Does Psychological Ownership Improve Team Member Contributions?

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Abstract: Teams are a critical aspect of how organizations function, however individual team members often fail to sufficiently contribute. In this study, we experimentally examine whether and how psychological ownership improves individual team members’ judgments and communication, two important components of team member contributions. We find that psychological ownership improves participants’ judgments by causing deeper information processing. Further, psychological ownership increases participants’ urgent communication but only when it is warranted, suggesting that psychological ownership prompts team members to communicate more effectively about the “right” issues rather than increasing communication indiscriminately. This study suggests that team structures, task framing, and other interventions designed to promote psychological ownership hold promise for improving judgments and communication in teams with increasingly complex structures that might otherwise undermine the performance of certain team members.

Key Words: Psychological ownership; judgment and decision-making; team member contributions
1. Introduction

In this study, we examine whether increasing individual team members’ psychological ownership, the feeling that something is one’s own (Pierce, Kostova, and Dirks 2001), over their part of a task improves two components of team members’ contributions: their quality of work and their communication within their teams. Teams are a critical aspect of how organizations operate in the modern economy (Deloitte 2016). However, individual team members sometimes fail to contribute sufficiently in team settings (Holmstrom 1982; Arya, Fellingham, and Glover 1997; Weber and Murnighan 2008). Such failures can result from putting less effort into their part of a task (Towry 2003; Rowe 2004) or not sharing information with other team members (Dahlin, Weingart, and Hinds 2005; van der Vegt and Bunderson 2005). Psychological ownership likely can improve team member contributions given its association with employee willingness to contribute beyond prescribed roles (VandeWalle, Van Dyne, and Kostova 1995; Van Dyne and Pierce 2004).

Regulating individual team member behavior through psychological ownership also has appeal because many team settings are not amenable to traditional formal and informal controls (e.g., incentive contracts, monitoring, team identity) addressed by prior research (e.g., Towry 2003; Coletti, Sedatole, and Towry 2005). For example, today’s teams often include members from different geographic and/or functional areas (O’Leary and Mortensen 2010; Neeley 2015; Jones and Kelly 2013), and aligning incentives is difficult or infeasible when team members are in different locations, have different levels of responsibility, or serve different functional roles (Rowe 2004). Formal controls such as explicit contracts pose challenges due to the difficulty of measuring individual performance in team settings (Arya et al. 1997; Arnold, Hannan, and Tafkov 2018). Informal controls (e.g., peer pressure to do one’s part, Towry 2003) often depend
on team members observing each other’s effort, which is not feasible when team members work in different locations or lack the expertise to evaluate each other’s work.

We expect psychological ownership to improve team member contributions by prompting deeper cognitive processing of the information relevant to one’s task. Prior research has focused on correlating psychological ownership with workplace attitudes or on testing its effect on decisions through affective mechanisms (e.g., VandeWalle et al. 1995; Pierce et al. 2001; Baer and Brown 2012; Shu and Peck 2011). However, attitudes often fail to translate into behavior and are more (less) likely to persist when they result from cognition (affect) that tends to prompt deep (superficial) processing (Petty and Cacioppo 1986). Thus, it is important to understand whether or how psychological ownership affects cognition. Psychological ownership is positively associated with feeling that one’s work is valuable and with taking responsibility for that work (Pierce et al. 2001; Brown, Crossley, and Robinson 2014), and dual process models of judgment and decision making (e.g., Petty and Cacioppo 1986; Kahneman 2003) suggest a heightened sense of responsibility will impact cognition by deepening the processing of evidence presented. We predict that increasing team members’ psychological ownership will improve the quality of team members’ work in judgment tasks, via deeper processing, such as relating pieces of information to each other and evaluating them for consistency with the message they support (Petty and Cacioppo 1986; Griffith, Hammersley, Kadous, and Young 2015). We also predict that increasing psychological ownership will influence team members’ communication, because judgments based on deeper processing are more likely to result in actions consistent with judgments (Petty, Haugtvedt, and Smith 1995).

Teamwork is often dynamic, in part due to the division of tasks across team members. Team members’ initial judgments often require re-evaluation upon receiving information from
other team members. Two undesirable outcomes can occur in this situation. One, a team member can fail to defend his/her initial judgment and revise it, even though other team members’ information should not change it. Such an outcome can result from individuals who are reluctant to challenge other team members, particularly team leaders, because they fear being viewed or treated negatively, they wish to avoid conflict, or they feel any challenges will be futile (Morrison and Milliken 2000; Milliken, Morrison, and Hewlin 2003). Two, a team member can refuse to re-evaluate his/her initial judgment, even though other team members’ information should change it. Increased psychological ownership can increase the desire to defend one’s judgments (Baer and Brown 2012) but it has a potential dark side of creating territorial behavior, where individuals defend what they own even when doing so is inappropriate (Pierce, Jussila, and Cummings 2009; Brown et al. 2014; Wang, Law, Zhang, Li, and Liang 2018). However, given its cognitive role in the context of a judgment task, we expect psychological ownership to elicit deeper processing, and individuals who engage in deeper processing are more likely to evaluate the strength of information that supports a persuasion attempt than rely on superficial cues (Petty and Cacioppo 1986). As such, we predict team members will better differentiate between strongly and weakly justified suggestions from their team leader when they have higher psychological ownership of their work, such that they push back only when warranted, because their deeper processing will help them recognize when they should and should not push back.

We test our predictions in a two-stage 2 x 2 between participants experiment, using a judgment task that requires information processing, with MBA students in the role of a member of a hypothetical team hired to assess the valuation of assets at a retail company. Each participant’s specific role is to assess the discount rate used in the valuation. A hypothetical team leader has the final say on the overall task in order to suggest a lower level of responsibility and
authority to our participants. In the first stage, we manipulate psychological ownership as lower or higher following Baer and Brown (2012). In the second stage, we manipulate whether a suggestion provided by the team leader is weakly or strongly justified by information accompanying that suggestion. In each stage, we collect measures of participants’ work quality and communication preferences. In the second stage, we also measure participants’ pushback against the team leader’s suggestion.

We find participants with higher psychological ownership are more likely to identify contradictions in case information and recommend a higher discount rate, which indicates higher quality work as a result of deeper cognitive processing since the case information suggests the discount rate used in the valuation is too low. We find participants with higher psychological ownership also more urgently communicate identified issues and the assessed discount rate, due to their higher quality work. Finally, we find participants differentiate weakly and strongly justified suggestions from their team leader, and push back more in response to the former, to a greater extent when psychological ownership is higher. This result is also consistent with higher psychological ownership causing deeper cognitive processing, which then overrides pressure from the team leader to follow his or her suggestion.

Our study contributes to research and practice in several ways. We identify psychological ownership as a mechanism that can enhance individual team members’ contributions outside of traditional formal and informal control frameworks or in the absence of incentives and individual performance metrics. This finding is important given the difficulty in employing traditional controls within many of today’s teams. Further, prior research suggests interactive mechanisms (e.g., monitoring, peer pressure) are critical to the effectiveness of informal controls (Towry 2003; Coletti et al. 2005; Kelly 2010), but our results suggest informal controls that increase
psychological ownership can be effective in the absence of these mechanisms. Organizations can consider simple, low-cost interventions that increase psychological ownership when designing team structures, policies for formal controls, and expectations and norms for informal controls.

Our results also suggest that mechanisms such as psychological ownership, which are aimed at influencing cognition, can improve team member contributions in complex judgment tasks in which performance depends on the quality, not just quantity, of effort. Showing that psychological ownership improves work quality and information sharing by enhancing the process by which participants make their judgments extends both organizational behavior and managerial accounting research. The former research documents a positive association between psychological ownership and positive work-related behavior (e.g., cooperation), while focusing only on affective mediators (Baer and Brown 2012) or without exploring how or why these outcomes occur (VandeWalle et al. 1995; Burris, Chiaburu, and Detert 2008). The latter research identifies mediators of performance related to organizational commitment (Nouri and Parker 1998; Chong and Chong 2002), which increases with psychological ownership (Mayhew, Ashkanasy, Bramble, and Gardner 2007), but has not demonstrated these mediators’ effects on cognition (Covaleski, Evans, Luft, and Shields 2003). Our study implies that the performance improvements attributed to mediators such as organizational commitment likely occur at least partially due to psychological ownership improving cognition.

