Rational versus intuitive gatekeeping: Escalation of commitment in the front end of NPD

Citation for published version (APA):

DOI:
10.1111/jpim.12452

Document status and date:
Published: 01/11/2018

Document Version:
Publisher's PDF, also known as Version of Record (includes final page, issue and volume numbers)

Please check the document version of this publication:
• A submitted manuscript is the version of the article upon submission and before peer-review. There can be important differences between the submitted version and the official published version of record. People interested in the research are advised to contact the author for the final version of the publication, or visit the DOI to the publisher's website.
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Rational Versus Intuitive Gatekeeping: Escalation of Commitment in the Front End of NPD
Ramon Eliëns, Katrin Eling, Sarah Gelper, and Fred Langerak

The unwillingness of a gatekeeper to let go of a fruitless new product development (NPD) project wastes valuable resources and hampers NPD performance. The onset of such escalation of commitment is likely to occur already in the front end of NPD, where high ambiguity and complexity make it hard to distinguish fruitless from potentially successful projects. This study investigates if a gatekeeper’s thinking style—whether they think rationally or whether they follow their intuition—can prevent escalation of commitment in the front end. Theory on cognition provides arguments for and against either thinking style’s influence on escalation of commitment, but empirical evidence on this matter is lacking. Our study demonstrates that gatekeepers who think rationally are less likely to escalate their commitment than those who follow their intuition. This result holds both in a correlational study of dispositional thinking styles, as well as in an individual-level randomized experiment in which the thinking style of experienced practitioners before they take gate decisions is induced. Our findings provide ample opportunities for improving existing front end gate review practices, such as allocating candidates for gatekeeper positions based on their thinking style, training gatekeepers to think rationally, and increasing the use of gate-decision rules and templates.

Practitioner Points
- Already in the front end of NPD, gatekeepers are vulnerable to escalation of commitment to an NPD project.
- A gatekeeper’s rational thinking style improves decision making at the last front end gate, as it reduces escalation of commitment.
- Careful selection and guidance of gatekeepers can enhance the use of a more rational thinking style when making decisions at the last front end gate.

Introduction
Continuing fruitless new product development (NPD) projects negatively affects a firm’s NPD performance as it wastes valuable time and resources that could otherwise be allocated to other, potentially more promising development projects. Therefore, it is of key concern that failing NPD projects are recognized and stopped as early in the NPD process as possible. Nevertheless, stopping unpromising NPD projects has been shown to be difficult (Sarangee, Woolley, Schmidt, and Long, 2014; Schmidt and Calantone, 2002). Even when there are clear indications early on that a project needs to be aborted, it is frequently carried on nonetheless (Schmidt and Calantone, 2002). This phenomenon is known as escalation of commitment.

Escalation of commitment can arise at the decision gates of the NPD process. At each decision gate, the managers who review the NPD project—called the “gatekeepers” (Cooper, 1994, 2008)—need to make a definite decision whether to continue or to stop the investment in a project. As soon as the decision has been made to advance a new product idea and to commit resources to its advancement, gatekeepers are likely to escalate their commitment to the project at any later gate (Brockner, 1992; Schmidt and Calantone, 2002; Staw, 1981). Previous research has identified factors and mechanisms, such as organizational culture; gate decision process characteristics; project team training; and the use of specific project testing, analysis, and assessment methods (Behrens and Ernst, 2014; Sarangee et al., 2014; Sleesman, Conlon, McNamara, and Miles, 2012) to combat such erroneous decision making at NPD gates. Our study extends this research...
RATIONAL VERSUS INTUITIVE GATEKEEPING

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by focusing on the thinking style that individual gatekeepers use in making NPD gate decisions.

Findings from NPD and other research domains suggest that the thinking style of a gatekeeper, i.e., the way the information about an NPD project is processed, can affect the occurrence of escalation of commitment in the front end of NPD (Dijksterhuis and Nordgren, 2006; Eling, Langerak, and Griffin, 2015; Wong, Kwong, and Ng, 2008). No research to date has contrasted the usefulness of different thinking styles in preventing escalation of commitment. On the one hand, the NPD literature shows that firms typically use structured and formal NPD processes (e.g., Barczak, Griffin, and Kahn, 2009; Calantone, Di Benedetto, and Schmidt, 1999; Cooper, 1994; Naveh, 2007) to evoke a rational thinking style based on argumentation and reasoning. Rationality is likely to prevent erroneous decision making because it is not that easily influenced by emotions and can follow strict decision rules that relate to NPD performance indicators and objectives (Dane and Pratt, 2007; Evans, 2008). On the other hand, findings from the psychology literature suggest that even when applying formal gate-decision rules and urging the gatekeeper to think rationally, rationality can still lead to incorrect decision making (Wong et al., 2008). The reason is that rationality may be incapable of dealing with decision problems that are as complex and uncertain as front end gate decisions (Dijksterhuis and Nordgren, 2006; Kahneman and Klein, 2009). A large amount of conflicting, uncertain, and frequently changing information has to be taken into account and weighted simultaneously by gatekeepers at the front end gates (Kim and Wilemon, 2002; Zahay, Griffin, and Fredericks, 2004). Rational thinking could incorrectly handle such complexity and uncertainty, using closed minded reasoning and by drawing the attention away from new conflicting information (Dijksterhuis and Nordgren, 2006).

More recent research has therefore emphasized the importance of using intuition in managerial decision making in general (e.g., Dane and Pratt, 2007; Gore and Sadler-Smith, 2011) and in the front end of NPD in particular (e.g., Eling et al., 2015; Eling, Griffin, and Langerak, 2014). Also, in practice, companies have started using less formal NPD decision processes (Markham and Lee, 2013) to better deal with the uncertainty surrounding NPD projects. Unlike rationality, intuition has been argued to enable complex decision making by creating a holistic combination of large amounts of information through unconscious processing, and by adapting more easily to new
incoming information (Dijksterhuis and Nordgren, 2006; Sadler-Smith and Shefy, 2004). Intuition may thus be better suited to prevent escalation of commitment early on in NPD. Contrarily, however, intuition has also been shown to be more affected by emotions (Wong, Yik, and Kwong, 2006) and more likely to lead to biased judgments (Kahneman, 2003), and could thus also increase escalation of commitment in NPD gate decision making.

