered conceptual errors. This analysis leads to the following interaction hypothesis (see also Figure 1, Panel A):

H2: The difference in auditors' willingness to report post-review discovered errors in an open versus a blame organizational error-management climate will be greater for a mechanical error than for a conceptual error.

<<<Insert Figure 1 about here>>>

Error-Management Climate and Error Originator

Research on error reporting in medical settings suggests that individuals feel more comfortable reporting their own errors than reporting errors made by others (Rathert and May 2007). Specifically, peers' errors in such contexts are reported by only a small percentage of discoverers and only when the reporter does not like the individual who committed the error (Wild and Bradley 2005). In a somewhat analogous literature on whistle-blowing, the focus has been on how to encourage the reporting of peer errors given that there is a strong belief, and some supporting evidence, that the person who "blew the whistle" on an organization's intentional errors to third parties outside the organization will be punished (e.g., Miceli and Near 1992; Miceli et al. 2008). Hence, senior management that wants such errors to be reported inside the organization finds great difficulties convincing employees that they will be supported and not punished (Miceli et al. 2009). Indeed, Miller and Thomas (2005) found management students' willingness to report an observed wrongdoing to be the lowest when it was committed by a fellow team member than any other relationship to self.⁹

⁹ While the whistle-blowing literature mainly focuses on the reporting of intentional wrongdoings to third parties we focus on unintentional errors. However, given that individuals are highly reluctant to report others' intentional wrongdoings; we expect that they should be even more reluctant to report others' unintentional wrongdoings, since the latter may be perceived as less severe. Error-management climate may well have a positive effect on reporting potential intentional errors given that it may not be entirely clear *ex ante* whether an error is intentional or not.

Further, social norms against “tattle tales” and “snitches” (e.g., Pershing 2003) are well-embedded in at least Western culture and suggest that auditors would be generally hesitant to reporting peers’ errors. The whistle-blowing, peer-reporting and medical error-reporting literatures document that people may not feel responsible for reporting errors committed by others (Trevino and Victor 1992; Uribe et al. 2002; Victor et al. 1993). Since the audit environment features several levels of review (e.g., Harding and Trotman 1999) that process may “shift away” responsibility for reporting others’ errors to either the originators themselves or the formally assigned reviewers (Trevino and Victor 1992; Victor et al. 1993). Hence, our third hypothesis is a main effect for error originator, *ceteris paribus*:

H3: Auditors are more willing to report post-review detected errors they committed than errors committed by their peers.

Whistle-blowing research has shown a greater likelihood of reporting others’ errors when there is a positive organizational climate. Vadera et al. (2009, 583) state “[...] research shows that individuals in organizations with team or friendship climates, strong ethical climates, or democratic climates are more likely to engage in whistle-blowing when they observe a wrongdoing” (see also Kaptein 2010 for similar US findings). The open error-management climate shares many of the characteristics of the positive organizational climate described in the whistle-blowing literature. Further we expect that the effect of an open climate will be more pronounced when reporting on peer errors given we already expect that individuals will be more willing overall to report their own versus peer errors (H3). Comparing the blame climate to the open climate, in the presence of persistent social norms against “tattling” and the reluctance to report team members, the blame climate reinforces the auditor’s unwillingness to report peer errors whereas the open climate enhances the auditor’s willingness to report peer errors. Hence, we predict the following interaction, *ceteris paribus*:

H4: The difference in auditors' willingness to report post-review discovered errors in an open versus a blame organizational error-management climate will be greater for peer errors than for own errors.

See Figure 2, Panel A for an illustration of the predicted interaction.

<<<Insert Figure 2 about here>>>

Error Originator and Error Type

We now consider the effect of error type on reporting willingness in light of the error originator (own versus peer). In addition to the reputation argument above, the voluminous research literature (e.g., Pronin et al. 2004; Harvey and Weary 1984) on the “fundamental attribution error” (Ross 1977) and the “self-serving bias” (e.g., Carver et al. 1980; Miller and Ross 1975; Sedikides et al. 1998) have at its core the notion that people attribute (but that does not necessarily imply report) negative acts they commit to environmental causes (i.e., nature, superiors, co-workers, “the system”). As a result, they avoid the attribution of such negative acts to themselves or their own flaws. We have argued above that mechanical errors are easier to excuse, hence we predict the following for self-committed errors, *ceteris paribus*:

H5a: Auditors' willingness to report post-review discovered errors is greater for own mechanical errors than for own conceptual errors.

The whistle-blowing and peer-reporting literature consistently finds that the more severe errors committed by other organization members (i.e., peers) are associated with greater likelihood of being reported by the potential whistle-blower (e.g., King 1997; 2001; King and Hermodson 2000; Vadera et al. 2009). We suggest that the auditor facing the error reporting decision would view conceptual errors as more severe than mechanical errors as conceptual errors suggest that the peer may be consistently making the mistake, potentially resulting in more than this one error discovered on this one engagement. Moreover, auditors may fear appearing petty by reporting a

peers' error that is mechanical (invoking the "tattle tale" or "snitch" norm more readily). We therefore predict:

H5b: Auditors' willingness to report post-review discovered errors is greater for peer conceptual errors than peer mechanical errors.

See Figure 3, Panel A for an illustration of the predicted interaction based on H5a and H5b.¹⁰

<<<Insert Figure 3 about here>>>

III. RESEARCH METHOD

Design, Task and Procedure

We designed and administered our experiment by using a two (error-management climate: blame versus open) by two (error type: mechanical versus conceptual) by two (error originator: own versus peer) full-factorial design. Participants were randomly assigned to one of the eight treatment conditions. Materials were provided to the participants in a paper-based format.¹¹

The case used in the current study is an adaptation (with permission) of the Burgstahler et al. (2000) case. We employed a PCAOB report (2004d) about sampling errors made in one of the Big-4 firms' audits to guide us making these modifications. The PCAOB case report disclosed that the audit firm did not project errors found in an inventory sample to the population as required for any sampling application. Hence, while the PCAOB report was about a conceptual

¹⁰ Due to the absence of theoretical reasons that would suggest a three-way interaction, we make no prediction about such an interaction. As we report later in the results section, the three-way interaction is not significant.