Finally, we show that in a judgment task psychological ownership increases team members’ urgent communication but only when it is warranted, suggesting that psychological ownership prompts team members to communicate more effectively about the “right” issues rather than increasing communication indiscriminately. This is especially important in settings where conflicting incentives exist that may encourage team leaders to make team members’
conclusions conform to their view (e.g., in the audit team setting, Sikka 2009; Griffith 2016).

Psychological ownership can help team members withstand team leader attempts at conformity.

The rest of the paper proceeds as follows. Section 2 outlines our underlying theory and hypotheses. Sections 3 and 4 describe our research design and results. Section 5 concludes.

2. Background and Hypotheses Development

Psychological ownership

Psychological ownership is the feeling that something is one’s own (Pierce et al. 2001). It can be felt toward physical targets such as homes and cars, and toward non-physical targets including one’s ideas and work (Pierce et al. 2001). This feeling of possessiveness encompasses multiple dimensions including control, autonomy, and physical ownership, and it results in the target (e.g., a team member’s work) being considered an extension of the self (Baer and Brown 2012). There are three routes to psychological ownership that likely influence team members’ ownership of their work: (1) having control over their work, (2) having an intense association with their work, and (3) investing in their work. Greater control arises from autonomy, flexibility in work patterns, and participation in organizational decision-making (Pierce, O’Driscoll, and Coghlan 2004). Association and investment arise from having more information about and understanding the collective objective of a team’s activities (Pierce and Jussila 2010).

Increasing psychological ownership can lead individuals to feel a greater sense of responsibility and concern for, and authority over, the target of ownership (Pierce et al. 2001; Brown et al. 2014). As such, individuals who feel more ownership are more willing to invest time and energy in a target such as their work, sacrifice themselves for it, or defend it from others (Van Dyne and Pierce 2004; Brown et al. 2014). Prior research has shown psychological ownership is associated with both positive outcomes such as organizational commitment, job
satisfaction, cooperative behavior, and constructive criticism (i.e., “helping” and “voice”) (VandeWalle et al. 1995; Van Dyne and Pierce 2004; Burris et al. 2008) and negative outcomes such as territorial behavior and knowledge hiding (Brown et al. 2014; Wang et al. 2018).

**The impact of psychological ownership on work quality and communication**

In tasks completed by a team, individuals contribute both by doing high quality work and by sharing it with their team. If team members do not perform their work effectively, teams cannot rely on each member’s contribution to the task. If team members do not communicate their work to the team effectively, teams (and team leaders) cannot incorporate all members’ work into the final output. In many tasks within a team setting, individual team members’ work requires substantial judgment (e.g., what assumptions to use in production or financial forecasts, what metrics to use to evaluate the performance of a product or business line) and, thus, doing high quality work requires high quality individual judgments.

We expect the level of psychological ownership team members feel over their work to impact both judgment (work quality) and communication (sharing work) via deeper cognitive processing. Deep information processing involves relating pieces of information to each other and evaluating whether they are consistent with the message they support (Petty and Cacioppo 1986; Griffith et al. 2015; Kadous and Zhou 2018). Psychological ownership causes people to value the target of ownership more (Shu and Peck 2011) and take greater care of the target of ownership (Peck and Luangrath 2018). While feelings of value and responsibility can influence team members’ contributions and performance through motivation or effort (e.g., time and energy devoted to a task; Van Dyne and Pierce 2004; Baer and Brown 2012; Brown et al. 2014), we expect such feelings can also influence performance through information processing. A heightened sense of responsibility can shift cognition from superficial, heuristic processing to more effortful, deeper processing of evidence (Petty and Cacioppo 1986; Kahneman 2003). The
resulting deeper processing of information by team members with higher psychological ownership will cause them to make higher quality judgments based on the available information.

**Hypothesis 1.** Team members will make higher quality judgments when they have higher versus lower psychological ownership of their work.

In teams, team members communicate with each other and with their team leaders. Sharing work results with a team leader is an important element of team member communication because team leaders often retain the final say and responsibility for their teams’ work (Cohen and Bailey 1997). However, team leaders’ final responsibility can result in them sometimes (even inappropriately) overriding or discounting team members’ concerns, especially if those members voice concerns late in the project timeline (Ashforth 1994; Knapp 2010; Burris 2012). We therefore examine urgent communication, which we define as occurring more immediately (e.g., as soon as an issue is discovered versus a week later) and in a more active manner (e.g., raising an issue proactively via email/phone versus waiting to be questioned about an issue).

Recent research has focused on individuals’ willingness to speak up, often referred to as “voice” (Detert and Burris 2007), in relation to leadership characteristics (Nelson, Proell, and Randel 2017), supervisor-subordinate relationships (Davidson, Van Dyne, and Lin 2017), and social networks (Venkataramani, Zhou, Wang, Liao, and Shi 2016). We focus on team members’ urgent communication to their team leader, rather than to other team members, for two reasons. First, the voice literature suggests that subordinate team members are often reluctant to speak up to team leaders (Burris 2012). Second, communicating with the team leader is most likely to ensure a team member’s contribution is incorporated into the team’s work.

Although prior psychological ownership literature has not shown a causal relationship between psychological ownership and willingness to speak up (VandeWalle et al. 1995; Mayhew et al. 2007), we expect increasing team members’ psychological ownership of their work to lead
them to communicate more urgently to their team leader. Deeper processing strengthens the link between judgment and action – individuals are more likely to act on judgments based on deeper processing (Petty and Cacioppo 1986). Deeper processing of judgments when psychological ownership is higher should therefore increase how urgently team members communicate the results of their work. Such communication is especially important if team members identify problems that the team and/or team leader will need to resolve to complete the team’s work.

**Hypothesis 2.** Team members will communicate more urgently when they have higher versus lower psychological ownership of their work.

**The impact of psychological ownership on responses to subsequent suggestions**

Work on teams is dynamic. Teams often create their final output through successive interactions and information gathering among team members, which can result in re-evaluation and revision of earlier judgments (Cohen and Bailey 1997). At times suggested changes to team members’ work are justified (e.g., a geographically dispersed team member is not aware of regulation changes in the country where the company’s headquarters are located), while at other times they are not (e.g., a team leader desires to wrap up the project before sufficient work has been done). Therefore, team members must have sufficient conviction to defend an earlier judgment if a suggestion is weakly justified but be open to revising earlier judgments if a suggestion is strongly justified.

Particularly with respect to team leaders, individuals can be reluctant to defend their judgments for fear of conflict or negative reprisal or for concern that such challenges will be futile (Morrison and Milliken 2000; Milliken et al. 2003). Feelings of psychological ownership over one’s judgments can increase the desire to defend them (Baer and Brown 2012), resulting in team members who appropriately push back against other team members, including team leaders. However, higher psychological ownership can lead to territorial behavior, and team members
who inappropriately defend their judgments, particularly when suggestions are externally imposed or interfere with an individual’s sense of ownership (Dirks, Cummings, and Pierce 1996; Brown et al. 2014; Kirk, Peck, and Swain 2018).

In our context, pressure from the team leader suggesting no further work is needed constitutes an externally imposed suggestion that limits team members’ work. If only the affective role of psychological ownership is at play then such pressure might cause those who feel greater ownership of their work to defend their initial judgments, even if subsequent information rightly points to revising those judgments (Baer and Brown 2012). However, because in a judgment task the cognitive role (i.e., deep processing) of psychological ownership also influences behavior, we expect team members to respond defensively to a team leader only when it is called for, such as when a suggestion is not justified (Petty and Cacioppo 1986).