To conclude, the findings from different research domains lead to contradicting arguments about the role of rationality versus the role of intuition in preventing escalation of commitment. Unfortunately, research that contrasts the effects of using either rationality or intuition in NPD gatekeeping to prevent escalation of commitment is lacking. Such research is important though because the way information about the NPD project is processed by gatekeepers has been shown to impact the quality of evaluative decision making in especially the front end of NPD (Eling and Herstatt, 2017; Eling et al., 2015). The objective of this study is therefore to rectify the equivocality of findings from different research domains by uncovering which individual gatekeeper’s thinking style—rationality or intuition—best prevents escalation of commitment in the front end of NPD.

To achieve this goal, our study builds on the research streams of escalation of commitment, thinking styles, and the front end of NPD. By combining insights from these three research streams, a unique two-step gate decision study is built. The study was conducted with 184 experienced NPD practitioners and used two complementary approaches: (i) a correlational approach based on the gatekeepers’ disposition toward a more rational or a more intuitive style of thinking and (ii) an experimental approach in which thinking styles by randomly assigning participants to either a rational or an intuitive condition are manipulated.

Our study contributes in a number of ways to the existing research streams on escalation of commitment, thinking styles, and the front end of NPD. By doing so, this article responds to calls in the NPD literature for finding ways to minimize human error in front end decision making (Eling and Herstatt, 2017) and for research on the use of intuition in NPD in general and the front end in particular (Eling et al., 2014). Moreover, by focusing on gate decision making in the front end, before substantial investments in the NPD project have actually been made, a corroboration of the findings of a meta-study that questions the existence of the so-called “sunk costs” effect as primary determinant of escalation of commitment (Sleesman et al., 2012) is given.

The remainder of this article is organized as follows. The next section provides the context and theoretical underpinning of our research, elaborating on why either thinking style—rational or intuitive—might reduce escalation of commitment. Thereafter, an explanation of our methodology is presented, including a stepwise explanation of our experimental design, an outline of our measurements, and a description of our selection of the practitioner sample. The results section provides support for rationality and against intuition as preferred thinking style to prevent escalation of commitment. Finally, the theoretical and practical implications as well as the limitations and suggestions for further research are discussed.

**Theoretical Background**

The majority of best practice firms use a Stage-Gate® type of development process (Barczak et al., 2009), which implies a stepwise commitment of resources to the NPD project. At a predefined number of review points or “gates” a committee of selected gatekeepers with different functional backgrounds carefully evaluates the NPD project and decides whether additional resources will be allocated to the project or whether the NPD project will be stopped. Gatekeepers are typically experienced managers with authority over the organization’s resources (Cooper, 1994, 2008). Thus gatekeepers finance and oversee an NPD project, but are not involved in decisions about the project’s execution, which are taken by the project leader and the project team members.

**Onset of Escalation of Commitment**

Escalation of commitment can have many different determinants (Sleesman et al., 2012; Sleesman, Lennard, McNamara, and Conlon, 2018). In NPD gatekeepers, escalation behavior can best be explained by the theories of (1) belief inertia distortion (Biyalogorsky,
Escalation of Commitment in the Front End

The earliest phase of the NPD process is often called the front end of NPD. The front end captures the idea and concept generation stages and decision gates before the actual development process starts (Kim and Wilemon, 2002; Reid and De Brentani, 2004). Although every company organizes the front end differently, two go/stop decision gates can generally be distinguished (Cooper, 2008), the idea gate and the concept gate. At the idea gate a decision is made whether to allocate resources to the advancement of a new product idea (Eling, Griffin, and Langerak, 2016). At the concept gate a decision is made whether to actually develop the defined new product concept and to commit significant resources for its development (Kim and Wilemon, 2002), which marks the final gate of the front end and the beginning of the actual product development.

The onset of gatekeeper escalation of commitment is expected to occur at the concept gate of the front end. As explained by Staw (1981), the occurrence of escalation of commitment is preceded by at least one initial positive decision, in which the belief that the right path has been taken is created (see also, Biyalogorsky et al., 2006). If the NPD project reaches the concept gate, at least one previous “go” decision has been taken (e.g., at the idea gate). This sets the stage for escalation of commitment to occur. Additionally, one of the main initiators of escalation of commitment is project uncertainty (Brockner, 1992; Sleesman et al., 2012). Uncertainty about a new project is highest in the front end compared to the subsequent stages in the NPD process (Kim and Wilemon, 2002; Van den Ende, Frederiksen, and Prencipe, 2015). Gatekeepers are highly unsure whether the early investments at the idea and concept gates will eventually pay off with a successful new product, and are thus even more likely than in later stages to ignore conflicting, but uncertain negative information.

For this and for the following two reasons, the current study focuses on the prevention of escalation of commitment in the front end, i.e., at the concept gate. First, it is easier to eliminate escalation of commitment in the front end than in later NPD stages. Escalation of commitment is a reinforcing process as positive beliefs and the strength of self-justification increase the further the project moves toward completion (Sleesman et al., 2012). Consequently, it becomes more and more difficult to cancel a project with each enforcing decision.

Second, failing NPD projects need to be stopped as early as possible, preferably already in the front...
end, because continuing a failing project in the development stage or beyond becomes very costly. The concept gate, which marks the transition of a project from the front end to the development phase, is regarded as one of the most crucial gates during NPD. This gate signifies the last opportunity of reflection upon the new project before actual development ensues, and investment of resources is exponentially ramped up (Cooper, Edgett, and Kleinschmidt, 2004; Khurana and Rosenthal, 1997). If not inhibited early, escalation of commitment to an NPD project in the front end can continue through the development stages until after new product launch, building up misguided resource investment with each subsequent stage of development (Kim and Wilemon, 2002).

A Gatekeeper’s Thinking Style and Escalation of Commitment

At each gate, gatekeepers need to make a definite decision whether to stop or continue the NPD project. This decision results from the gatekeeper’s thought process. During this process, gatekeepers can use a more rational thinking style or their intuition. Since escalation of commitment is a form of erroneous decision making, a gatekeeper’s thinking style stands at the base of its occurrence.