¹¹ All experimental instruments were in German and administered in Germany by a native German speaking author. The US based case was adapted as necessary for the German audit environment and then translated into German by one of the authors. A professional translator independently translated the case materials back from German to English and the two reconciled any differences, which focused on technical accounting and auditing terms. Further, four German-speaking business professionals read the case for general understandability and clarity. Next, the first audit firm that agreed to participate read and commented on the case prior to a pre-test. The case was then pre-tested on 15 auditors (none of whom took part in the experiment) and modifications were made based on that pre-test to further enhance understandability of the case materials.

error, it is relatively easy to modify a sample-related error to be either mechanical (i.e., the correct arithmetic projection was not done) or conceptual (i.e., no projection at all was done). This allows us to hold the context constant rather than using different errors in different contexts to instantiate error type, resulting in greater internal validity.

Each participant received a packet of case materials, which included a brief introduction to the research project. The materials included (1) background information about the hypothetical audit engagement and client, including the description of the error-management climate manipulation (open versus blame); (2) a series of working paper extracts including the error type manipulation (mechanical versus conceptual); (3) the dependent variables measured; (4) manipulation checks; and (5) a debriefing questionnaire.

Participants learned of an audit carried out by an international audit firm. The background information described the audit of a medium-sized privately held manufacturing firm with debt agreements that require audited financial statements.¹² In the planning phase of the audit, inherent risk, control risk and risk of material misstatement were assessed as moderate and materiality was set at €1,000,000 (equal to 5% of earnings before taxes). Participants were informed that the audit plan relied on substantive testing and that all proposed or potential adjustments based on errors in excess of €50,000 are posted to the “Summary of Non-Booked Audit Differences (SNBAD).” The materials also stated that in prior years, management had readily made required adjustments. However, this year, without prior consultation with the audit firm, the client’s president has provided shareholders and creditors with preliminary unaudited earnings information and strongly prefers to minimize adjustments to the financial statements because he believes that “such adjustments will unduly reduce shareholder and creditor

¹² There is also a legal requirement in Germany that companies have what is referred to as a statutory audit in the Anglo-Saxon world.

confidence in management.” Hence, the president has asked the audit firm to propose no adjustments unless absolutely necessary. Consequently, the office-managing partner of the audit firm has made it clear to the audit team that only essential adjustments should be proposed to client management.

Following the error-management climate description, participants were shown three working papers including the SNBAD that had been detached from the audit file during the initial review process. The SNBAD summarized five adjustments leading to a total proposed adjustment that had been waived as it was well below materiality. The two other working papers were extracts from the lead sheets, providing the details for the adjustment and its calculations. The participants were told they had been assigned the task to “tidy up” the file for final review by the quality assurance partner before the audit report would be signed and the financial statements released. It was during this hypothetical tidying up of the working paper file that participants were informed they discovered an error (manipulated as either conceptual or mechanical) that had been made during working paper preparation. The participants were told that the error they had found resulted in discovering additional income-reducing adjustments that needed to be added to the SNBAB. The combined total of the previous and the newly discovered overstatement of income totaled €998,000, which is slightly below materiality of €1,000,000.¹³ The participants learned that this error had been overlooked by all previous reviews and would be unlikely to be detected in the upcoming quality review.

¹³ In considering known errors discovered in samples two factors are involved in evaluating the effect of the errors on likely misstatement. First, there is the projection of the errors to the population, the focus of our manipulation, and second, there is the estimation of the sampling risk that should be allowed for in considering the likely misstatement. We did not provide the sampling risk estimates to the participants in this experiment. If participants had automatically considered a reasonable allowance for sampling risk, the total misstatement would have to be over €1.0 million given that the misstatement without sampling risk is just € 2,000 less than the materiality of €1 million. Our computations, employing the information provided in the case, suggest misstatements would be nearing €1.3 million if sampling risk were to be incorporated in the calculation of likely misstatement.

After examining the background information and the working papers, participants were asked to indicate their willingness to report the additional overstatements they discovered to an appropriate responsible person for the audit engagement. In addition, participants responded to a number of manipulation checks, covariate measurements, demographic questions, and questions related to the understanding of the experimental case.

Independent variables

Error-Management Climate

Following the client description and under the heading “Office climate at your firm,” the error-management climate was manipulated as either ‘blame’ or ‘open.’ See Table 1 for the wording of the error-management climate manipulation that follows the approach used in the underlying psychology and limited accounting research (e.g., Van Dyck et al. 2005; Gronewold and Donle 2011).

<<<Insert Table 1 about here>>>

Error Type

All “mechanical error” participants were told of the incorrect arithmetic in the projection to the population and provided with the correct computation, whereas in the “conceptual error” condition participants were told about the absence of the projection to the population and given the correct one.¹⁴ The design choice to inform participants in the own-error conditions about the

¹⁴ As noted, the conceptual error of not quantifying sampling risk was not brought to the attention of the auditors. To the extent that participants consider sampling risk, we bias against finding our expected results as we expect that more important errors are more likely to be reported and as noted above adding in sampling risk takes the likely errors to well above materiality. In the second part of this experiment, following Burgstahler et al. (2000) within-subjects design, we bring sampling risk explicitly to the attention of our participants after the set of dependent variables that we analyze in this experiment had been collected. In all eight cells the means moved towards a greater willingness to report ($F(1, 181)=12.18, p<0.001$) consistent with the argument in the paper that more important errors are more likely to be reported. However, due to the initial relatively high responses only a marginal main

error discovery rather than allowing them to self-discover the error was done to ensure we were considering the reporting decision, not a joint test of discovery ability and reporting. Given that prior research (Asare and McDaniel 1996; Bamber and Ramsay 1997; Tan and Trotman 2003) strongly shows that different error types are detected at different rates with different amounts of auditor experience we did not want to confound error discovery with the error reporting judgment.