The strength of a suggestion’s justification influences acceptance of that suggestion (O’Keefe 1998; Bonaccio and Dalal 2006; Kadous, Leiby, and Peecher 2013). Individuals accept suggestions more readily when they believe the suggestions are more strongly justified (Yaniv 2004) and individuals’ beliefs about justifiability depend on the extent and nature of their information processing (Priester and Petty 2003; Yaniv and Milyavsky 2007). Individuals who engage in deeper processing are more likely to be persuaded by the strength of the information supporting or contradicting a message (e.g., argument quality) than by easy to process but less relevant heuristic cues (e.g., attractiveness of message source, number of supporting versus contradicting arguments) (Petty and Cacioppo 1986; Kadous et al. 2013). In contrast, individuals who engage in more superficial processing are more likely to be persuaded by heuristic cues. Further, individuals tend to be “cognitive misers” who are unwilling to expend unnecessary
cognitive energy unless something, such as higher psychological ownership, motivates them to do so (Lerner and Tetlock 1999; Evans 2008; Kahneman, and Frederick 2005).

Of relevance to our team setting, conservation of cognitive energy can lead people to adopt the preferences of those to whom they are accountable when those preferences are known (Tetlock 1985). Team leaders’ suggestions about what team members should do make their preferences clear. Team members with lower psychological ownership, who are unlikely to deeply process the information justifying suggestions, are likely to accept those suggestions regardless of justification strength. In contrast, those with higher psychological ownership are unlikely to accept suggestions without deeply processing the information justifying them. Due to their deeper processing, we expect higher ownership team members to differentiate between strong and weak justifications and push back on suggestions when they are weakly justified, and to push back less on strongly justified suggestions. More generally, we predict the following:

**Hypothesis 3.** Team members will better differentiate between strongly and weakly justified suggestions when they have higher versus lower psychological ownership of their work.

3. **Method**

**Participants and procedures**

In a two-stage between-participants experiment using an information processing task, we manipulated psychological ownership as lower or higher, and justification of the team leader’s suggestion as weak or strong.¹ We obtained 86 usable responses from MBA students enrolled in a financial accounting course who received course credit for participating. The course instructor emailed 160 students a link to the experiment. To minimize interference with experimental manipulations, we stipulated that participants complete the online study in one uninterrupted

¹ We obtained approval from the Institutional Review Board (IRB) of the university where the experiment took place, and all participants consented to participate per IRB requirements.
sitting. Of the 157 students who clicked the link, we identified and excluded data from 53 participants who did not complete the study in one uninterrupted sitting, as evidenced by the time taken to complete the study (median time = 637 minutes). Of the 104 participants who completed the study uninterrupted (median time = 45 minutes), we excluded data from 13 participants who did not complete the psychological ownership manipulation and five participants who did not complete qualitative measures. The number of excluded participants did not differ across conditions (p = 0.29 two-tailed).

The case, adapted from Peecher, Piercey, Rich, and Tubbs (2010) and Kadous et al. (2013), involved a task with multiple pieces of information, but it was unclear how to weight and incorporate the information into a judgment. Deeper information processing—relating pieces of information to each other and evaluating them for consistency (Kadous and Zhou 2018)—will lead to higher quality judgments in such a task. The case instructed participants to imagine they were working as part of a team assessing the valuation of several assets at RCI, Inc., the financing arm of a hypothetical retailer. Participants’ role within the team was to assess the discount rate, which companies must subjectively determine based on assumptions about future business conditions. The company used the discount rate to value one of its assets. After making a judgment about the discount rate, participants communicated their judgments to a hypothetical team leader. Participants had requisite knowledge to complete the case, as they had substantially completed accounting and finance courses that covered discounted cash flow models and discount rates, and had on average six years of professional work experience. Our final sample of participants took a median time of 44 minutes to complete the experiment, reflecting the

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2 Reported results become slightly stronger in some cases and slightly weaker in others when data is retained from these 18 participants (n = 104), but the pattern of results and inferences drawn remain unchanged.

3 Reported p-values are one-tailed for directional predictions and two-tailed otherwise.
informational complexity of the task and the involved nature of the decision making processes engaged in by participants.

The case included information from the company and information from the hypothetical team that, at times, contradicted each other. The contradictions were relevant to assessing the discount rate but were not explicitly identified for participants. Identifying contradictions required deep processing to understand how the various pieces of information related to each other and impacted the discount rate. We can infer deeper processing, therefore, from participants who identified some of these contradictions. Further, participants’ judgments about the discount rate were subjective because discount rates are based on assumptions about future financial performance and economic conditions. We created an information pattern in the case that indicated a higher discount rate was more reasonable, allowing us to observe variation in judgment quality and infer variation in information processing.

The company used a relatively low discount rate of 13.2 percent compared to the rates used by industry leaders and peers, which resulted in an unreasonably high asset value. The company justified its low discount rate with five different reasons. Yet, other information in the case contradicted each of these justifications, suggesting the discount rate was too low given the circumstances. For example, one reason the company gave for its low discount rate was that the company had more affluent customers than other organizations, which suggests a lower risk of customer default that would support a lower discount rate (and a higher asset value). The team noted that the upscale segment of the economy recovered slowly from a recent economic downturn, which suggests, but does not explicitly state, that the company’s affluent customer base may not have insulated it from customer default risk as much as the company believed.
Appendix A summarizes the company’s justifications and the contradictory information that appeared elsewhere in the case.

[Insert Figure 1 here]

In stage 1, participants read brief background information about the company and their role, completed a planning memo task, and reviewed detailed case information before making an initial judgment about the discount rate. In stage 2, participants received further information from the team leader and made a final judgment about the discount rate. Participants documented their rationales for both judgments and the initial and final issues, if any, that they would communicate to the team leader. They also indicated how urgently they would communicate in both stages. After completing both stages of the experiment, participants answered demographic and other post-test questions. Figure 1 illustrates the two-stage design. We randomly assigned participants to experimental conditions.

**Independent variables**

*Psychological ownership*

We manipulated lower versus higher psychological ownership through the planning memo task by instructing participants to review the completed memo versus copy the memo information into a blank planning memo template. Our manipulation is similar to that of Baer and Brown (2012), who used a creative task setting where participants completed a business proposal. They effectively increased psychological ownership over the proposal by having higher ownership participants add a name and fill in missing details, which reduced their willingness to remove items from the proposal relative to lower ownership participants. We adapted this manipulation as needed to fit our task and online setting, and to ensure information is equivalent
across conditions, while retaining internal validity via the key features of perceived control (i.e., filling in missing details to the memo) and personal involvement (i.e., providing a team name).

Participants in both conditions received identical planning information: the team’s objective (assess asset value), other team members’ names, key assumptions to test, each member’s responsibility and deadline for testing, and three procedures for the participant to perform (obtain benchmark discount rates, obtain the company’s reasons for deviating from benchmarks, and evaluate macroeconomic factors). The planning information focused mainly on deadlines and team member responsibilities. It did not include any details about the nature of the company and its discount rate, or about the specific contradictions present in the case information, so it was unlikely to help participants assess the discount rate or identify contradictions. In the lower ownership condition, participants reviewed the information, which was contained in a completed planning memo. In the higher ownership condition, participants received the same information in the form of a bulleted list of notes, and they completed the planning memo by using the notes and adding a team name to the memo. These participants could also reformat the memo. All participants had access to the planning information throughout the experiment. See Appendix B for the notes, template, and completed memo used to manipulate psychological ownership.

In light of our adaptations and given the potential for manipulation checks to impact inferences drawn from experiments (Hauser, Ellsworth, and Gonzalez 2018), we conducted a validation study to verify that our manipulation increased the routes to psychological ownership (control, involvement, investment) and to rule out potential alternatives. We recruited 71 undergraduate accounting students to complete the study at the end of a class session; 67 students completed the study at that time, uninterrupted. Participants received the same
instructions as in our main study, but only completed the manipulation and background information sections. To measure participants’ level of psychological ownership, they responded to the following four items (Cronbach’s α = 0.80) on 11-point scales with endpoints of not much and a great deal (first item), not at all and extremely (second and third items), and strongly disagree and strongly agree (last item): “How much control did you feel you had over the task?” “How involved did you feel in the task?” “How invested were you in the task?” and “If someone praised my performance on this task, it would feel like a personal compliment.” We found, as expected, the average of the four ratings was significantly higher in the higher ownership condition (M = 5.25, SD = 1.96) than in the lower ownership condition (M = 4.40, SD = 1.50; t(65) = 2.02, p = 0.02).