Rationality and intuition make up the core of dual processing theory, which explains cognition to consist of these two distinct components that shape decision making (Kahneman, 2003). Rationality entails slow, conscious, and analytical processing of specific information (Evans, 2008; Tversky and Kahneman, 1974). As absolute rationality is hampered by the boundaries of human information processing and is impossible to reach by an individual, the terms “rational thinking” or “rationality” indicate a form of rationality by which a gatekeeper formulates arguments and reasons to support their gate decisions (Gigerenzer and Goldstein, 1996; Simon, 1955).

Intuition, in contrast, can be interpreted as a “gut feeling” or attitude whereby the gatekeeper is unable to verbalize the underlying reasoning (Dijksterhuis and Nordgren, 2006; Shapiro and Spence, 1997), as the thought process leading up to the intuition is unconscious (Sadler-Smith and Shefy, 2004; Shapiro and Spence, 1997). Thus, intuition is a signal from the unconscious to the conscious mind that provides the gatekeeper with an unsubstantiated attitude toward continuing or stopping the NPD project (Dijksterhuis and Nordgren, 2006; Eling et al., 2014).

Although rationality and intuition are not opposites, the main focus lies with the fundamental difference between either thinking style’s effect on the occurrence of escalation of commitment in the front end of NPD, because prior literature provides multiple angles on how either rationality or intuition affect escalation of commitment of a gatekeeper. This difference can only be investigated by contrasting the individual effects of each style. When hypothesizing which thinking style better prevents escalation of commitment, arguments can be made for and against both rationality and intuition. To accurately compare and contrast both thinking styles, competing hypotheses that are detailed below are proposed and tested. Structuring our expectations into two opposing hypotheses enables us to systematically contrast and evaluate the existing equivocal theoretical and empirical evidence for and against using each thinking style (Armstrong, Brodie, and Parsons, 2001).

The Rational Gatekeeper versus the Intuitive Gatekeeper

Previous research shows that many biases are prevalent in intuitive thinking, e.g., loss aversion, endowment effect, and status quo bias, which can be overcome by rational thinking (Evans, 2008; Kahneman, 2003; Kahneman, Knetsch, and Thaler, 1991; Nickerson, 1998; Schwarz et al., 1991). Rational thinking is less sensitive to such biases and regarded as more objective, and is therefore often proposed as the preferred thinking style (Kahneman, 2003). In NPD, formalized and explicit decision processes are often favored because they promote objectivity and traceability of the decision process (Barczak et al., 2009).

Gatekeepers applying a rational thinking style, consciously and carefully weigh each piece of information and explicitly reason about their gate decisions (Evans, 2008; Kahneman and Klein, 2009). They know which arguments their decisions are based on and are, therefore, better able to build an objective argumentation. Thus when being rational, gatekeepers are aware of their decision process and can control it (Epstein, Pacini, Denes-Raj, and Heier, 1996; Evans, 2008). This is a clear advantage over intuitive thought, which is an unconscious process that is more difficult to control and explain (Eling et al.,
In an ambiguous context such as the front end of NPD, rational thinking could therefore make it easier to identify and reject fruitless NPD projects, preventing escalation of commitment.

Gatekeepers who think rationally always follow certain argumentation and decision rules (Evans, 2008; Kahneman, 2003). The NPD process, including the front end, is often pervaded by decision rules that relate to performance indicators and targets that a rational gatekeeper strives to stay in line with (Hart, Hultink, Tzokas, and Commandeur, 2003). A rational gatekeeper can follow these rules without deviation, reducing error in the gate-decision process. Intuition, in contrast, cannot be properly guided by these decision rules because of its unconscious nature (Dijksterhuis and Nordgren, 2006). An intuitive gatekeeper would thus have difficulty justifying their judgment as it is seemingly unguided and could lead to escalation of commitment without realizing it.

When decision makers adopt a rational thinking style, they are also less likely to be influenced by their emotions (Dane and Pratt, 2007; Epstein et al., 1996). Research has shown that emotions significantly impact our thought process (Loewenstein and Lerner, 2003) and several emotions have been identified as antecedents of escalation of commitment (Harvey and Victoravich, 2009; Sleesman et al., 2012; Wong et al., 2006). In particular, basic emotions such as anger and anxiety (Tsai and Young, 2010), but also higher level emotions such as regret (Ku, 2008; Wong and Kwong, 2007) and optimistic overconfidence (Astebro, Jeffrey, and Adomdza, 2007; Markovitch, Steckel, Michaut, Philip, and Tracy, 2015), increase the decision maker’s tendency to escalate their commitment. Since a rational gatekeeper is better able to separate emotion from judgment compared to an intuitive gatekeeper, it can thus be argued that gatekeepers adopting a rational thinking style are less likely to escalate their commitment in the front end of NPD. Together these arguments suggest that:

**H1: Gatekeepers who adopt a rational thinking style when making gate decisions in the front end of NPD show less escalation of commitment than those who adopt an intuitive thinking style.**

However, the literature also provides evidence that the unconscious mind is superior at solving complex decision tasks (Dane and Pratt, 2007; Dijksterhuis and Nordgren, 2006; Sadler-Smith and Shefy, 2004) similar to the ones encountered by gatekeepers in the front end. There are several reasons for this.

First, proponents of intuitive thinking argue that intuition is a more reliable decision style in situations of uncertainty, such as the front end of NPD, because intuition is better capable of adapting to new information (Dijksterhuis and Nordgren, 2006; Evans, 2008). Intuition enables the gatekeeper to be open to new incoming information that signals project failure, which may prevent escalation of commitment. Contrarily, rationality is said to strengthen the gatekeeper’s conscious beliefs about their decisions, which increases the tendency to search for supportive explanations (Wong et al., 2008). This type of explicit reasoning can lead to confirmation bias, causing the gatekeeper to primarily consider information in further decision making which is in alignment with initial beliefs (Nickerson, 1998). This causes the gatekeeper to commit strongly to projects that were positively evaluated earlier on in the NPD process. Indeed, Wong et al. (2008) found that a predisposition toward rationality leads to increased escalation of commitment.

Second, intuitive thinking is not constrained by the capacity of our working memory (Dijksterhuis and Nordgren, 2006). This means that intuitive gatekeepers are better able to incorporate the large amounts of information that are relevant for the decision problem at hand into a holistic perspective on the gate decision problem. This also allows them to create broader spanning associations and match complex patterns (Dane and Pratt, 2009; Evans, 2008; Sadler-Smith and Shefy, 2004), leading to a more insightful understanding of the complex gate decision problem and thus to improved gate decision making (Eling et al., 2014).