Error originator

The error originator manipulation featured language that focused on either the participant learning of his/her own errors (e.g., “you,” “your,” etc.) or those of a named peer. Error origination was introduced during the description of the audit engagement and consistently employed throughout the experimental materials. For example, participants in the self-committed error treatment were informed that “you and your audit team” had completed all planned fieldwork and that “you yourself” had prepared all working papers that were referred to in the materials. In the “peer error” condition, another auditor working at the same local office and member of the audit team was described as having prepared the working papers in which the errors were detected described as at the same level in the firm as the reader (“Andreas Meyer”).¹⁵ We deliberately chose not to attempt to induce the participants in the self-committed error discovery setting to actually make the initial error for both practical (i.e., how could we ensure such errors would be created as unintentional errors by their very nature occur randomly?) and internal validity (i.e., how could we carry out randomization of participants to cells if we did not know which participants make a certain error *ex ante*?) reasons.

effect for climate was observed ($F(1, 181)=2.19, p<0.08$ one tailed) but the patterns of treatment means were consistent with those reported in this paper.

¹⁵ The use of a first name (instead of only the surname) in Germany supports the notion that it is a relationship with a familiar and friendly peer.

Dependent Variable

Participants responded on a scale from 0 (Very Unlikely) to 10 (Very Likely) to the following question: “How likely are you as an auditor at Good and Better WPG¹⁶ to report the problem you found in the finished goods working paper to an appropriate responsible person for this audit engagement at Good and Better (e.g., audit team leader, engagement manager, responsible partner, or quality reviewer)?” This willingness to report measure reflects the emphasis on the individual auditor’s responsibility to report and was the same in both own and peer error conditions.

Sample

198 German auditors from a Big-4 audit firm participated in the experiment administered during firm training.¹⁷ Eight participants were eliminated: four with missing values for the dependent variable and four extreme outliers (i.e., the residuals more than 4 standard deviations from the ANOVA’s residual mean). Two sessions were administered in two different German locations. At least one of the researchers was present at both experimental sessions to ensure that the participants followed the experimental instructions and worked quietly and independently. Participants have sufficient audit experience (mean equals 10.47 months served on audit engagements) to carry out the task per their audit firm. Further, as desired, the participants had limited experience with reviewing activities (mean equals 1.2 months). Self-reported experience with reviewer activities (measured in months) varies significantly across experimental conditions

¹⁶ Good and Better WPG is the name of the fictitious audit firm in our experiment.

¹⁷ Note that in total, six different audit firms participated in various versions of this research. Gronewold et al. (2011) document the results of these other experimental conditions.

($p < 0.05$) and is correlated with the dependent variable; hence, we include it as a control variable.¹⁸ See Table 2 for more demographic details about the participants.¹⁹

<<<Insert Table 2 about here>>>

Respondents demonstrated they understood the case by recalling correctly that (1) in prior year audits, the client had always readily booked audit proposed adjustments (mean equals 2.90, all scales were from -5 (strongly disagree) through +5 (strongly agree), and (2) management is currently strongly committed to reporting the net income figure as is, unless the audit firm threatens to qualify the report (mean equals 2.40). Participants also recalled that the potential adjustments recorded in the SNBAD *prior* to the current error being discovered were well below the materiality threshold (mean equals -2.55 reverse scored). Overall, these responses indicate that participants understood the case.

IV. RESULTS

Manipulation Checks

We employ seven items (e.g., “At this office of Good and Better WPG, there is a climate characterized by ‘being open for improvement’ in the case of errors that have occurred in carrying out audit procedures.”) based on previous error management research to check the effectiveness of our manipulation of error-management climate. As the seven items loaded onto a single factor that captures over 50% of the variance of the items we computed an average index

¹⁸ Ten participants had missing values for review experience. For these missing values we entered the variable’s mean of zero months, the most common level of experience. Choice of missing value substitution makes no difference in our analyses.

¹⁹ To verify whether randomization across experimental treatments was successful, we examined whether the following demographic factors vary across treatment conditions: age, gender, auditor rank, academic degree, audit engagement experience, and experience with similar errors like those in the case. None of these items are significantly different across treatment conditions (all p ’s > 0.20). No other demographic variables are correlated with the dependent variable.

of the seven.²⁰ The mean of the index for participants in the ‘open climate’ treatment (1.83) is significantly greater than the index mean of the ‘blame climate’ (-1.37, $p < 0.001$).²¹ Thus, we conclude that the manipulation of the error-management climate was successful.

To test for understanding of the error type manipulation, using again the “Strongly Disagree” (-5) to “Strongly Agree” (+5) scale, participants indicated their agreement with the statement “The detected error in the work papers was more like a ‘mechanical’ error (e.g. calculation error, typing error, writing error, or the like, in audit or evaluation steps carried out) than a ‘conceptual’ error (e.g. missing of a complete audit step or of a crucial evaluation step, a fundamental thinking error, or the like).” The mean level of agreement for the mechanical error condition (1.82) was significantly greater ($p < 0.001$) than for the conceptual error (-1.42). This suggests an effective manipulation of error type.

To test for understanding of the error originator manipulation (using the same -5/+5 scale as before) participants indicated if they themselves had prepared the working papers on which the errors were detected. The mean response was 4.02 for the ‘own error’ treatment and -3.34 for the ‘peer’s error’ treatment. The two means are significantly different ($p < 0.001$), suggesting a successful manipulation of error originator. Furthermore the strong results in the own error condition, suggests that participants accepted that they had initially prepared the working papers.

