Differentiating between Decisions and Decision-Making: The Role of Confidence in Predicting Performance for Complex Strategic Decisions

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Abstract

This paper presents a study that investigates the role of confidence in predicting performance in a business strategy game (The Business Strategy Game, Thompson et al., 2022), specifically when making complex decisions as part of a team. The study distinguishes between an individual's confidence in their decision-making process and their confidence in specific decisions. Because complex business decisions are typically team-based, it also examines an individual's confidence in the team's decision-making process and actual decisions. Decision performance
was measured two ways: financial performance (earnings-per-share) and non-financial performance (company image rating). Results show that an individual’s confidence in their specific decisions positively predicts financial performance, whereas their confidence in the team’s specific decisions positively predicts both financial and non-financial performance. Decision-makers consistently lost confidence in both their team’s decisions and decision process after receiving performance feedback but regained that confidence before the next decision. However, this pattern was less evident for an individual’s confidence in their own decisions or process. Over time, individuals gained confidence in their own decisions, the team’s decisions, and the team’s decision process, but this gain was not evident for confidence in the decision process.

**Keywords:** Decision making; confidence; overconfidence, metacognition, strategy, performance, complexity, ambiguity.

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**Introduction**

Confidence is considered a key factor in decision making but there are conflicting descriptions of how it relates to success, despite years of research across multiple fields (Gigerenzer, Hoffrage & Kleinbölting, 1991). One body of research focuses on how confidence is associated with accuracy in highly structured, perceptual discrimination tasks (reviewed by Heeger, 2007). Another, broader set of studies acknowledges that confidence is related to success in various tasks (Hattie & Timperley, 2007; Hayward et al., 2010; Kluger & DiNisi, 1996). However, one important issue that is often overlooked in those studies is the pervasive tendency for decision makers to exhibit overconfidence (Kahneman & Tversky, 1982; Lichtenstein, Fischhoff & Phillips, 1977; Moore & Healy, 2008).

Most confidence studies, regardless of their perspective, are conducted in laboratories and measure confidence in a one-dimensional way, either
as a numerical value or indirectly through a quantitative trace. However, decision-making and associated cognitions, such as confidence, are more complex in practice and as understood by neuroscientists (Boldt et al., 2019; Boldt, Gardelle & Yeung, 2017). For instance, confidence in a particular decision and the decision-making process may be distinct cognitions due to differences in available information or the probability of achieving successful outcomes (Koriat & Adiv, 2016; McLain & Wu, 2022; Oney & Oksuzoglu-Guven, 2015).

Several neuroscientific studies have shown that the processing of information before and after making a decision happens in separate systems (Murphy et al., 2015). Other studies in the neurosciences have linked confidence with a two-phase decision process, where the first decision affects confidence in subsequent ones (Insabato et al., 2010). These studies suggest that decision confidence is multifaceted and that these facets are temporally distinct yet related, with confidence in the decision-making process being separate from confidence in specific decisions. Furthermore, confidence can change over multiple decisions due to the receipt of outcome information (e.g., Kvidera & Koutstaal, 2008). Strategic decisions are even more complex since they are often made in a social context, and research has shown that individuals tend to alter their perceptions and responsibility for decisions when working as part of a team (Isenberg, 1986; Stoner, 1961).

This paper presents an investigation of the relationships between a decision-maker’s confidence and their ability to make effective, team-based decisions in a business strategy simulation. The study focuses on the impact of two types of confidence, namely, confidence in one’s own decision-making process and decisions, and confidence in the team’s decision-making process and decisions, on the success (i.e., performance) of those decisions. The business strategy simulation utilized in this research is the Business Strategy Game (BSG), as described by Thompson et al. (2022).
Decision Confidence
Decision confidence is a metacognition defined by McLain and Wu (2022) as a two-faceted cognitive construct describing the subjective evaluation of the accuracy of one’s beliefs about his or her decision-making ability (process confidence) and the content of his or her specific decision. Confidence is defined somewhat differently by students in engineering-derived studies in which confidence is a subjective identification of a specific target in a noisy field (summarized by Heeger, 2007, in describing the basics of Signal Detection Theory). It should be noted here that decision confidence is more specific than self-confidence, which is commonly used to describe an individual’s subjective belief in his or her general qualities. This point is made by Oney and Oksuzoglu-Guven (2015) who argue that self-confidence is too coarse a construct and that its effects are better understood if it is distinguished into general and situation-specific self-confidence. For this study, confidence is specific to decision making as a member of a strategic decision team and not confidence in one’s general abilities or self. However, parallel to Oney and Oksuzoglu-Guven’s proposed construction of the parallel concepts of generalized self-confidence and situation-specific self-confidence, in this study confidence in the general, and relatively stable, method of approaching and making decisions is distinguished from the relatively more variable confidence in the content and quality of specific decisions. This two-factor definition is applied to the operational definitions in this study.