Third, intuitive thinking has a tendency to naturally weigh the importance of different factors during complex tasks while maintaining a holistic approach to information gathering (Dijksterhuis and Nordgren, 2006). An intuitive gatekeeper is therefore also expected to unconsciously weigh the value of different pieces of information more accurately. A gatekeeper’s intuition could guide them by automatically weighing and adjusting for conflicting information which could help prevent escalation of commitment.
Together these arguments lead us to formulate the competing hypothesis:

**H2**: Gatekeepers who adopt an intuitive thinking style when making gate decisions in the front end of NPD show less escalation of commitment than those who adopt a rational thinking style.

To summarize, there are compelling arguments to believe that either a rational or an intuitive thinking style is more effective at combating escalation of commitment in the front end. To determine which thinking style best prevents escalation of commitment the dispositional thinking styles of NPD decision makers was measured by the Rational Experiential Inventory (REI) and a randomized experiment was conducted in which the thinking style of a gatekeeper practitioner sample was manipulated.

**Methodology**

An experiment was used to test our hypotheses. An experiment provides a controlled environment to establish non-spuriousness, by randomly dividing participants across conditions. Using an experimental design it was possible to establish causality between the thinking styles and escalation of commitment. Figure 1 provides a stylized overview of the research design.

The experiment was centered on the development of a new hybrid jet-engine in the aviation industry (see Online Appendix). Using such a niche industry in the experimental setup ensured that possible confounding effects of industry-specific knowledge were a priori suppressed (Lam, 2000). The participants were confronted with fictitious reports of the hybrid jet-engine project at the idea and concept gates in the front end of NPD, respectively. The reports were designed in such a way that escalation of commitment was induced (see detailed descriptions below).

**Sampling Method**

As best practice firms use cross-functional front end gate committee compositions (Barczak et al., 2009; Cooper, 2008; Schmidt, Sarangee, and Montoya, 2009), participants were drawn from diverse functional areas, such as R&D, design, marketing, sales & purchasing, manufacturing, and strategy when selecting the sampling frame. Although NPD project evaluations are known to be made by a committee of gatekeepers, our experiment was conducted at the individual gatekeeper level. The rationale is that decisive judgments are first made by individuals (Eling et al., 2015; Kahn, Barczak, and Moss, 2006). The members of the review committee must first fully understand and commit on an individual level to a decision before entering the committee discussion (Amason, 1996). Therefore, studying the effect of thinking styles at individual gatekeeper level is an important first necessary step in understanding the role of thinking styles in gate decision making. It is nevertheless acknowledged that the nature of group decision making in gate committees might result in more complex dynamics than can be observed in our individual-level gate decision experiment.

Gate decision making relies on problem solving through knowledge and learning (Goffin and Koners, 2011). In practice such decisions are therefore often taken by experienced gatekeepers (Cooper, 1999). As expert decision making differs from novice decision making (Dane, Rockmann, and Pratt, 2012; Dew, Read, Sarasvathy, and Wiltbank, 2009; Staats, KC, and Gino, 2017), experienced participants were required. To ensure the availability of procedural NPD gate decision making...
knowledge (Grant, 1996; Kyriakopoulos and de Ruyter, 2004) in participants, they were asked whether they are professionally involved in NPD decision making and by excluding all respondents from the experiment that answered “no” to this screener question.

Not only such procedural NPD knowledge impacts gate decision making, but also context-specific technical knowledge can influence gatekeeper decision making (Grant, 1996; Kyriakopoulos and de Ruyter, 2004; Olivera, 2000). Since our interest is in gate decision making by gatekeeper experts, irrespective of context, a niche industry was chosen, namely the aviation industry, in order to dampen any context effects that could occur in our sampling procedure. Careful design and pretests of the materials (as described below) ensured that missing context knowledge of participants did not impede expert gate decision making.

The participants were recruited in collaboration with Survey Sampling International (SSI), a company specialized in survey sampling and data collection solutions. In addition, participants were recruited through email and telephone and at seminars of the Dutch Product Development & Management Association (PDMA). Together these efforts resulted in 184 valid responses (120 and 64 from each source, respectively). The comparative analyses did not show any significant differences between both subsamples. Descriptive sample statistics are shown in Table 1.

**Set-up and Materials**

The participants received an invitation and link to the experiment by e-mail. After a general introduction to the experiment and an indication of the estimated completion time participants were instructed to envision they were a member of a gate review committee of a high-tech aviation company. In their role as gatekeepers, participants were first given the idea gate development report of the new hybrid jet engine. They were instructed to review the information in the report in four minutes time.1 Afterward the participants were taken to the next screen where they were instructed to make their idea gate decision (either Go or Stop). After making this decision, participants were asked to indicate how certain they were of the decision that they had just made on a scale from 0 to 100 percent. Participants who made a Stop decision at the idea gate were redirected to the control questions without participating further in the experiment.

The participants who took a Go decision at the idea gate continued to the next step in the experiment, in which they received the concept gate development report. Again, participants received four minutes to review the information contained in the report.2 After reviewing the concept gate development report participants were randomly assigned to either of three conditions: dispositional, rational, or intuitive. In the dispositional condition, participants were asked to take an immediate concept gate decision. In the rational and intuitive condition, first the thinking styles of the participants were manipulated using well-validated manipulation methods (Dijksterhuis, 2004; Dijksterhuis, Bos, Nordgren, and van Baaren, 2006) and afterward participants were asked to make their concept gate decision. Details on the conditions are presented below. After making the concept gate decision, the participants from all conditions were

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1Time restrictions were used in the experiment to reduce the chance that participants get distracted and perform other tasks and only return to the experiment at a later point in time. The reading time for both reports was restricted to the same period of four minutes to ensure that participants only read the report without actively processing the information provided. Additionally, information processing should only occur after the reading of the report. The 4-minute time interval approximated the average reading time in pretesting plus one standard deviation.

2See footnote 1.