Finally, Table 3 reports the overall analysis for the experiment. The dependent variable is how likely the participants themselves would be to report the error.²² Table 3 Panel A’s

²⁰ The seven items were taken from the “organizational error culture” scale developed by Van Dyck et al. (2005), which has already been successfully tested in an auditing setting (Gronewold and Donle 2011). In addition to the exploratory factor analysis reported in the text, a reliability analysis reveals a high Cronbach’s alpha (0.84), indicating that the single identified factor measures the underlying construct with a high degree of consistency.

²¹ All seven items were highly significantly different ($p < 0.001$) in the correct direction when analyzed individually.

²² To check for potential social desirability issues about reporting errors (e.g., Clement and Krueger 2000; Mikulincer and Horesh 1999; Ruvolo and Fabin 1999; Smith 1997) we also asked participants how their peers would respond to the same question. While there was a significant main effect for own report willingness versus

ANCOVA shows the overall model is highly significant at conventional levels ($F(1,181)= 3.30$, $p<0.002$). Further, consistent with the lack of theory to support a three-way interaction prediction, it can be seen in Panel A that the three-way interaction (error-management climate, error type and error originator) is not significant ($F(1,181)= 0.98$, $p>0.30$).

<<<Insert Table 3 about here>>>

Hypothesis Testing

Error-management climate

The main effect of error-management climate is significant ($\mu_1-\mu_2=8.78-8.33=0.45$, $t=1.86$, $p<0.04$, one-tailed), supporting H1. However, this is qualified by the interaction of climate with error type being significant ($F(1,181)=4.38$, $p<0.04$) and with the interaction with error originator being significant ($F(1,181)=6.26$, $p<0.015$). Hence, to properly test both H1 and our interaction hypotheses we examine the simple effects.

Error-management climate and error type

We find, as predicted in H2 (Figure 1 Panel A), the willingness to report mechanical errors in the open climate is greater than in the blame climate ($\mu_1-\mu_2=9.09-8.14=0.95$, $t=2.78$, $p<0.01$, one-tailed, see Figure 1, Panel B and Table 3 Panel C). Further, while we predicted a similar directional, albeit weaker effect for conceptual errors being reported, there is no difference in the reporting likelihood for conceptual errors between the blame and open climate conditions ($\mu_1-\mu_2=8.48-8.53=-0.05$, $p=0.87$). Hence, consistent with H2, we find that there is a greater difference in willingness to report mechanical errors in the open condition whereas that difference is not present in the conceptual error condition. Further, the open error-management

predictions about peers' report willingness ($F(1,181)=51.22$, $p<0.001$), there were no significant interactions (all $p's>0.19$) although all patterns of results were substantively the same.

climate results in willingness to report mechanical errors equal to the level of conceptual errors being reported in either error management condition. This finding qualifies H1 such that an open climate increases the willingness to report errors only when the errors in question are mechanical, as conceptual errors appear to be consistently reported at a high level.

Error-management climate interaction with error originator

Error originator has no significant main effect ($F(1,181)=2.02, p>0.15$), however, as noted above it does interact significantly with error-management climate ($F(1,181)=6.26, p<0.02$). H4 predicts that the effect of error-management climate will be greater for peer-committed errors than for self-committed errors. An examination of the simple effects (see Table 3 Panel D) of error-management climate in the two error originator conditions (see Figure 2 Panel B) reveals that auditors are more likely to report peer-committed errors in an open climate, as compared to a blame climate ($\mu_1-\mu_2=8.91-7.86=1.05, t=3.04, p<0.01$, one-tailed), but when they themselves committed the error, the effect of climate is not significant ($\mu_1-\mu_2=8.65-8.80=-0.15, p=0.65$). Further, the final level of reporting for peer errors in the open error-management climate is not significantly different from either the own error/open climate condition (8.91 versus 8.65, $p>0.40$) or own error/blame climate condition (8.91 versus 8.80, $p>0.75$). Hence the effect of open error-management climate is to increase the likelihood of reporting peer errors to the same level as reporting own errors. Thus, there is overall support for H4, whereas H3 is not supported.

Error type interaction with error originator

As noted previously, error originator has no significant main effect ($F(1,181)=2.02, p>0.15$), however, it is significant in the interaction with error type ($F(1,181)=6.36, p<0.02$) (see Table 3 Panel A). Examining the simple effects (see Table 3 Panel E) we find as predicted in

H5a in the self-committed error condition mechanical errors are more likely to be reported than conceptual errors ($\mu_1 - \mu_2 = 9.09 - 8.37 = 0.72$, $t = 2.13$, $p < 0.03$, one-tailed). In the peer-committed condition the difference appears to reverse ($\mu_1 - \mu_2 = 8.14 - 8.64 = -0.50$) as expected in H5b, however, the effect is not significant ($t = -1.43$, $p = 0.15$). Hence, our results support H5a in that auditors' willingness to report errors is greater for mechanical errors than for conceptual errors in the self-committed error condition but there is no difference between error types in the peer-committed condition as predicted by H5b. Further, the simple effects analysis does not provide support for the main effect of error originator predicted by H3.

Robustness of experimental findings

All reported tests of mean differences are for least square adjusted means (i.e., adjusted for the covariate months of review experience). Results do not change when raw mean tests are carried out (see Table 4 Panels A, B and C for raw means and standard deviations for the three significant interactions), and significance levels are generally higher. Further, we buffered for multiple comparisons, where appropriate, in analyzing the simple effects.