Confidence and Decision Performance
To investigate the impact of confidence on performance in complex and uncertain team-based strategy decisions, I divided confidence into two cognitive aspects. The first aspect is confidence in the decision-making process. Business strategy decisions require multiple sub-decisions involving the allocation of limited resources to optimize financial and non-financial outcomes, while accommodating market uncertainty and uncertain competitor choices. While a decision-maker may have confidence in their process for making those choices, uncertainties may
weaken their confidence in the success of any specific decision. Therefore, the second aspect reflects confidence in the prospects of a specific decision. Specific decisions vary in terms of the magnitude and ranking of choices within the overall strategy, are influenced by current resources and conditions, and are affected by the past behavior of competitors. It is common to believe in one's ability to make a certain class of decisions but feel unsure about a specific decision due to unique factors.

In team-based decisions, such as those associated with competitive strategy, an additional aspect of confidence partitioning is necessary. In team-based decision-making, compromises and the inability to make choices about all aspects of strategy mean that confidence in the decision will be divided between confidence in one's own contributions and confidence in the choices made or controlled by other team members. As confidence is a subjective belief in the likelihood of success, an individual's confidence should be positively related to decision outcomes when the individual contributes to the decision and believes that decision outcomes are affected by their inputs. Competitive strategy decisions in a simulated context, where decision inputs affect outcomes, are such situations. Despite this, confidence, as an individual's meta-cognition, should be partitioned into confidence in one's own inputs and confidence in the other team member's inputs. This partition accounts for the variance in the inputs and the team-based composition of the decision.

A team-based decision benefits from the diverse information inputs and process scrutiny of team members. When team members have varied and relevant knowledge and experience, sharing their different ideas can improve each individual's contribution. Each team member is also cautious when contributing to the team's decision due to the public exposure of their ideas. Therefore, a well-controlled team decision process has the potential to generate better decisions than an individual, and the individual is likely to have greater confidence in the decisions of a knowledgeable, experienced decision team.
The individual’s confidence in the team’s process is likely to be high when the team consists of experienced and trained decision-makers, qualities that contribute to decision quality. This should result in a positive relationship between confidence and the team's performance. However, a counter-argument exists in a competitive situation where there is uncertainty about other teams’ strategic choices. This uncertainty may weaken confidence in both the team process and specific decisions, although confidence should still be a positive predictor of decision performance and be more predictive of performance than the individual’s confidence in their own contributions to the decision due to the benefits of multiple inputs from other team members.

This leads us to the following four hypotheses regarding the ability of confidence to predict decision performance.

- Hypothesis 1. An individual’s pre-decision confidence in his or her contributions to a team-based decision will positively predict decision performance.
- Hypothesis 2. An individual’s pre-decision confidence in his or her decision process will positively predict decision performance.
- Hypothesis 3. An individual’s pre-decision confidence in the team’s decision will positively predict decision performance.
- Hypothesis 4. An individual’s pre-decision confidence in the team’s decision process will positively predict decision performance (hypothesis 4a) and this relationship will be stronger than that for confidence in the team’s specific decision (hypothesis 4b).

Confidence and the Receipt of Performance Information (feedback)

The activities of pre- and post-decisional cognitions both involve processing information. In strategic decision-making, feedback about the performance of decisions is a common source of information. There is extensive literature on feedback and its effect on confidence in business decisions, with many studies showing a positive correlation between feedback and confidence. However, Kluger and DeNisi’s (1996) broad
review of feedback studies found that many did not support this positive correlation. After careful examination they concluded that feedback can increase confidence in decision-making, but only if it is relevant to the task at hand. Relevant feedback can help individuals learn from mistakes, improve performance, and feel more in control, leading to greater motivation and better decision-making.