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### Table 1. Data Sample Descriptive Statistics

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<td></td>
<td></td>
</tr>
<tr>
<td>PhD degree</td>
<td>12</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other</td>
<td>5</td>
<td></td>
<td></td>
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<tr>
<td>Gender</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>138</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Female</td>
<td>46</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

---
again asked to indicate their decision certainty. Hereafter participants were asked a number of control questions including NPD experience and socio demographics. The experiment was administered online using Qualtrics software.

**Measuring Dispositional Thinking Style**

Although each individual has the ability to naturally cross back and forth between different thinking styles, each person has an innate tendency to rely more on either rationality or intuition (Epstein et al., 1996; Stanovich and West, 2000). In other words, everyone has their own dispositional thinking style. In the dispositional condition, the thinking style of participants was not manipulated. Instead, participants were instructed to make the gate decision immediately after reviewing the development report at the concept gate, thus following their dispositional thinking style.

To measure the dispositional thinking style of all participants they were asked to fill in the short version of the Rational Experiential Inventory (REI-10; see Tables 2 and 3) just before viewing the concept gate development report. The REI-10 is a well-validated scale that measures both rationality as well as intuition (Dane and Pratt, 2009; Epstein et al., 1996; Hodgkinson and Sadler-Smith, 2003). It includes five rationality items and five intuition items. To accommodate for the NPD context, the wording of the REI-10 items was adjusted. Each item is measured on a 7-point scale ranging from “completely disagree” to “completely agree.” To assess the psychometric properties of the scale, reliability coefficients were computed and a factor analysis was performed. Two of the five items from the rationality scale were dropped due to low/negative correlation with the other items on the scale (updated rationality Cronbach’s α = .75, intuition Cronbach’s α = .87) after which a two-factor solution (eigenvalues of 2.796 and 1.656 and variances explained .350 and .557) well fitted the data (see Table 3). Based on this evidence, the rationality and intuition scales were formed using the corresponding factor scores.

**Manipulating Thinking Styles**

Because of our interest in the effect of each individual thinking style on escalation of commitment, both thinking styles were compartmentalized as separate

### Table 2. Descriptive Statistics for Context Specific REI Scale Factors of the Dispositional Condition

<table>
<thead>
<tr>
<th>N</th>
<th>Rationality</th>
<th>Mean</th>
<th>S.D.</th>
<th>Cronbach’s α</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>4.32</td>
<td>1.19</td>
<td>.75</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>4.67</td>
<td>1.05</td>
<td>.87</td>
<td></td>
</tr>
</tbody>
</table>

All items are measured on a 7-point Likert scale anchored from “Completely Disagree” to “Completely Agree.” Low correlation items removed.

### Table 3. REI Factors after Varimax Rotation

<table>
<thead>
<tr>
<th>Denomination of Factors</th>
<th>Components</th>
<th>Factor Loadings</th>
<th>Degree of Communality</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Rationality</td>
<td>I don’t enjoy thinking a lot when making gate decisions.</td>
<td>−.159</td>
<td>.761</td>
</tr>
<tr>
<td></td>
<td>I try to avoid thinking in-depth when making gate decisions.a,c</td>
<td>−.165</td>
<td>.695</td>
</tr>
<tr>
<td></td>
<td>Thinking hard and for a long time when making gate decisions gives me little satisfaction.a,c</td>
<td>−.218</td>
<td>.593</td>
</tr>
<tr>
<td>Intuition</td>
<td>I trust my initial feelings while making gate decisions.b</td>
<td>.746</td>
<td>−.207</td>
</tr>
<tr>
<td></td>
<td>I believe in trusting my hunches when it comes to making gate decisions.b</td>
<td>.798</td>
<td>−.281</td>
</tr>
<tr>
<td></td>
<td>My initial impressions are almost always right when making gate decisions.b</td>
<td>.704</td>
<td></td>
</tr>
<tr>
<td></td>
<td>When it comes to making gate decisions, I can usually rely on my “gut feelings.”b</td>
<td>.677</td>
<td>−.297</td>
</tr>
<tr>
<td></td>
<td>I can usually feel what is right or wrong in making gate decisions, even if I can’t explain how I know.b</td>
<td>.741</td>
<td>−.157</td>
</tr>
<tr>
<td>Eigenvalues</td>
<td></td>
<td>2.796</td>
<td>1.656</td>
</tr>
<tr>
<td>Variance Explained</td>
<td></td>
<td>.350</td>
<td>.557</td>
</tr>
</tbody>
</table>

*aRationality items.

*bIntuition items.

cReverse coded items.
manipulations. This enables us to show how each thinking style individually influences gatekeeper escalation of commitment. In the rational and intuition conditions participants were respectively induced to adopt a rational or intuitive thinking style. The thinking style of these participants was manipulated using a well-validated and widely used procedure by Dijksterhuis (2004) and Dijksterhuis and Nordgren (2006), including the time interval to implement the manipulation.

To induce a rational thinking style participants were instructed to “think carefully” for three minutes after reviewing the concept gate development report and before making the concept gate decision, leading participants to consciously think about the information provided to them. To induce an intuitive thinking style, participants were shown a word puzzle after reviewing the concept gate development report, and were instructed to find as many words as they could in three minutes. Having to focus on a word puzzle distracts the participant from consciously thinking about the development report (Strick et al., 2011). The premise here is that the participant will continue to process the report’s information unconsciously, eventually leading to a strong intuitive decision (Dijksterhuis and Nordgren, 2006).

**Inducing and Measuring Escalation of Commitment**

To induce and measure escalation of commitment, two development reports were created and used based on the two consecutive front end decision gates: the idea gate and the concept gate. The reports were designed and pretested in such a way that the objectively correct decisions are a Go at the idea gate, and a Stop at the concept gate. To achieve this design, the report at the idea gate consisted almost only of positive information about the hybrid jet-engine project and the financial information presented was such that the net present value of the project was positive. This was done in order to let participants form positive beliefs about the hybrid jet-engine idea, to nudge them to make a Go decision, and to invoke a feeling of responsibility and commitment toward the project, which is necessary for escalation of commitment to occur (Biyalogorsky et al., 2006; Sleesman et al., 2012). Conversely, the development report at the concept gate presented merely negative information including a negative net present value, so that, objectively, a Stop decision was the correct gate decision. In view of objective Go/Stop decisions at the idea versus the concept gates, and the response pattern in the pretests (see details below), subsequent Go decisions taken at both the idea and the concept gates are considered escalation of commitment.