During post-experimental debriefing participants responded on a scale from -5 to +5 to the following question: "Has your audit experience been characterized as tending to be predominately one of "getting it right the first time" or "being open for improvement" when errors have been found in carrying out audit procedures?" anchoring on each descriptor plus a small explanation at each end of the scale. We included this continuous variable in an ANCOVA to examine how overall results would be affected when controlling for participants' own error-climate assessment. The ANCOVA main effect of error-management climate moves from $p = 0.06$ to $p = 0.04$. The three interaction terms also become somewhat more significant, but the overall results remain equivalent to reported results. Further, as evidence of proper

randomization, if we replace the manipulated climate variable with the participants' own error climate experience (we dichotomized the scale responses based on the median response), we found no significant main effect or interactions with our other two variables. Hence, these robustness checks provide added evidence that participants accepted the error climate manipulation and that their own current experience with error management climate did not affect their experimental judgments.

The grand (adjusted) mean for the dependent variable in the experiment was 8.56 with roughly 33% of respondents at the top value of the scale "10." This may indicate the presence of "ceiling effects" (i.e., too high of a percentage of the data is clustered at the top of the scale). However, research on ceiling effects finds analysis problems only with a much higher percentage of the respondents clustered at one end of the scale (e.g., Uttl 2005). Further, any ceiling effect biases against our finding significant effects in our hypotheses tests.²³

V. CONCLUSION

In this study we examine the effects of error-management climate differences on the auditor's willingness to report errors, taking into account different error types and social norms against being a "tattle tale" or "snitch" when considering error reporting. We focus on an error detected by auditors that is suggestive of a potential material misstatement in the client's financial statements that has been discovered after all detailed file reviews had been completed but before the financial statements have been released. Hence the error is potentially correctible without external embarrassment (or lawsuits) to the auditor. We provide evidence that an open

²³ In a related paper (Gronewold et al. 2011) more experienced audit seniors responded to an analogous case with the grand mean willingness to report of 6.35 versus 8.57 ($F(1,365)=87.652$; $p<0.001$); yet results for error-management climate are similar to those reported herein. In that experiment only 7% of respondents were at the top of the scale, suggesting, if anything, more experienced respondents would be less likely to cluster at the top end of the scale.

error-management climate, while not a panacea for all issues related to increasing reporting of discovered errors, is effective in many contexts and in no context causes a significant decrease in reporting propensity. Specifically, the open error-management climate supports greater willingness to report the error when the error is mechanical, bringing the reporting of mechanical errors up to the already high levels of reporting conceptual errors. Moreover, an open error-management climate increases the likelihood of reporting peer errors up to the level at which an auditor is willing to self-report. Further, we find that error type and originator both matter, as auditors are more willing to report their own errors, especially mechanical ones, in the blame condition whereas they are less willing to report peer errors, especially if mechanical, in the same condition. Overall, the evidence is compelling that error-management climate affects the willingness of auditors to report post-initial review working paper errors.

Some limitations to this study include the following. First, it may be asserted that our manipulation of the error-management climate was too strong and obvious, resulting in potential demand effects. However, a demand effect suggests a lower likelihood of discovering interactions as there would be no difference in the demand effect across conditions, yet all three two-way interactions are significant. Second, we manipulated error type (mechanical versus conceptual) only one way, albeit consistent with the manner done in previous research (e.g., Ramsay 1994) and drawn from a published “real world” example (PCAOB 2004d). Third, it is possible that participants (being staff auditors) may have had direct experience primarily with mechanical errors given previous research that indicates reviews carried out by staff auditors or by seniors on staff auditors’ work primarily result in the discovery of mechanical errors (e.g., Ramsay 1994). If conceptual errors are mainly discovered at higher levels of review and feedback is not provided to the staff auditor, it is possible that error correction feedback is not

available for conceptual errors committed by staff auditors. Only further research with more experienced auditors can resolve this issue. Fourth, we chose a setting where the audit error was one that directly affected the financial statements reported results (i.e., overstatement of income). Auditors may deal differently with the discovery of omitted audit procedures or results that indicate previous auditor made extent decisions may be incorrect (see Peytcheva and Gillett 2010). Fifth, it may be argued that a blame-oriented error-management climate might lead auditors to commit fewer errors in the first place because it imposes higher sanctions and hence motivates auditors to avoid errors. This is ultimately an empirical question to be addressed in future research; however, such an effect appears rather unlikely given previous research findings from social psychology and organizational behavior that finds no such differences (e.g., Edmondson 1996; Gillingham et al. 1997; Reason 2000; Rybowskiak et al. 1999; Van Dyck 2009; Van Dyck et al. 2005). Sixth, it is possible that in some of our tests we experienced ceiling effects, which might obscure effects that are present but not significant due to the scale effects. However, our finding of all three interactions as significant suggests this is not a large concern.

Implications of this research for practice suggest that encouraging an open and accepting error-management climate will result in a greater willingness by junior auditors to report errors they discover in the working papers contributing to higher quality audits. Further, this research shows that problems documented in the whistle-blowing literature about “not squealing” norms for intended actions also affects auditors’ willingness to report their peers’ errors (that we do not ascribe intentionality to), at least for mechanical errors, which emphasizes the need for audit firms to consider the findings of the whistle-blowing literature in designing their own control systems. Finally, it should be emphasized that an open error-management climate is predicated

on the fact that both the individual and the office benefit from learning about the error and more importantly that once learned about that members do not repeat the error.

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Table 1: Error-Management Climate Manipulation

First introduction of office error-management climate manipulation:

Blame: The overall climate of this office of your firm is noted for a “getting it right the first time” mentality that reflects the office managing partner’s own beliefs and actions. Errors in carrying out audit procedures are seen as signs of incompetence and reviewers who miss errors are at risk of at least demotion back to being preparers. You have seen top seniors coming from review meetings with managers and partners – after discussions about errors in files – nearly reduced to tears. Performance evaluations document such problems, complicating possibilities for future promotion within the firm.