To rule out the possibility that our manipulation increased feelings of accountability, as opposed to psychological ownership, we asked participants, “How accountable did you feel to the team leader as you worked on the task?” using an 11-point scale from not at all accountable to extremely accountable. Responses did not significantly differ in the higher (M = 4.23, SD = 2.63) and lower ownership conditions (M = 4.01, SD = 2.09; t(65) = 0.38, p = 0.70 two-tailed).

While the information contained in the planning memo should not help in assessing the discount rate or identifying contradictions due to its focus on administrative and logistic details, we asked two questions in the validation study to verify participants in the higher versus lower psychological ownership condition did not recall the memo information to a greater extent. We asked participants “What is the team leader’s name?” prompting them to select one name from the list of the five other team members, and “Which of the following procedures to assess the discount rate were included in the planning memo?” prompting them to select as many procedures as they wished from a list of six, three of which were correct. Participants in the
higher ownership condition responded correctly no more frequently than participants in the lower ownership condition for either the team leader question (67% versus 59%, Fisher’s exact p = 0.62 two-tailed) or the procedures question (73% versus 59%, Fisher’s exact p = 0.30 two-tailed). The results of our validation study provide support that our manipulation increased feelings of psychological ownership and rule out potential alternative explanations for differences between conditions.\(^4\)

*Justification strength of team leader’s suggestion*

After completing stage 1 of the case, participants all received the following email from the hypothetical team leader:

FYI – I just came across some information about RCI’s first-loss position that should give you the answer you need for your assessment of the discount rate. In my opinion, this information confirms that the discount rate RCI is using is appropriate. Yes, there are reasons for RCI’s discount rate to increase but this information limits that increase. See attached for what I mean but we should be able to wrap up your part of the file immediately.

The email attachment contained our manipulation of justification strength. Participants in the weak condition received information that cited a recent court decision confirming the company was not legally obligated to cover certain losses, despite its first-loss position (i.e., the company is to suffer the first economic loss if customers default on credit card payments). However, this information was redundant because the case information provided in stage 1 already established the company’s lack of legal obligation. Those in the strong condition received information about

\(^4\) In our main study, we asked participants to respond to four measures (Cronbach’s α = 0.93) of psychological ownership (e.g., “This is MY assessment of the discount rate”) adapted from Baer and Brown (2012) that use scales ranging from 1 (strongly disagree) to 7 (strongly agree). The average of the four ratings was marginally significant higher in the higher (M = 5.18, SD = 1.48) versus lower ownership condition (M = 4.63, SD = 1.66; t(84) = 1.60, p = 0.06). Two key differences exist between our study and Baer and Brown (2012) that likely contributed to marginal results using their measures. First, the target of ownership in our context was the discount rate assessment (i.e., the participant’s work) rather than the memo used to manipulate psychological ownership as in Baer and Brown (2012). As a result, the phrasing of the questions was less natural and harder to interpret in our context. Second, participants in Baer and Brown (2012) completed the measures immediately after completing the manipulation. In an effort to not impact responses (Hauser et al. 2018), our participants did not complete these measures until after completing the rest of the two-stage experiment (which took, on average, 18.2 additional minutes). The delay in responding could have weakened the effect of psychological ownership before participants answered the four measures.
the company selling a portion of its first-loss position during the current fiscal year to reduce its exposure to default losses. The case information provided in stage 1 did not include this information. Therefore, in both conditions the team leader expressed her preference to accept the company’s discount rate and provided relevant information, but only in the strong justification condition did she provide new information to the participant that supported this preference. We designed this manipulation to provide different information, with different implications for participants’ judgments. This design allows us to test how psychological ownership affects participants’ ability to differentiate the information; we infer deeper information processing from better differentiation.

**Dependent variables**

We asked participants to provide several initial assessments and responses prior to receiving the team leader’s email (stage 1). To test Hypothesis 1’s prediction that psychological ownership will improve judgments, we measured two dependent variables: participants’ assessments of the discount rate and identification of contradictions. To test Hypothesis 2’s prediction that psychological ownership will improve communication, we measured participants’ urgency of communication. In stage 2, after receiving the team leader's email, participants provided final assessments and responses. To test Hypothesis 3’s prediction that psychological ownership will help team members differentiate between strongly and weakly justified suggestions, we also measured participants’ likelihood of insisting the information contained in the email attachment from the team leader was unhelpful.

**Discount rate assessments**

Participants provided assessments, in percentage terms, of the most appropriate discount rate and the lowest rate they would be willing to accept. Higher assessed discount rates reflect
higher quality judgments, because the contradictions in the case information imply the company’s discount rate was unreasonably low given the circumstances.

Identification of contradictions

Participants explained their discount rate assessments and described the issues, if any, they would discuss with the team leader. We had these responses coded to measure participant identification of the contradictions of the company’s justifications for their low discount rate. Contradictions identified in qualitative responses provide evidence of higher quality judgments via deeper processing of case information. Two independent coders, who were blind to hypotheses and experimental conditions, coded each response to indicate which, and how many, of the five contradictions (shown in Appendix A) a participant identified. Initial inter-rater agreement was 89.7 percent and Cohen’s kappa was 0.70 (p < 0.01 two-tailed). Coders met to resolve disagreements and one of the authors mediated these resolutions; the coders and author were blind to experimental condition during this process. Our analyses used the resolved coding.

Urgency of communication

We adapted our urgency measure from Griffith et al. (2015) and Kadous and Zhou (2018). Participants chose how to communicate their initial discount rate assessment and related issues to the team leader from four options: (1) document their assessments/issues and wait for the team leader to ask questions about them when she reviews them in a few weeks, (2) wait until the next team meeting (in two weeks) to communicate their assessments/issues, (3) contact the team leader via email in the next few days to discuss any issues, or (4) contact the team leader immediately via phone to discuss any issues. Each option is progressively more urgent; further, the first two options reflect a desire to wait and let the team leader dictate the communication timing while the latter two reflect a desire to initiate communication soon. We
used both the ordinal measure, ranging from 1 to 4, and a binary measure, which we coded as communicating more urgently (options 3 and 4) versus less urgently (options 1 and 2).

*Insistence that team leader’s evidence was unhelpful*

We examine Hypothesis 3 to determine if psychological ownership induced participants to ignore a suggestion’s justification strength and push back against any suggestion that threatens to reduce their autonomy or control, or whether it induced them to better differentiate between a weakly and strongly justified suggestion and push back only when necessary. In stage 2 only, participants indicated how likely they were to insist the information received from the team leader did not help confirm whether the discount rate was appropriate, using an 11-point scale ranging from *not at all likely* to *extremely likely*. Because the team leader’s email suggested the company’s discount rate was appropriate and no further work was necessary, higher ratings are consistent with participants pushing back more against the team leader’s suggestion.

4. Results

*Stage 1 tests*

*Tests of Hypothesis 1*

We found strong evidence that participants made higher quality judgments when psychological ownership was higher versus lower. As expected, participants identified at least one contradiction significantly more often when psychological ownership was higher (29 of 39, 74%) versus lower (17 of 47, 36%; Fisher’s exact p < 0.01). Table 1, Panel A (Panel B) summarizes the results of the appropriateness (acceptability) measure. The most appropriate

---

5 We used a binary measure in our main analyses because of the frequency of participants who did not identify any contradictions, particularly in the lower psychological ownership condition. As a result, the standard deviation of the count measure (equal to the total number of contradictions identified by each participant) was high, and greater than its mean for the lower ownership condition. We repeated our analyses using the count measure and inferences did not change. Higher ownership participants identified, on average, 1.36 contradictions, which was significantly higher than the mean of 0.81 contradictions identified by lower ownership participants (Z = 2.44, p = 0.01).
discount rate was significantly higher when psychological ownership was higher (M = 14.5, SD = 1.07) versus lower (M = 13.7, SD = 1.29; t(84) = 2.83, p < 0.01). The lowest acceptable discount rate was also significantly higher when psychological ownership was higher (M = 13.2, SD = 1.30) versus lower (M = 12.5, SD = 1.59; t(84) = 2.22, p = 0.02). These results support Hypothesis 1 that team members with higher versus lower psychological ownership make higher quality judgments: they engaged in deeper processing, as evidenced by greater likelihood of identifying contradictions, and they adjusted their judgments accordingly, as evidenced by higher assessed discount rates.