**Material Design and Pretesting**

The development reports were created using key gate evaluation criteria from the literature (Hart et al., 2003) and seven interviews with NPD professionals from different industries to ensure that the reports were realistic, albeit understandable for professionals who are not from the aviation industry. In creating the reports it was also ensured that the type of information provided was realistic for a front end setting (Kim and Wilemon, 2002) by including a balance of objective information, such as financial information, and subjective information, such as the general assessments of senior management and different functions involved in the project. In addition, the financial and other numerical information was provided as intervals instead of specific numbers reflecting the uncertainty of the numbers. Intervals at the concept gate were smaller than or equal to those for the idea gate as uncertainty is typically reduced along the NPD trajectory.

The gate reports and reading times were independently pretested with 21 gatekeepers from different companies. To test for the intended objective decision pattern (i.e., Go at the idea gate and Stop at the concept gate) in order to induce and measure escalation of commitment, each pretest participant saw and made a decision for only one of the two reports. For the idea gate report, 10 out of 10 (100%) gatekeepers made a Go decision after reviewing the development report. In the pre-test of the concept gate report, 10 out of 11 (90.9%) gatekeepers made a Stop decision after reviewing the development report.

**Results**

**Dispositional Thinking Styles and Escalation of Commitment**

The correlational analysis of dispositional thinking style and escalation of commitment gives us the opportunity to identify whether gatekeepers who have an innate tendency toward rationality or intuition
escalate their commitment less. Here only the participants in the dispositional condition were used whose decision-making style was not manipulated. Within this group, 67 out of 79 participants (84.8%) who made a Go decision at the idea gate also made a Go decision at the concept gate. To test the correlation with dispositional thinking style, a logistic regression was conducted using escalation of commitment (Go decision = 1 / Stop decision = 0, at the concept gate) as the dependent variable and the REI as explanatory variables. Results of these analyses are shown in Table 4.

Model 1 and 2 include rational and intuitive dispositions, respectively. Model 1 shows that the higher the decision maker scores on rational thinking style, the less likely they escalate their commitment (β = −1.58, SE = .49, p = .001). Conversely, Model 2 shows that the higher the decision maker scores on intuitive thinking style, the more likely they escalate their commitment (β = .70, SE = .33, p = .034). In Model 3, where both rationality and intuition are included, both the positive effect of intuition (β = .75, SE = .37, p = .042) and the negative effect of rationality (β = −1.64, SE = .50, p = .001) on escalation of commitment remain significant. This provides empirical support for H1—decision makers who naturally adopt a more rational thinking style are less prone to escalate their commitment to an ongoing development project.

### Manipulated Thinking Styles and Escalation of Commitment

To test whether there is a causal effect of thinking style on escalation of commitment a comparison is made between the rational and intuitive conditions in our randomized experiment. Within the rational condition, 27 out of 36 participants (75.0%) who made a Go decision at the idea gate, also made a Go decision at the concept gate (see Table 5). In the intuition condition this was 39 out of 41 participants (95.1%). A two-sample independent t-test shows that (see Table 6 and Figure 2) escalation of commitment is significantly (t = 2.49, df = 49.76, p = .02) less likely to occur in the rational condition (M = .75) than in the intuition condition (M = .95). This means that, conditional on committing to the project at the idea gate, intuitive decision makers are more likely to give a Go decision at the concept gate even though the project at the concept gate should be stopped. Thus, adopting an intuitive thinking style increases the risk of escalation of commitment compared to adopting a rational thinking style. These results again provide

### Table 4. Results of Logistic Regression for Escalation of Commitment and Dispositional Thinking Styles

<table>
<thead>
<tr>
<th>DV = Escalation of Commitment</th>
<th>Model 1</th>
<th></th>
<th>Model 2</th>
<th></th>
<th>Model 3</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>β</td>
<td>S.E.</td>
<td>p-Value</td>
<td>β</td>
<td>S.E.</td>
<td>p-Value</td>
</tr>
<tr>
<td>(intercept)</td>
<td>2.38</td>
<td>.49</td>
<td>&lt;.001</td>
<td>1.93</td>
<td>.36</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>Rationality</td>
<td>−1.58</td>
<td>.49</td>
<td>.001</td>
<td>−1.64</td>
<td>.50</td>
<td>.001</td>
</tr>
<tr>
<td>Intuition</td>
<td>.70</td>
<td>.33</td>
<td>.034</td>
<td>.75</td>
<td>.37</td>
<td>.042</td>
</tr>
<tr>
<td>AIC</td>
<td>56.98</td>
<td></td>
<td></td>
<td>66.56</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Table 5. Descriptive Statistics for Escalation of Commitment by Thinking Style

<table>
<thead>
<tr>
<th>Thinking Style</th>
<th>Escalation of Commitment</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>M</td>
</tr>
<tr>
<td>Rationality</td>
<td>.75</td>
</tr>
<tr>
<td>Intuition</td>
<td>.95</td>
</tr>
<tr>
<td>Dispositional</td>
<td>.85</td>
</tr>
</tbody>
</table>

### Table 6. Results of t-test for Escalation of Commitment by Thinking Style

<table>
<thead>
<tr>
<th></th>
<th>Intuition</th>
<th></th>
<th>Rationality</th>
<th></th>
<th>Dispositional</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>95% CI for Mean Dif.</td>
<td>t</td>
<td>df</td>
<td>95% CI for Mean Dif.</td>
<td>t</td>
<td>df</td>
</tr>
<tr>
<td>Intuition</td>
<td>.04, .36</td>
<td>2.49*</td>
<td>49.76</td>
<td>−.00, .21</td>
<td>1.95</td>
<td>115.21</td>
</tr>
<tr>
<td>Rationality</td>
<td>−.04, .21</td>
<td>1.95</td>
<td>115.21</td>
<td>−.27, .07</td>
<td>−1.17</td>
<td>57.46</td>
</tr>
</tbody>
</table>

*p < .05
empirical support for H1 and are in line with our findings based on the correlational association between dispositional thinking styles and escalation of commitment. Interestingly though, escalation of commitment is prevalent across conditions, emphasizing the fact that breaking free from escalation of commitment is difficult for gatekeepers.