However, the literature on overconfidence bias identifies an area of decision-making in which there must be caution when using confidence to predict decision outcomes (Kahneman & Tversky, 1982). In complex, ambiguous decisions, pre-decision confidence is widely associated with a bias toward overconfidence. While confidence may positively predict performance in that greater confidence may lead to more positive decision outcomes, this confidence tends to be excessive. Whether this bias also distorts the accuracy of expected decision outcomes is unclear.

Evidence of overconfidence may appear as a drop in confidence once information about decision outcomes, that is, performance feedback, is received (Kahneman & Tversky, 1982). Accordingly, studies of the effects of feedback information on confidence find that the receipt of feedback can lower decision confidence. This effect is not certain, however. Confidence may be lowered but only if the decision-maker accepts external information that suggests overconfidence was unwarranted. This requires, at a minimum, that the task be unambiguous and that feedback information be clear and accurate. Rejection of such information may occur if the information can be discounted without consequence or if there are undesirable consequences for accepting the information, such as embarrassment or loss of respect.

Previous studies are silent about whether this effect is the same for confidence in the decision and confidence in the way the decision was made. It is likely that the decision maker’s confidence in how decisions are made, a method developed over many decisions and grounded in strategy expertise, is more resistant to reduction than confidence in that specific decision once feedback is received. This is especially likely for team-based
decisions in which responsibility for a decision outcome can be spread around team members while the individual preserves his or her confidence in how he or she makes decisions. This effect is predicted by a number of studies of team decisions for which consequences were mitigated or “spread around”, reducing the individual’s sense of responsibility for a failure (Stoner, 1961; Kogan & Wallach, 1964; Reynolds, Joseph & Sherwood, 2009).

After a decision cognitive effort is applied to determining whether to accept or reject evaluative information about the success of the decision, and to preserving one’s confidence in his decision or decision-making ability (Merkel & Weber, 2011). Social representations of the decision seek to minimize reputational harm (Weick, 1995). Therefore, and in contrast with the information-gathering and identification of optimal choices during the pre-choice process, the post-decision process has even been described as the real confidence-building process and that confidence is therefore a post-decisional construct (Insabato et al. 2010; Murphy, et al., 2015; Petrusic & Baranski, 2003).

- Hypothesis 5. A decision-maker’s pre-decision confidence in a specific decision will decline once clear and accurate performance information is received.
- Hypothesis 6. A decision-maker’s pre-decisional confidence in the team’s specific decision will decline once clear and accurate performance information is received and this decline will exceed the decline for the individual’s confidence in his or her team’s decision process.

**Method**

Sixty-one students, grouped into 17 teams of 2-5 members each, experienced in business studies and specifically educated in business strategy, participated in a business strategy simulation at a university in the northeastern United States. These students had studied the mechanics of the complex simulation prior to data collection, which was sampled from the
normal stream of multi-round simulation decisions, after some practice rounds were completed so that system learning would not confound the effects of confidence on performance.

The simulation used was the BSG (Thompson et al., 2022). In the simulation, the decision teams each represent a simulated “company” that makes multiple, specific operational, financial, management, human resources, and marketing decisions for each of several, repeated decision rounds. Each set of decisions represents one simulated “year” of strategic competition. The decision set of each team is pitted against the set of each other team in a batch-processed competition. The combination of financial and non-financial performance metrics resulting from each team’s decisions are then presented to the decision-makers. The metrics describe a wide variety of absolute and relative performance parameters roughly similar to the types of metrics reported in a publicly-traded company’s annual report but also including some quantified representations of less tangible outcomes such as product quality and the company’s public image.

Measures

Confidence. Confidence was measured before and after a decision round with 15 items measuring the individual decision-maker’s confidence in the way he or she makes decisions (process confidence-individual; 3 items) and in the content of the specific round’s set of decisions (content confidence-individual; 4 items). The items also measure the decision maker’s confidence in the way the team made the decisions (process confidence-team; 3 items) and the content of the team’s decisions (content confidence-team; 5 items). The confidence measures are multi-item, Likert-type with 9 response categories ranging from 1) very strongly disagree to 9) very strongly agree and based on development and analysis of confidence measures described in McLain and Wu (2022). Pilot testing of these measures with a 38-student data sample indicated acceptable levels of reliability ranging from .91 to .94 (coefficient alpha) for each measure, but a careful review of the data suggested some wording changes to
improve item clarity and representation of each corresponding construct. The resulting, revised set of 15 items was used to collect the confidence data in this study. Coefficient alphas for the refined measures were .91 for the individual’s confidence in the way he or she made decisions, .96 for the individual’s confidence in the way his or her team made decisions, .93, for the individual’s confidence in the content of his or her decisions, and .96 for the individual’s confidence in his or her team’s decisions. The items associated with each measure are presented in the Appendix.