[Insert Table 1 here]

Tests of Hypothesis 2

We found evidence that participants communicated more urgently when psychological ownership was higher versus lower. As shown in Table 2, the pattern of participants’ communication choices – whether to document only, wait weeks for the team leader’s review to talk, email the team leader in a few days to talk, or phone the team leader immediately – exhibited more urgency at a marginally significant level (Jonckheere-Terpstra z = 1.29, p < 0.10) when ownership was higher (6, 2, 23, and 8 participants, respectively) versus lower (13, 5, 20, and 9 participants, respectively). Further, participants chose one of the latter two “more urgent” options, indicating they intended to initiate communication rather than wait to let the team leader dictate the timing, significantly more often when ownership was higher (31 of 39, 80%) versus lower (29 of 47, 62%; Jonckheere-Terpstra z = 1.78, p = 0.04). These analyses provide support for Hypothesis 2 that team members with higher versus lower psychological ownership more urgently communicate the issues they identify. We found further support for Hypothesis 2 in our stage 1 mediation analysis.
Stage 1 mediation

We performed mediation tests to provide evidence that in stage 1 of the experiment, increased psychological ownership increased communication urgency through deeper processing and resulting judgments. Figure 2 shows our mediation model. We estimated a generalized structural equations model with links 1 and 3 and 5, which used binary dependent variables, modelled as logit regressions.6

Results supported the model when the dependent/mediator variable was the “lowest acceptable” discount rate but not when it was the “most appropriate” discount rate.7 Specifically, for “lowest acceptable,” links 1 through 3 were all positive and significant (all p < 0.02) while the direct effects in link 4 (p = 0.13) and link 5 (p = 0.09) were not significant or marginally significant, indicating full and partial mediation, respectively. In addition, the 95 percent bootstrapped, bias-corrected confidence interval for the indirect paths through links 1-2 (0.30, 3.26) and through links 1-2-3 (0.05, 1.62) did not contain zero, indicating significance at the p = 0.05 level (Preacher and Hayes 2008). In contrast, for “most appropriate,” link 1 was significant (p < 0.01) but link 2 (p = 0.12) and link 3 (p = 0.32) were not; accordingly, neither indirect effect was significant. Overall, at least for assessments of the lowest acceptable discount rate, these

---

6 Inferences did not change if we used the count measure for the contradiction mediator and Poisson regression, or if we used the four-level urgency dependent variable and an ordered logit regression.

7 Results for the two measures likely differed because participants’ assessments of the “most appropriate” discount rate may have been influenced by what participants believed others would view as appropriate, not necessarily their own beliefs, making it a noisier measure (Bauer 2015). Assessing the “lowest acceptable” discount rate allowed participants to choose a lower rate without discrediting themselves as not knowing the “right” (most appropriate) answer, yet it also demonstrated how much they could concede to the company. Thus, the “lowest acceptable” measure was likely a stronger measure of participants’ actual beliefs about the discount rate, because this measure was less likely than “most appropriate” to reflect what participants thought they should answer based on others’ (e.g., the company’s, peers’) views.
results indicate that increased psychological ownership improves judgments about the discount rate (Hypothesis 1) by facilitating the identification and use of contradictory information. Increased psychological ownership increases urgency of communication to the team leader (Hypothesis 2) through identification of contradictory information and judgments reflecting that identification.

**Stage 2 tests**

*Test of Hypothesis 3*

For Hypothesis 3, we expect participants with lower ownership will be less insistent that the team leader’s evidence was unhelpful (i.e., push back less) regardless of how well the team leader justifies a suggestion, while participants with higher ownership will be less insistent only if a suggestion is strongly justified. Therefore, compared to the other three conditions, we expect participants in the higher psychological ownership/weak justification condition will be most likely to insist the information was unhelpful in assessing the discount rate.

Table 3 reports the results. As expected, the planned contrast with weights of \{3,-1,-1,-1\} corresponding to the order of conditions specified above was significant (F(1, 80) = 4.70, p = 0.02). The residual between-cells variation was insignificant (F(2, 80) = 0.05, p = 0.94 two-tailed), indicating that the hypothesized contrast explained the data well. Additional pairwise comparisons further supported Hypothesis 3. When psychological ownership was higher, mean ratings were marginally significantly higher when justification was weak (M = 6.55, SD = 3.24) versus strong (M = 5.17, SD = 2.72; t(80) = 1.32, p < 0.10). When psychological ownership was lower, as expected, mean ratings did not differ significantly when justification was weak (M = 4.75, SD = 2.79) versus strong (M = 4.65, SD = 3.56; t(80) = 0.11, p = 0.91 two-tailed). Mean ratings were significantly higher when psychological ownership was higher versus lower when
the team leader’s suggestion was weakly justified ($t(80) = 1.83, p = 0.04$). Mean ratings were significantly higher in the higher ownership/weak justification versus lower ownership/strong justification condition ($t(80) = 2.12, p = 0.02$). These results support Hypothesis 3. Team members with higher psychological ownership better differentiate between weakly and strongly justified suggestions from their team leader to stop work, and team members in the former case are more likely to push back on the suggestion than those in the latter case or than those with lower ownership, regardless if the suggestion they receive is weakly or strongly justified.

[Insert Table 3 here]

Stage 2 mediation

We performed mediation tests to provide evidence that the interactive effect of psychological ownership and justification strength on participants’ differentiation of suggestions (Hypothesis 3) influences judgments and communication. Table 4 reports the descriptive statistics for the stage 2 judgment and communication urgency measures. Our research design in stage 2 focused on the team leader’s suggestion and supporting information, which made our measure, insistence that the team leader’s information was unhelpful, a key process measure to test our interaction effect in Hypothesis 3. Therefore, our stage 2 mediation analysis focused on insistence as the mechanism by which our interaction influenced final judgments and communication. Higher insistence is likely communicated more urgently, so we expect an indirect effect of our interaction on communication through insistence. Whether we should expect insistence to influence discount rate assessments is less clear, as even participants who recognized the suggestion was strongly (weakly) justified by the accompanying information and insisted less (more) could still choose not to adjust their discount rate assessment downward (upward). Expectations for direct effects are also unclear, in part because participants with lower
versus higher psychological ownership already made initial discount rate and communication decisions that could serve as anchors for final decisions.

Figure 3, Panel A shows our first mediation model where communication urgency was the dependent variable. We estimated a generalized structural equations model with link 2, which used a binary dependent variable, modelled as a logit regression, and the predicted ordinal pattern of the interactive effect from Hypothesis 3 (higher psychological ownership/weak justification: +3, other three conditions: -1). Results supported the model. Links 1 and 2 were positive and significant (both p < 0.05). The direct effect in link 3 (p = 0.23) was not significant, indicating full mediation. The 95 percent bootstrapped, bias-corrected confidence interval for the indirect path did not contain zero (0.004, 0.211), indicating significance at the p = 0.05 level.

Figure 3, Panel B shows our second mediation model. We estimated a structural equations model and as in Figure 3, Panel A, we used the predicted ordinal pattern of the interactive effect of {+3,-1,-1,-1}. Results supported the model whether the discount rate dependent variable was “lowest acceptable” or “most appropriate.” For either model, links 1 and 2 were positive and significant (all p < 0.02) and the direct effect in link 3 (both p > 0.14) was not significant, indicating full mediation. Following Preacher and Hayes (2008), the 95 percent bootstrapped, bias-corrected confidence interval for the indirect path did not contain zero for “lowest acceptable” (0.005, 0.117) or for “most appropriate” (0.003, 0.095), indicating significance at the p = 0.05 level. Overall, these results indicate that the interactive effect of psychological ownership and justification strength improved judgments and communication.