Validity Checks

A strong positive belief about one’s decision at the start of the project is necessary for escalation of commitment to occur (Biyalogorsky et al., 2006). To check whether this positive belief was actually present, all participants were asked how certain they were of their decisions at the idea and concept gates. The results show that the participants who made a Go decision at the idea gate were certain of their decision (\(M = 64.20\) on a scale of 0–100 percent, \(SD = 16.68\)). The participants who made a Stop decision at the idea gate were significantly less certain of their gate decision (\(M = 45.89\)) than those who made a Go decision (\(t = 4.57, \, df = 34.07, \, p < .001, \, 95\% \, CI\) for mean difference \(-10.16–26.45\)). This indicates that a strong positive belief about one’s Go decision at the idea gate was present. This result also indicates that the high success potential of the project indicated by the development report at the idea gate was properly conveyed.

A strong belief of having made the right decision after the concept gate verifies that the participants’ decisions were genuine and not induced by doubt. When comparing the participants who made a Stop decision at the concept gate with the participants who made a Go decision at the concept gate, and thus escalated their commitment, both are equally certain of their gate decision (\(t = -0.08, \, df = 1.22, \, p = .95, \, 95\% \, CI\) for mean difference \(-173.71–170.49\)). Furthermore, the results show that, at the concept gate, all participants (across the three conditions and whether they made a Go or a Stop decision) had moderately high certainty (\(M = 61.8\)) in their decision. In other words, participants who escalated their commitment were equally convinced that they made the right gate decision as participants who did not escalate their commitment, validating our escalation of commitment measure.

Discussion

This research finds that rational gatekeepers are significantly less likely to escalate their commitment than intuitive gatekeepers at the final gate of the front end of NPD. This finding holds both in the correlational analysis of dispositional thinking styles as well as in the randomized causal experiment in which gatekeepers’ thinking styles were manipulated, which strengthens the validity of our findings. It is consistently found that the advantages of using a conscious, rational thinking style outweigh the disadvantages. This supports the general notion in NPD to apply formal processes and explicit rules in gate decision making (Barczak et al., 2009; Cooper, 1994), also in the front end (Eling et al., 2016; Kock, Heising, and Gemünden, 2015; Markham, 2013). The explanation of our finding is that rational thinking allows for more systematic reasoning and puts the emphasis on the right information during gate decision making (Evans, 2008; Kahneman and Klein, 2009). Being aware of the decision process, being able to follow decision rules that relate to gate criteria, and being in control of one’s own emotions toward the project, thus also help reduce the likelihood of gatekeepers getting wrongly committed (Dane and Pratt, 2007; Dijksterhuis and Nordgren, 2006; Epstein et al., 1996).

Conversely, the advantages of intuitive decision making are not that useful in preventing escalation of commitment at the final gate of the front end of NPD. An explanation could be that, despite the higher capacity and natural information weighing processes of the unconscious (Dijksterhuis and Nordgren, 2006; Eling et al., 2014), intuitive gatekeepers are unable to emotionally detach themselves.
from the project. Negative emotions such as anticipated regret and fear of decision consequences can lead to wrongful weighing of information and, consequently, poor decision making (Ku, 2008; Wong and Kwong, 2007). Another reason why intuition might lead to more escalation of commitment of gatekeepers is their optimistic overconfidence in past decisions, which might persist even when new negative information becomes available (Kahneman and Klein, 2009). Previous research has indeed shown that decision maker overconfidence is likely to lead to escalation of commitment (Åstebro et al., 2007; Markovitch et al., 2015).

Although our study unambiguously provides evidence that rationality significantly outperforms intuition in preventing escalation of commitment, the experimental results show that even rational gatekeepers display escalation of commitment. This is in line with earlier research that found dispositional rationality to be related to escalation of commitment, without contrasting rationality with intuition though (Wong et al., 2008). Although the high percentage of rational gatekeepers also escalating their commitment is related to our experimental setup, which had the clear goal to induce escalation of commitment, there also might be an additional explanation for this finding. Prior research has come to conflicting conclusions about whether formalization practices at the NPD process level improve NPD success (Barczak et al., 2009; Evanschitzky, Eisend, Calantone, and Jiang, 2012) or whether such practices lead to too much rigidity (Sethi and Iqbal, 2008). Likewise, there may be a fine line between useful, practical rationality in gate decision making and too rigid rational processes. The right balance probably is industry or project specific, or dependent upon organizational or individual gatekeeper characteristics. For example, prior research has shown that product innovativeness is a driver of gatekeeper commitment (Schmidt and Calantone, 2002), which could also moderate the relationship between rationality and escalation of commitment (Eling et al., 2014). Moreover, factors of organizational culture, such as acceptance of failure (Sarangee et al., 2014) and creative encouragement (Kock et al., 2015) or willingness of individual gatekeepers to take risks (Tversky and Kahneman, 1974), could impact the usefulness of rational gate decision making.

Finally, the finding that escalation already occurs in the very front end of the NPD process shows that the common premise that a significant amount of capital needs to have been invested in an NPD project in order for escalation of commitment to occur, does not hold (Garland, 1990). Even before significant investments are made, gatekeepers can become wrongfully committed to an NPD project, most likely as a result of self-justification or project uncertainty (Brockner, 1992).

Theoretical Implications

Our findings contribute to existing research on the front end of NPD, on escalation of commitment, and on thinking styles in several ways. First and most importantly, this study contributes to the general escalation and thinking style literatures by contrasting rationality with intuition, and thus making the explicit connection to dual-processing theory (Evans, 2008). Prior research that solely focused on self-reported dispositional rationality (Wong et al., 2008) or indirect measurement of rationality through negative affect (Wong et al., 2006), shows that rationality elicits escalation of commitment, but failed to contrast the effects of rationality with intuitive thinking (Aloysius, 2003; Wong et al., 2008). Our study adds to this research by directly comparing rationality with intuition, both from a dispositional perspective as well as a behavioral perspective. However, to be able to draw more general conclusions on the contrasting effect of rationality and intuition in preventing escalation of commitment, future research in other escalation situations than front end gate decisions is required.