Performance. Financial and non-financial performance was measured by extracting two performance metrics from the multi-parameter, simulation outcome reports for each of five decision rounds. The two extracted metrics were the team’s earnings-per-share (a financial metric) and image rating (a non-financial metric and quantitative representation of the company’s reputation). Values for both earnings-per-share and image rating are relatively interval.

Results

Analyses were performed at the level of the individual. Ability differences between teams are encapsulated in the team-level performance metrics. There was less than five percent variation in response numbers by decision round and response omissions, which were rare, were imputed with item means. Before-after confidence comparisons and graphs were based on sample means. Analyses of the measures data were performed using R version 4.1.2 and associated analytical packages including Psych/PsychTools and Lavaan. Analyses of the relationships between confidence and performance, including linear multiple regression tests, were performed using SPSS version 28.

Age and gender were included as covariates. Studies conducted by Hanssen et al. (2008) and others have observed age-related differences in decision confidence. Also, Graham et al. (2002) have noted that many
studies consistently show gender-related differences in confidence when it comes to investment decisions.

Correlations between the four pre-decision forms of confidence and the two performance metrics were all positive (see Table 1). Neither age nor gender was strongly correlated with the forms of confidence with the exceptions that older decision-makers had a little more confidence in the team’s decision process and a little less confidence in the team’s specific decisions.

Examining the relationship between pre-decision confidence and decision performance, the individual decision-maker’s confidence in decision content, both the self and team, were significant positive predictors of earnings-per-share. Confidence in the team’s decision content also predicted the company’s image rating, although confidence in one’s own decision did not. See Table 2 for details. These findings partially support hypothesis 1 and fully support hypothesis 3 regarding decision content but fail to support hypotheses 2 and 4 regarding decision process although there is marginal (p < .10) support for hypothesis 4a regarding the influence of confidence in the team’s decision process on image rating. This finding is not stronger, however, than the influence of confidence in the team’s specific decisions, contrary to hypothesis 4b.

A notable finding, observable in Figures 2a and 2b, are the repeated declines in confidence pre- to post-decision. These declines represent losses of confidence between making decisions and receiving performance feedback. The data reveal declines in the individual’s average content confidence (t = .278, p = .390) and process confidence (t = .403, p = .344); and confidence in his or her team’s decision content (t = 1.662, p = .049) and process (t = 1.804, p = .036), although the declines were significant only for the individual’s confidence in the team’s process and content. The data, measured over five decisions and evidencing pre- to post-decision declines in the decision-maker’s content confidence, nonetheless provide insufficient support for hypothesis 5 because the declines were not significant. This suggests the declines are modest if not ephemeral.
The data support hypothesis 6 regarding confidence in the team’s decision content; however, the declines were not significantly greater than those in the team’s decision process. Note that, after receiving performance feedback, declines in the decision-maker’s confidence in both the team’s decision content and process were significant.

There is, in this study, no way to measure the true level of an individual’s decision confidence, making it impossible to state in absolute terms that pre-decision confidence is “excessive”; however others’ findings and theoretical arguments regarding overconfidence suggest that, prior to experiencing external performance information, overconfidence is pervasive. This overconfidence can be reduced if credible, specific, and timely performance information is received and accepted (e.g., Kahneman & Tversky, 1982). The findings of this study augment those claims by suggesting that, if overconfidence is present, it quickly returns even if the type of decision is repeated and even though confidence dropped after receiving performance information following the previous decisions. In other words, any suppression or correction of an overconfidence bias is short-lived.

When examining confidence in the content of specific decisions, the individual’s confidence in his or her decisions was often greater than confidence in the team’s decisions (Figure 2a). A different pattern prevailed when examining confidence in the process used to make decisions. In that, the individual’s confidence tended to be less than the individual’s confidence in the decision process of his or her team. Although not true for every decision period, this pattern persisted over most of the five decisions (Figure 2b). When one participant was asked about this finding, he stated without doubt that this was because of the greater inputs from the multiple team members.