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8 Inferences did not change if we used the ordinal urgency dependent variable and an ordered logit regression.
9 Inferences did not change if the stage 1 discount rate assessment was included as a covariate in the models.
urgency through better differentiation of strongly versus weakly justified suggestions (Hypothesis 3).\textsuperscript{10}

\[\text{Insert Figure 3 here}\]

5. Conclusion

In this study, we examined the effects of psychological ownership over one’s work on judgments and communication choices in a team setting. We found that participants in the role of a team member who had higher (versus lower) psychological ownership made higher quality judgments, as indicated by higher discount rate assessments, which resulted from deeper cognitive processing revealed by the identification of contradictions within the case information. As a result, participants with higher ownership communicated the results of their work to their team leader more urgently. Further, participants with higher ownership pushed back more against weakly (but not strongly) justified suggestions from the team leader, and this effect influenced subsequent judgments and communication.

The improved judgments and communication resulting from increased psychological ownership have important implications for any organizational setting where individuals might vary in their psychological ownership. We focus on the team setting in this study as workplace teams increasingly include members from a variety of locations and specializations, and such teams do not always function effectively (e.g., global audit teams, Public Company Accounting Oversight Board 2016). However, the theory we rely on is not limited to the team setting; our theory and results imply that organizational policies, regulatory standards, task structures, and interventions designed to promote psychological ownership could be promising avenues for

\textsuperscript{10} We performed a serial mediation model similar to that in stage 1, testing a mediation pattern from the independent variables through insistence and discount rate assessments to urgency of communication. Similar to stage 1, we found a significant effect of discount rate assessments on urgency for the “lowest acceptable” (p = 0.02) but not the “most appropriate” (p = 0.18) discount rate.
improving the performance of employees across many settings. Our study demonstrates that even a subtle manipulation of psychological ownership can increase the deep processing that individuals engage in to make judgments and can result in more urgent, but discriminating, communication. Further, increased psychological ownership could result in improved outcomes in other collaborative contexts, such as joint ventures, strategic alliances, or other interfirm relationships. Future research can consider whether or how psychological ownership plays an important role in these settings.

Employing traditional formal and informal controls within modern organizational and team settings is difficult (Arya et al. 1997; Rowe 2004) and psychological ownership is a mechanism that can enhance individual work quality and communication even in the absence of these controls. However, psychological ownership likely also plays a role in some formal and informal controls commonly used by organizations. For example, we find that psychological ownership (i.e., feeling ownership over one’s task) produces results similar to those produced by participative budgeting (i.e., having a voice in how one’s budget is set) but, unlike the latter, the former does not require a formal organizational policy to implement (Covaleski et al. 2003). Our results suggest psychological ownership could play a role in how participative budgeting improves motivation and performance; that is, individuals with more voice likely feel greater ownership over the process. Future research can explicitly examine this potential role.

Our study enriches understanding of how psychological ownership functions, as we provide causal evidence of behavioral effects that result from psychological ownership-induced differences in the decision making process. While prior literature contemplates such an effect (Mayhew et al. 2007), the only causal evidence of psychological ownership’s effect on judgments in work settings is in a creative task setting that does not involve information
processing or evaluative judgments (Baer and Brown 2012). Studies on consumer choice have shown causal evidence of behavioral effects of psychological ownership on judgments in non-work settings (e.g., willingness to pay for a product), but the mechanisms examined are largely affective and do not include information processing (Peck and Luangrath 2018). We contribute to the literature by demonstrating that increasing team members’ psychological ownership of their work enhances the process by which they arrive at judgments in an information processing task that requires evaluative judgments. Specifically, team members with higher ownership perform deeper processing directed toward information relevant to a decision, which in turn improves their judgments and communication related to the decision.

In addition, prior literature finds psychological ownership leads to defensive, rather than constructive, responses to suggestions that minimize team members’ work (Baer and Brown 2012). Our study indicates that high levels of ownership in judgment tasks can help people respond appropriately to suggestions based on the justification strength of those suggestions. Specifically, we demonstrate that higher ownership only causes individuals to push back against suggestions for change when warranted. Thus, we identify a limit on territorial behavior described as the dark side of psychological ownership (Kirk et al. 2018).

This study should be interpreted in light of its limitations. First, we do not use incentives in our research design. While incentives are often used to model and address problematic team member behaviors (e.g., free riding or shirking), our goal is to test an intervention that can help to address problematic behaviors independent of incentives. Our complex judgment task requires participants with specific knowledge (i.e., MBA students or others with valuation knowledge), so we focus our use of these scarce participants on testing our intervention. We also do not use interacting teams in our design. This choice is deliberate, because our goal is to test an
intervention that does not work through monitoring or other interactive mechanisms such as peer pressure, trust, or social norms. Finally, we do not examine levels of psychological ownership that exist in real-world team settings among different types of team members. Various features of teams such as geographic dispersion, cross-functional disciplines, and variation in responsibility and authority are consistent with theory regarding determinants of psychological ownership and suggest psychological ownership likely varies with features of the person, task, and team. Certain subsets likely systematically have lower psychological ownership than others; we leave examination of where psychological ownership is likely to have the biggest impact to future research. We believe that these limitations do not constrain the inferences and implications based on our study, and that this study provides a starting point for further research into when, why, and how psychological ownership can improve team member contributions.
## APPENDIX A

### RCI’s Justifications and Contradictory Information

<table>
<thead>
<tr>
<th>Justification for Low Discount Rate</th>
<th>Contradictory Information</th>
<th>Implication</th>
</tr>
</thead>
<tbody>
<tr>
<td>RCI has more affluent customers than the peer companies used for benchmarking RCI’s discount rate.</td>
<td>The upscale segment of the economy is recovering more slowly than the rest of the economy.</td>
<td>RCI’s customer base is more heavily concentrated in the upscale segment of the economy than its peers.</td>
</tr>
<tr>
<td>General macroeconomic conditions are mostly unchanged from the prior year.</td>
<td>The upscale segment of the economy is recovering more slowly than the rest of the economy.</td>
<td>The macroeconomic conditions most applicable to RCI’s customer base are worse than the general macroeconomic conditions.</td>
</tr>
<tr>
<td>Customer credit ratings are mostly unchanged from the prior year.</td>
<td>Most credit checks for existing customers are 5-10 years old.</td>
<td>Credit ratings are based on out of date credit checks. Because the affluent customer segment has struggled financially in the last few years, new credit checks would likely result in lower credit ratings.</td>
</tr>
<tr>
<td>RCI’s more generous credit terms in the current year (which typically would indicate increased risk, requiring an increase in the discount rate) are mitigated by the affluent customer base and unchanged positive factors noted above.</td>
<td>New, more generous credit terms have been extended in the current year. When extended to existing customers, RCI did not perform new credit checks.</td>
<td>Credit checks are 5-10 years old and this customer segment has struggled financially in the last few years, suggesting generous credit terms have been extended to customers whose credit ratings have dropped.</td>
</tr>
<tr>
<td>RCI’s lower prepayment rates in the current year (which typically would indicate increased risk, requiring an increase in the discount rate) are mitigated by the affluent customer base and unchanged positive factors noted above.</td>
<td>The upscale segment of the economy is recovering more slowly than the rest of the economy. New, more generous credit terms have been extended in the current year. When extended to existing customers, RCI did not perform new credit checks.</td>
<td>Prepayment rates decreased more than peer companies, but RCI’s discount rate increased by a smaller amount than peers. Prepayment rates are unlikely to catch up to peers as the generous introductory terms offered this year expire, because RCI’s market and customer segment appear less healthy than peers.</td>
</tr>
</tbody>
</table>
APPENDIX B
Psychological Ownership Manipulations

Panel A: Completed Planning Memo (Lower Psychological Ownership Condition)

Assessment of Valuation of Retained Interest as of 10/31/2015
RCI, Inc.
Planning Memo for Assessment Team

Section 1: General Planning
Objective:
This memo documents the team’s plan for assessing RCI’s FY 2015 valuation of the retained interest of securitized credit card receivables (year ended 10/30/2015).

Team Members:
E. Brewster, M. Green, S. Neuman (team leader), A. Peery, J. Watson, [Your name here]

Key Assumptions:
The team has identified five key assumptions underlying RCI’s valuation. The key assumptions are cash flow projections of 1) excess cash collections, 2) the cash reserve fund, and 3) debt securities from securitization held by RCI, future effective tax rate, and discount rate.