(Open): The overall climate of this office of your firm is noted for an “open for improvement” mentality that reflects the office managing partner’s own beliefs and actions. Errors in carrying out audit procedures are seen as a natural part of learning and reviewers who miss errors are coached by more experienced reviewers so they do not miss similar problems in the future. You have seen top seniors coming from review meetings with managers and partners – after discussions about errors in files – with a renewed determination to work harder next time. Performance evaluations do not document such problems if the person does not repeat them or is making progress in addressing them, allowing possibilities for future promotion within the firm.

Later in the case the error-management climate manipulation is reinforced using the following:

Blame In part you are relieved when you think that the error cannot be easily detected; because you are not certain you want to go through a detailed debriefing about how you could have been “so stupid” as to miss something this obvious – despite the fact that two levels of review had also missed it. One thing is for certain: if you report this, your annual performance evaluation is going to become a much more negative one.

(Open): In part you are relieved when you think that the error cannot be easily detected as it will result in a great learning opportunity when you sit down with the reviewers to determine how to ensure that this type of error is not missed again – especially given the fact that two levels of review had also missed it. One thing is for certain: if you report this, your annual performance evaluation is not going to be affected unless you continue to make the same error, which certainly will not occur.

Table 2: Sample Demographics

Variable	N=190*		
Gender			
Male	109	(57.4%)	
Female	70	(36.8%)	
Missing	11	(5.8%)	
Rank			
Assistant auditor	176	(92.6%)	
Senior-associate	2	(1.1%)	
Senior	3	(1.6%)	
Manager	0	(0%)	
Other	1	(0.5%)	
Missing	8	(4.2%)	
Academic degree			
Bachelor	23	(12.1%)	
Master	6	(3.2%)	
German Diploma, Master or State Examination	151	(79.5%)	
PhD	1	(0.5%)	
Missing	9	(4.7%)	
Variable	Mean	SD	N=190*
Age	27.58	2.15	181
Audit engagement experience (months)	10.47	4.66	183
Reviewer experience	1.20	3.14	180
Statistical audit sampling experience (0=Never; 10=All clients)	6.14	3.05	187

* Data is missing where N is less than 190.

Table 3: Willingness to Report Error to an Appropriate Person^a

Panel A: Results of a 2x2x2 ANCOVA of Report Willingness per Error-Management Climate^b, Error Type^c, and Error Originator^d Controlling for Reviewer Experience^e

Source	Type III Sum of Squares	df	Mean Square	F-value	p-value
Model	72.3	8	9.04	3.30	0.002
<i>Error-Management Climate (EMC)</i>	9.51	1	9.51	3.47	0.065
Error Type (ET)	0.54	1	0.54	0.20	0.657
Error Originator (EO)	5.54	1	5.54	2.02	0.156
EMC x ET	12.00	1	12.00	4.38	0.038
EMC x EO	17.16	1	17.16	6.26	0.014
ET x EO	17.42	1	17.42	6.36	0.013
EMC x ET x EO	2.69	1	2.69	0.98	0.323
<i>Reviewer Experience</i>	7.74	1	7.74	2.90	0.091
Error	496.01	181	2.74		

Panel B: Adjusted Means and Standard Deviations of Error-Management Climate, Error Originator, and Error Type on Report Willingness Controlling for Reviewer Experience

Error-Management Climate	Error Type	Error Originator	Mean	SD	n
Blame	Conceptual	Self	8.82	0.33	25
		Peer	8.24	0.35	23
	Mechanical	Self	8.79	0.34	24
		Peer	7.48	0.35	22
Open	Conceptual	Self	7.92	0.33	25
		Peer	9.03	0.35	23
	Mechanical	Self	9.38	0.34	24
		Peer	8.79	0.34	24

Panel C: Adjusted Means and Standard Deviations of Report Willingness by Error-Management Climate and Error Type Controlling for Reviewer Experience

Error-Management Climate	Error Type	Mean	SD	n
Blame	Conceptual	8.53	0.24	48
	Mechanical	8.14	0.25	46
Open	Conceptual	8.48	0.24	48
	Mechanical	9.09	0.24	48

Panel D: Adjusted Means and Standard Deviations of Report Willingness by Error-Management Climate and Error Originator Controlling for Reviewer Experience

Error-Management Climate	Error Originator	Mean	SD	n
Blame	Own	8.81	0.24	49
	Peer	7.86	0.25	45
Open	Own	8.65	0.24	49
	Peer	8.91	0.24	47

Panel E: Adjusted Means and Standard Deviations of Report Willingness by Error Originator and Error Type Controlling for Reviewer Experience

Error Type	Error Originator	Mean	SD	n
Conceptual	Own	8.37	0.23	50
	Peer	8.64	0.25	46
Mechanical	Own	9.09	0.24	48
	Peer	8.14	0.25	46

Table 3 Legend:

- ^a Report Willingness: Response to the likelihood you would report the problem found in the finished goods working paper to an appropriate responsible person for this audit engagement at Good and Better (e.g. audit team leader, engagement manager, responsible partner, or quality reviewer). (0=Very unlikely; 10=Very likely).
- ^b Error-Management Climate: Client office is described as one with an “open” learning and supportive error-management climate versus a “blame” climate.
- ^c Error Type: The type of the error is “mechanical” (e.g., an arithmetical error in a computation) versus “conceptual” (e.g., not performing the necessary computation).
- ^d Error Originator: The originator of the error is the auditor (own error) or the auditor’s peer (peer error).
- ^e Reviewer Experience: Self-reported experience with reviewer activities measured in months.