Three of the four types of confidence trended upward over the five decisions. The exception was the individual’s confidence in his or her decision process which remained roughly the same despite deviations from decision to decision (Figure 2b). This suggests the individual’s
attitude toward how his or her decisions are made remains roughly the same over time and multiple decisions while confidence of other types increases.

**Discussion**

This study sheds light on the difference between an individual’s overall confidence in their decision-making abilities and the confidence they have in a particular decision. Although these two types of confidence are related, they impact decision-making performance in different ways. The study draws these conclusions within the framework of a simulated, team-based, strategic competition.

Confidence in the team’s decisions was strongly related to both financial and non-financial performance. In addition, the findings specifically suggest that decision-makers are more confident in their own decisions than in their team’s decisions but are more confident in their team’s decision process than in their own process.

The present study has found that a decline in confidence among decision-makers following the receipt of performance feedback was a frequent occurrence. This result supports the notion that decision-makers not only recognize the significance of performance feedback, but also adjust their confidence levels accordingly. The findings of this study align with the existing literature on pervasive decision overconfidence (Kahneman & Tversky, 1982). In particular, decision-makers indicated that their pre-decision confidence levels were excessive and subsequently decreased their confidence in response to feedback.

The results of this study are consistent with existing literature that underscores the role of confidence as an information-based signal of the perceived accuracy of a choice (summarized by Heeger, 2007). All correlations between confidence and performance were positive, and all significant effects of confidence on performance in the regression
analyses were also positive, although some negative influences were found that did not reach statistical significance.

Based on these results, one conclusion that can be drawn is that pre-decision confidence levels may be inflated, yet they are still moderately predictive of decision performance. This effect was particularly strong for a decision-maker’s confidence in their team’s decisions, where higher levels of confidence corresponded with better performance and lesser confidence in the team’s decisions predicted lesser performance. Interestingly, this relationship was weaker for an individual’s confidence in their own contributions to the decisions. Among other factors, the complexity of the decisions in this study, and the team-based nature of the decisions, may complicate and obscure the relationship between confidence and performance.

**Limitations of This Study**
A small sample of student subjects, limited in range of age and decision-making experience limits the generalizability of interpretation of the findings. A broader diversity of samples and methods of measuring the study variables should improve confidence in the applicability and stability of the findings. The scope of this study is restricted to simulated strategic business decisions. Even the broader domain of strategic decisions is not representative of all types of complex decisions and there are many more decision outcomes of interest than the two outcomes studied here. In addition, variations in team size, composition, and abilities, are influences not examined in this study but we acknowledge that those influences may be relevant to decision-making and confidence research and should be considered in future studies.

**Suggestions for Research and Theory**
Support for popular theory of decision confidence is weakened when we consider that such theory rests on research conducted with tasks that lack ecological validity. Theory development may be advantaged if research generates more insights regarding confidence when making complex,
uncertain decisions. Evidence from the neurosciences and research into learning provide information from which theory might be advanced beyond the engineering-derived theory that currently represents the best-developed and studied theory of decision confidence. Because a preponderance of past studies have almost exclusively incorporated simple, correct-choice decisions, future confidence studies incorporating complex, ambiguous decisions are strongly encouraged.

**Practical Implications**

Much has been written about overconfidence when making decisions of all kinds. The practical advice offered by the findings of this study includes increasing the awareness of overconfidence and seeking critiques and feedback from others that focus on amplifying potential risks and flaws in decisions. Advice regarding how to make decisions may also prove valuable but must be considered carefully due to the natural tendency of decision-makers to reject disconfirming information, especially if that information is about the decision-maker’s way of making decisions and not just about the content of a specific decision. As the findings of this study suggest, decision-makers’ confidence in their process was relatively unchanging. Decision-makers should therefore be trained to not only reflect on such process criticism but actually seek it, and feedback providers should also be trained in delivering critiques and advice in a manner that is readily understood and acceptable. The added time and effort required to accomplish these tasks is rewarded with more accurate expectations for decisions and improved ways of making decisions.

**References**


**Web Appendix**

A web appendix for this paper is available at https://dx.doi.org/10.15239/j.brcacadjb.2023.13.01.wa04