Allocation and Timing of Procedures:
Team members are responsible for testing the key assumptions as follows:

<table>
<thead>
<tr>
<th>Assumption</th>
<th>Team Member Name</th>
<th>Due Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cash flow projections of excess cash</td>
<td>J. Watson</td>
<td>11/27/2015</td>
</tr>
<tr>
<td>Cash flow projections of cash reserve</td>
<td>A. Peery</td>
<td>11/30/2015</td>
</tr>
<tr>
<td>Cash flow projections of debt securities</td>
<td>M. Green</td>
<td>12/2/2015</td>
</tr>
<tr>
<td>Future effective tax rate</td>
<td>E. Brewster</td>
<td>12/4/2015</td>
</tr>
<tr>
<td>Discount rate</td>
<td>[Your name here]</td>
<td>12/1/2015</td>
</tr>
</tbody>
</table>

Section 2: Specific Procedures
In this section, each team member will complete the sub-section for their assigned assumption to document the specific procedures that will be performed to complete their assignment.

[Note: Assume that your teammates will complete their sub-sections at a later time.]

Procedures to Assess Discount Rate:
1. Obtain discount rates used by benchmark companies.
2. Obtain management information about company-specific factors that may suggest the need to adjust benchmark-average.
3. Evaluate macroeconomic factors that may affect the probability of repayment.
Panel B: Planning Meeting Notes and Blank Planning Memo Template (Higher Psychological Ownership Condition)

Planning Meeting Notes:

- Team members: E. Brewster, M. Green, S. Neuman (team leader), A. Peery, J. Watson, me

- Overall team objective – assess RCI’s valuation of the retained interest of securitized credit card receivables for FY 2015, which ended on 10/30/2015. There are five key assumptions underlying this valuation: cash flow projections of 1) excess cash collections, 2) the cash reserve fund, and 3) debt securities from securitization held by RCI, future effective tax rate, and discount rate.

- Delegation of duties – Each team member (other than team leader) responsible for one assumption.
  - Cash flow proj. of excess cash – J. Watson
  - Cash flow proj. of cash reserve – A. Peery
  - Cash flow proj. of debt securities – M. Green
  - Tax rate – E. Brewster
  - Discount rate – me


- Specific procedures for discount rate – obtain discount rate used by benchmark companies; obtain management information about company-specific factors that may suggest need to adjust benchmark-average; evaluate macroeconomic factors that may affect probability of repayment.
Assessment of Valuation of Retained Interest as of 10/31/2015
RCI, Inc.
Planning Memo for [enter team name here]

Section 1: General Planning
Objective:

Team Members: [include your name here]

Key Assumptions:

Allocation and Timing of Procedures:
Team members are responsible for testing the key assumptions as follows:

<table>
<thead>
<tr>
<th>Assumption</th>
<th>Team Member Name</th>
<th>Due Date</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Section 2: Specific Procedures
In this section, each team member will complete the sub-section for their assigned assumption to document the specific procedures that will be performed to complete their assignment.

[Note: Assume that your team mates will complete their sub-sections at a later time.]

Procedures to Assess Discount Rate:
1.
2.
3.
REFERENCES


FIGURE 1
Experimental Design

Stage 1

Read case instructions and background information

Receive completed planning memo (lower psychological ownership condition)

Receive planning meeting notes and blank planning memo template (higher psychological ownership condition)

View initial information about RCI’s discount rate

Make initial judgment about discount rate

Stage 2

Receive email from team leader suggesting participant should conclude that RCI’s discount rate is reasonable

Includes redundant information to justify suggestion (weak justification condition)

Includes new information to justify suggestion (strong justification condition)

Make final judgment about discount rate

Complete post-experimental questionnaire

Psychological ownership manipulation

Stage 1 dependent measures

Justification strength manipulation

Stage 2 dependent measures
This figure illustrates the model of how identification of contradictions mediates the effect of psychological ownership on the assessment of a discount rate, and how the assessment of a discount rate, through identification of contradictions, mediates the effect of psychological ownership on urgency of communication. Results shown above used binary measures of identification of contradictions and urgency of communication, and the stage 1 lowest acceptable discount rate as the measure of assessment of discount rate. Links 1, 2, and 3 were significant in the predicted direction. We followed Preacher and Hayes (2008) to test indirect effects. The 95% bias-corrected and bootstrapped confidence intervals for the indirect effects of both Links 1—2 and 1—2—3 were significant. Further, the direct effect of Link 4 (Link 5) was not (marginally) significant, supporting full (partial) mediation. All p-values are one-tailed.
FIGURE 3  
Stage 2 Mediation Model

Panel A: Urgency of Communication

This figure illustrates the model of suggestion differentiation mediating the interactive effect of psychological ownership and justification strength on urgency of communication. Results shown above used the predicted ordinal pattern of the interactive effect (higher psychological ownership/weak justification: +3, other conditions: -1), participants’ rating of how likely they were to insist the information did not help confirm whether the discount rate was appropriate, and a binary measure of stage 2 urgency of communication. Links 1 and 2 were significant in the predicted direction. We followed Preacher and Hayes (2008) to test indirect effects. The 95% bias-corrected and bootstrapped confidence interval for the indirect effect was significant. Further, the direct effect of Link 3 was not significant, supporting full mediation. All p-values are one-tailed.
FIGURE 3 (continued)
Stage 2 Mediation Model

Panel B: Discount Rate Assessment

This figure illustrates the model of suggestion differentiation mediating the interactive effect of psychological ownership and justification strength on final discount rate assessments. Results shown above used the predicted ordinal pattern of the interactive effect (higher psychological ownership/weak justification: +3, other conditions: -1), participants’ rating of how likely they were to insist the information did not help confirm whether the discount rate was appropriate, and the stage 2 lowest acceptable discount rate as the measure of assessment of discount rate. Links 1 and 2 were significant in the predicted direction. We followed Preacher and Hayes (2008) to test indirect effects. The 95% bias-corrected and bootstrapped confidence interval for the indirect effect was significant. Further, the direct effect of Link 3 was not significant, supporting full mediation. All p-values are one-tailed.
TABLE 1
Tests of Hypothesis 1: Initial discount rate assessments

Panel A: Most appropriate discount rate - Mean (Standard Error)

<table>
<thead>
<tr>
<th>Condition</th>
<th>n</th>
<th>Most appropriate discount rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lower psychological ownership</td>
<td>47</td>
<td>13.74</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(0.19)</td>
</tr>
<tr>
<td>Higher psychological ownership</td>
<td>39</td>
<td>14.48</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(0.17)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Higher versus lower</th>
<th>Difference</th>
<th>t-statistic</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>0.73</td>
<td>2.83</td>
<td>0.003</td>
</tr>
</tbody>
</table>

Panel B: Lowest acceptable discount rate - Mean (Standard Error)

<table>
<thead>
<tr>
<th>Condition</th>
<th>n</th>
<th>Lowest acceptable discount rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lower psychological ownership</td>
<td>47</td>
<td>12.49</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(0.23)</td>
</tr>
<tr>
<td>Higher psychological ownership</td>
<td>39</td>
<td>13.19</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(0.21)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Higher versus lower</th>
<th>Difference</th>
<th>t-statistic</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>0.70</td>
<td>2.22</td>
<td>0.015</td>
</tr>
</tbody>
</table>

a We manipulated psychological ownership between participants at two levels (higher versus lower) via a planning memo task.
b Participants provided an initial assessment of the most appropriate discount rate.
c Participants provided an initial assessment of the lowest discount rate they would be willing to accept.
All p-values are one-tailed.
### TABLE 2
Tests of Hypothesis 2: Urgency of communication