Table 4: Willingness to Report Error to an Appropriate Person Raw Means

Panel A: Raw Means and Standard Deviations of Report Willingness by Error-Management Climate and Error Type

Error-Management Climate	Error Type	Mean	SD	n
Blame	Conceptual	8.53	1.50	48
	Mechanical	8.21	2.27	46
	Overall	8.37	1.91	
Open	Conceptual	8.41	1.74	48
	Mechanical	9.10	1.20	48
	Overall	8.75	1.52	

Panel B: Raw Means and Standard Deviations of Report Willingness by Error-Management Climate and Error Originator

Error-Management Climate	Error Originator	Mean	SD	n
Blame	Own	8.85	1.27	49
	Peer	7.86	2.33	45
	Overall	8.37	1.91	
Open	Own	8.63	1.66	49
	Peer	8.89	1.37	47
	Overall	8.75	1.52	

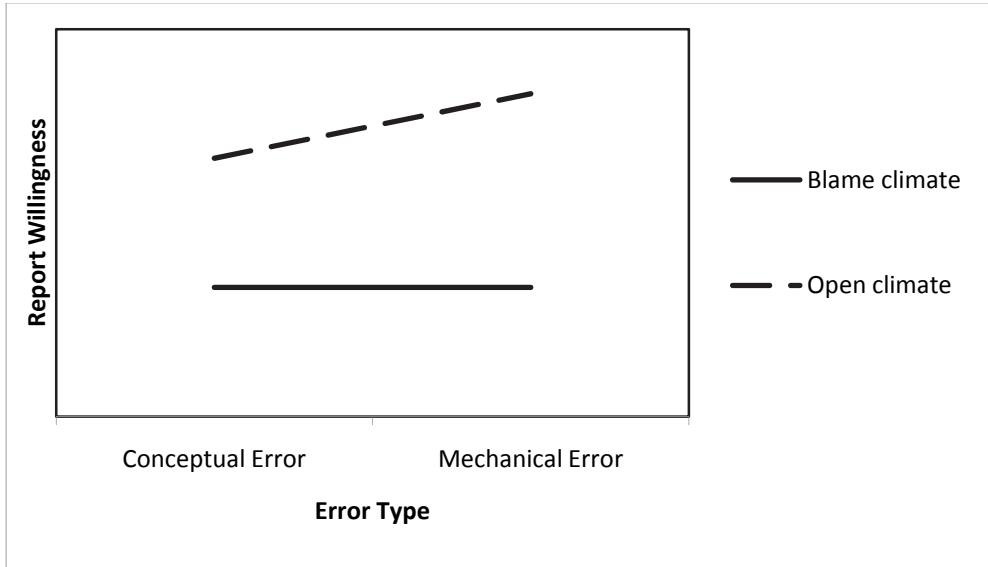
Panel C: Raw Means and Standard Deviations of Report Willingness by Error Type and Error Originator

Error Type	Error Originator	Mean	SD	n
Conceptual	Own	8.37	1.63	50
	Peer	8.58	1.61	46
	Overall	8.47	1.61	
Mechanical	Own	9.12	1.20	48
	Peer	8.19	2.27	46
	Overall	8.66	1.85	

Table 4 Legend: For definitions of variables see Table 3 legend.

Figure 1 Error-Management Climate and Error Type

Panel A: Predicted Interaction Effect of Error-Management Climate x Error Type on Report Willingness (H2)



Panel B: Observed Interaction Plot: Error-Management Climate by Error Type on Report Willingness (Adjusted Means)

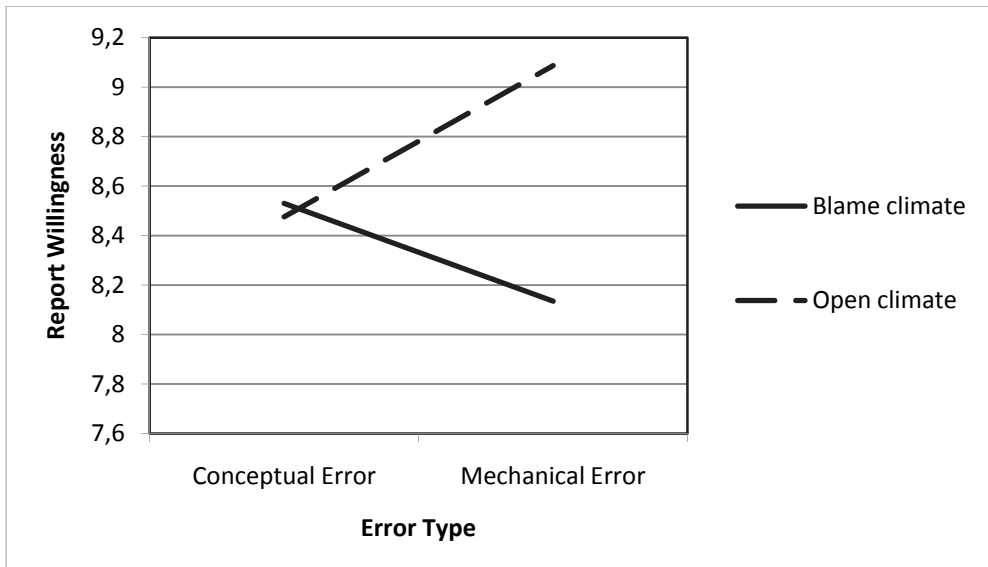
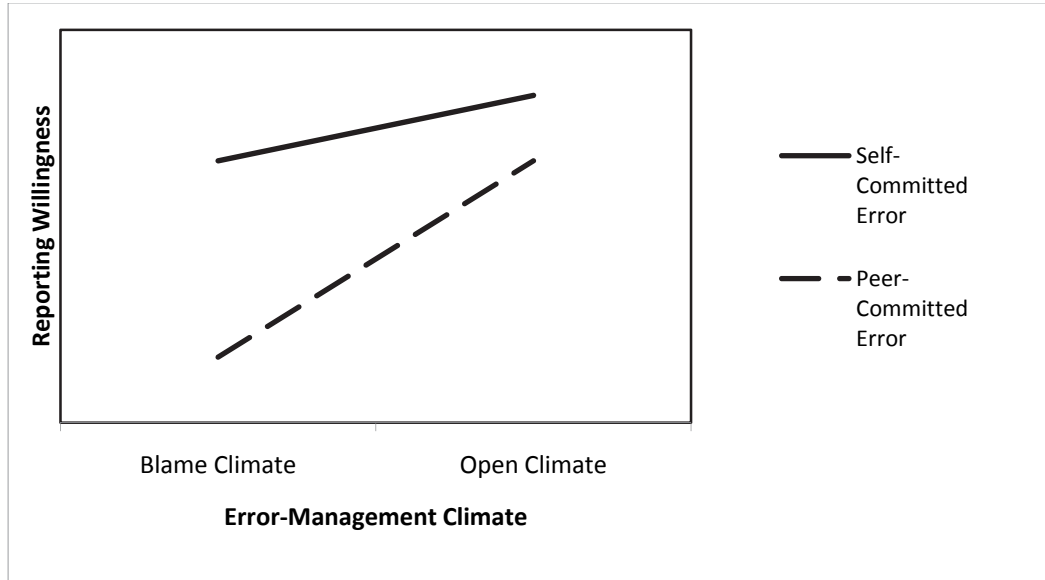