<table>
<thead>
<tr>
<th>Condition</th>
<th>Communication choice</th>
<th>Document Only</th>
<th>Wait to Talk</th>
<th>Email Soon</th>
<th>Talk Now</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lower psychological ownership</td>
<td></td>
<td>13</td>
<td>5</td>
<td>20</td>
<td>9</td>
<td>47</td>
</tr>
<tr>
<td></td>
<td></td>
<td>28%</td>
<td>11%</td>
<td>43%</td>
<td>19%</td>
<td></td>
</tr>
<tr>
<td>Higher psychological ownership</td>
<td></td>
<td>6</td>
<td>2</td>
<td>23</td>
<td>8</td>
<td>39</td>
</tr>
<tr>
<td></td>
<td></td>
<td>15%</td>
<td>5%</td>
<td>59%</td>
<td>21%</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>18</td>
<td>6</td>
<td>43</td>
<td>15</td>
<td>86</td>
</tr>
</tbody>
</table>

*Jonckheere-Terpstra trend test*  
\[ z\text{-score} 1.29 \]  
\[ p\text{-value} 0.099 \]

<table>
<thead>
<tr>
<th>Condition</th>
<th>Less Urgent</th>
<th>More Urgent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lower psychological ownership</td>
<td>18/47 (38.3%)</td>
<td>29/47 (61.7%)</td>
</tr>
<tr>
<td>Higher psychological ownership</td>
<td>8/39 (20.5%)</td>
<td>31/39 (79.5%)</td>
</tr>
</tbody>
</table>

*Jonckheere-Terpstra trend test*  
\[ z\text{-score} 1.78 \]  
\[ p\text{-value} 0.038 \]

\(^a\) Refer to Table 1 for description of the independent variable.  
\(^b\) Participants selected one of four options for communicating their assessment of the discount rate to the team leader: (1) document their assessment/issues and wait for the team leader to ask questions during review in a few weeks, (2) wait until the next team meeting (in two weeks) to talk to team leader, (3) contact the team leader via email in the next couple of days, or (4) contact the team leader immediately via phone. Each option is progressively more urgent; further, the first two options reflect a desire to wait to communicate with the team leader, while the latter two reflect a desire to communicate more urgently. For the purposes of testing Hypothesis 2, we also combined options 1 and 2 into a “Less Urgent” category and options 3 and 4 into a “More Urgent” category. This table captures participants’ communication choices for their initial discount rate assessments. All p-values are one-tailed.
TABLE 3
Tests of Hypothesis 3: Distinguishing weak and strong justifications

**Dependent variable:** Insist information does not help confirm appropriateness of discount rate\(^a\)

**Panel A:** Descriptive statistics - Mean (Standard error)  *Number of observations*

<table>
<thead>
<tr>
<th>Psychological ownership</th>
<th>Justification strength</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Weak</td>
<td>Strong</td>
<td></td>
</tr>
<tr>
<td>Lower</td>
<td>4.75 (0.73)</td>
<td>4.65 (0.61)</td>
<td>5.00 (0.45)</td>
</tr>
<tr>
<td></td>
<td>19</td>
<td>27</td>
<td>46</td>
</tr>
<tr>
<td>Higher</td>
<td>6.55 (0.66)</td>
<td>5.17 (0.82)</td>
<td>5.53 (0.50)</td>
</tr>
<tr>
<td></td>
<td>23</td>
<td>15</td>
<td>38</td>
</tr>
<tr>
<td></td>
<td>5.60 (0.47)</td>
<td>4.90 (0.47)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>42</td>
<td>42</td>
<td></td>
</tr>
</tbody>
</table>

**Panel B:** ANOVA

<table>
<thead>
<tr>
<th>Source</th>
<th>df</th>
<th>MS</th>
<th>F</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Psychological ownership (PO)</td>
<td>1</td>
<td>26.89</td>
<td>2.67</td>
<td>0.106</td>
</tr>
<tr>
<td>Justification strength</td>
<td>1</td>
<td>11.11</td>
<td>1.10</td>
<td>0.296</td>
</tr>
<tr>
<td>PO*Justification strength</td>
<td>1</td>
<td>8.21</td>
<td>0.82</td>
<td>0.369</td>
</tr>
<tr>
<td>Error</td>
<td>80</td>
<td>10.06</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Panel C:** Planned contrasts

<table>
<thead>
<tr>
<th>Contrast</th>
<th>F</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>Contrast weights:</em> Higher PO/Weak justification (3), all other conditions (-1)(^d)</td>
<td>4.70</td>
<td>0.017</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Follow-up pairwise comparisons:</th>
<th>t</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Higher PO/Weak justification versus Higher PO/Strong justification(^d)</td>
<td>1.32</td>
<td>0.096</td>
</tr>
<tr>
<td>Lower PO/Weak justification versus Lower PO/Strong justification</td>
<td>0.11</td>
<td>0.913</td>
</tr>
<tr>
<td>Higher PO/Weak justification versus Lower PO/Weak justification(^d)</td>
<td>1.83</td>
<td>0.036</td>
</tr>
<tr>
<td>Higher PO/Weak justification versus Lower PO/Strong justification(^d)</td>
<td>2.12</td>
<td>0.019</td>
</tr>
</tbody>
</table>

\(^a\)Participants indicated how likely they were to insist the information did not help confirm whether the discount rate was appropriate, rated on an 11-point scale from *not at all likely* to *extremely likely*. Two participants did not provide a response to this question, hence \(n = 84\) for this table and related analyses.

\(^b\)Justification strength was manipulated at two levels (weak versus strong) via the email from the team leader provided to participants after completing the first stage of the experiment.

\(^c\)Refer to Table 1 for description of the psychological ownership independent variable.

\(^d\)One-tailed p-value.
### TABLE 4
Stage 2: Descriptive statistics

**Panel A:** Final discount rate assessments\(^a\) – Mean (Standard error) *Number of obs.*

<table>
<thead>
<tr>
<th>Justification strength (^b)</th>
<th>Most appropriate discount rate</th>
<th>Lowest acceptable discount rate</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Weak</td>
<td>Strong</td>
</tr>
<tr>
<td></td>
<td>13.65 (0.21)</td>
<td>13.26 (0.18)</td>
</tr>
<tr>
<td>Psychological ownership (^b)</td>
<td>Lower</td>
<td>12.63 (0.29)</td>
</tr>
<tr>
<td></td>
<td>13.90 (0.19)</td>
<td>13.82 (0.24)</td>
</tr>
<tr>
<td></td>
<td>24</td>
<td>15</td>
</tr>
<tr>
<td></td>
<td>13.76 (0.14)</td>
<td>13.51 (0.15)</td>
</tr>
<tr>
<td></td>
<td>44</td>
<td>42</td>
</tr>
<tr>
<td></td>
<td>Higher</td>
<td>12.80 (0.20)</td>
</tr>
<tr>
<td></td>
<td>12.76 (0.19)</td>
<td>12.51 (0.33)</td>
</tr>
<tr>
<td></td>
<td>39</td>
<td>15</td>
</tr>
</tbody>
</table>

**Panel B: Urgency of communication \(^c\)**

<table>
<thead>
<tr>
<th>Justification strength (^b)</th>
<th>Communication choice</th>
<th>Document Only</th>
<th>Wait to Talk</th>
<th>Email Soon</th>
<th>Talk Now</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lower</td>
<td>Weak</td>
<td>3</td>
<td>2</td>
<td>7</td>
<td>8</td>
<td>20</td>
</tr>
<tr>
<td>Psychological ownership (^b)</td>
<td>Strong</td>
<td>5</td>
<td>2</td>
<td>9</td>
<td>11</td>
<td>27</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>8</td>
<td>4</td>
<td>16</td>
<td>19</td>
<td>47</td>
</tr>
<tr>
<td>Higher</td>
<td>Weak</td>
<td>2</td>
<td>1</td>
<td>8</td>
<td>13</td>
<td>24</td>
</tr>
<tr>
<td></td>
<td>Strong</td>
<td>1</td>
<td>3</td>
<td>6</td>
<td>5</td>
<td>15</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>3</td>
<td>4</td>
<td>14</td>
<td>18</td>
<td>39</td>
</tr>
</tbody>
</table>

\(^a\) Participants provided a final assessment of the most appropriate and lowest discount rates in Stage 2.

\(^b\) Refer to Table 1 (3) for description of the psychological ownership (justification strength) independent variable.

\(^c\) Refer to Table 2 for description of the dependent variable. This panel captures participants’ communication approach for their final discount rate assessments.