Figure 2 Error-Management Climate and Error Originator

Panel A: Predicted Interaction Effect of Error-Management Climate x Error Originator on Report Willingness (H4)



Panel B: Observed Interaction Plot: Error-Management Climate by Error Originator Report Willingness (Adjusted Means)

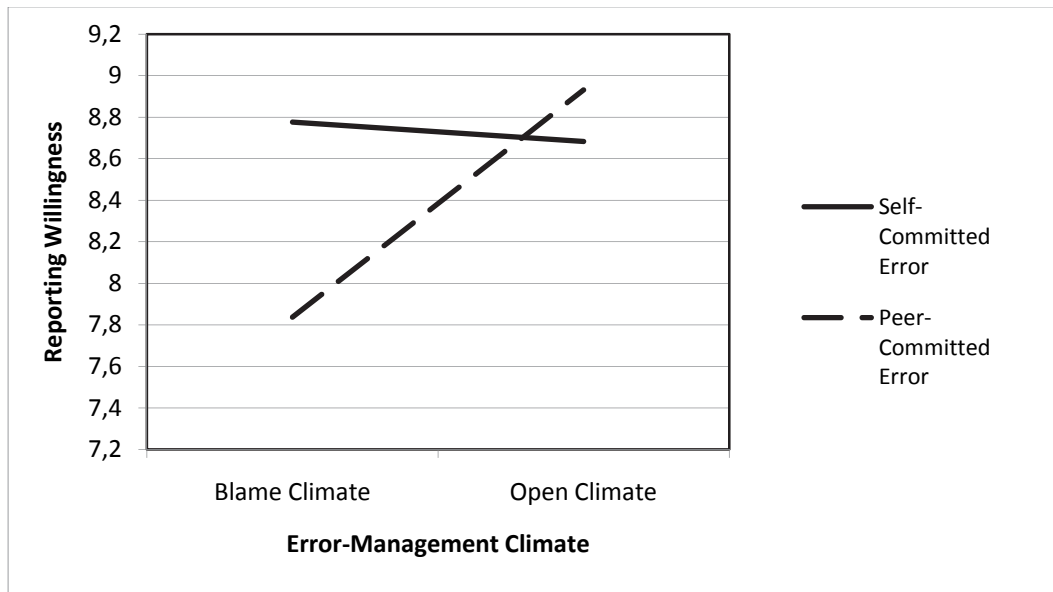
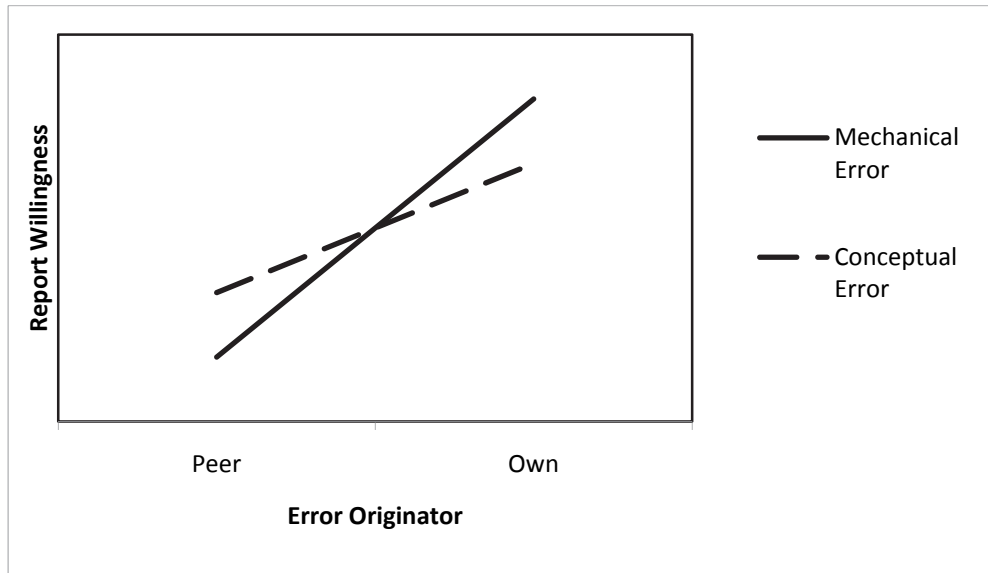


Figure 3 Error Originator and Error Type

Panel A: Predicted Interaction Effect of Error Type x Error Originator on Report Willingness (H5a and H5b combined)



Panel B: Observed Interaction Plot: Error Originator by Error Type Report Willingness (Adjusted Means)