Second, in contribution to the NPD literature, our study not only responds to a call for research on how to reduce error in front end decision making (Eling and Herstatt, 2017; Hauser, Tellis, and Griffin, 2006), but also resolves conflicting findings from different research domains that indicate that either a rational or an intuitive thinking style may best prevent escalation of commitment in gate decision making (Eling et al., 2014; Wong et al., 2008). Our study provides both correlational and causal evidence that adopting a rational thinking style is better to combat erroneous decision making at the last front end gate than intuition. This finding supports the general notion in NPD to apply formal processes and explicit rules in gate decision making (Barczak et al., 2009; Cooper, 1994), also in the front end (Eling et al., 2016; Kock et al., 2015; Markham, 2013). However, since also
rational gatekeepers still escalate their commitment, future research is needed to investigate which project, process, or organizational conditions (Eling et al., 2014; Sarangee et al., 2014) strengthen or weaken the effect of thinking style on escalation.

Third, our study responds to a call for further research on the use of intuition in general NPD and in the front end particularly (Eling et al., 2014). To date, research on using different thinking styles in NPD has primarily focused on the combination of intuition and rationality (Dayan and Di Benedetto, 2011; Eling et al., 2015) instead of contrasting the effects of using either style, which our study does. Since in contrast to our finding that rational thinking is preferred for front end gate decision making, intuition may perhaps be more beneficial for making other front end or NPD decisions (Eling et al., 2014) future research should develop a more finegrained understanding of which decisions during execution of the project or at review gates benefit more from a rational thinking style, and which decisions more from an intuitive style.

Finally, this study clearly shows that gatekeepers are already susceptible to escalation of commitment in the front end of NPD, before substantial investments in the NPD project have been made. This proves that the occurrence of escalation of commitment in NPD is not only related to the so-called sunk-costs effect (Sleesman et al., 2012), but may have other causes that transcend gatekeepers’ decision-making style at the final gate of the front end of NPD.

Managerial Implications

Our study shows that individual gatekeepers using a rational thinking style in making front end NPD gate decisions show significantly less escalation of commitment to the project than gatekeepers using an intuitive style. To reduce the likelihood of escalation to NPD projects to occur at the last front end gate, gatekeepers thus better think rationally when making gate decisions and subsequently discussing their decision with other members of the gate committee. To achieve this rationality, firms can select gatekeepers with a disposition toward rationality, and/or train them in using a rational style.

For selection purposes firms could include a rational disposition as a qualification for hiring or allocating particular candidates as gatekeepers to the gate review committee. This makes sense because a disposition toward rationality correlates with decreased escalation. Selection can take place, for example, by creating and using a task aptitude test based on the REI measure. Although targeting individuals with a rational disposition for gatekeeper positions through such a test could reduce the threat of escalation of commitment, it is important to note that individuals rarely function solely as gatekeeper and that they might need skilled intuition to proficiently perform other tasks in the NPD process. This should be kept in mind before using the task aptitude test for other than gate decision making-related purposes.

Where training is concerned our randomized experiment has shown that externally induced rationality also reduces the risk of escalation of commitment in individual gatekeeper decision making. Therefore, organizations could reinforce rationality at the final front end gate through gate decision making guidelines and gatekeeper rules of order. For example, as the experiment has shown, it can help give individual gatekeepers enough time during their decision process and the instruction to carefully think about whether or not to continue the NPD project at hand. Also listing pros and cons and discussing them with the other members of the gate committee could be a fruitful exercise to increase rationality. The individual gatekeepers could be invited to explicate their gate decision via rational argumentations that can be evaluated independently by external experts also attending the gate meeting. To further aid rationality, organizations could establish a list of standard gate criteria and use scorecards or thresholds per criterion that need to be met by every NPD project to pass the gate. This would make gatekeepers less vulnerable to biases. Finally, rationality could be increased by offering gatekeepers ex-ante training in using more rational decision making. Although the ability to train people to be more rational in any context needs to be further investigated, rational decision making in a context such as the front end can be trained by learning how to use decision-making templates such as milestone templates and progress charts (Kahneman, 2003; Sadler-Smith and Burke, 2009).

Limitations and Future Research

As with all research this study also has limitations that should be considered when interpreting the
results. These limitations simultaneously provide additional opportunities for future research. First, in our study the group setting of gate committees was set aside and instead individual gatekeeper decision behavior is focused on. Following up on our study, a possible research avenue can be combining intuitive and rational agents in an experimental gate committee group setting to see if our individual-level results hold, and whether novel insights can be gained.

Second, our study manipulated the thinking style after the gatekeeper has taken in the information contained in the reports presented at the idea and concept gates. This was in order to be able to discern the effect of information processing on actual decision making from information intake. One could argue though that thinking style not only affects information processing, but also information intake. This complexity was not taken into account by our study, but would be worth exploring in future research. A follow‐up study could manipulate thinking style before taking in the information contained in the development reports and contrast the findings with ours.

Third, when pretesting the gate reports the focus was to keep visual cues limited, and to carefully balance (objective) numerical and (subjective) textual information. Visual cues, such as graphs, tables, bold italic text are known to trigger intuitive processing, while cues such as numeric information trigger rational processing (see Kahneman, 2002). The presence of visual cues was limited to textual cues about whether particular sections of the concept gate report showed new information or not. This made sure that information intake was not favored by either a rational or intuitive thinking style. Whether and how this has possibly affected our outcomes is unclear, but as gate reports in practice often include visuals, future research could identify the best way to present information in order to induce a rational thinking style. An example of this could be contrasting the effects on gatekeeper decision making of visually rich development reports with visually poor development reports.

Fourth, it remains difficult to uncover what pieces of information within the idea and concept gate reports actually elicited escalation of commitment. Staw (1981) discusses several underlying mechanisms that could potentially be driving escalation of commitment such as motivation to justify previous decisions, norms for consistency, perceived probability, and value of future outcomes. Although our gate reports were carefully crafted and pretested, these underlying mechanisms have not been subject to thorough investigation, let alone translated to the specifics of gate reports in an NPD setting. It would be interesting to uncover which indicators in our gate reports acted as triggers for escalation of commitment by manipulating these mechanisms (e.g., norms for consistency) in different experimental groups.

Fifth, escalation of commitment is characterized by making a continuation decision while a stop decision is warranted. However in both literature and practice it often remains unclear when escalation of commitment is actually escalation or appropriately allocated commitment (Wong and Kwong, 2017). Especially in the front end of NPD it often is, even in hindsight, difficult to differentiate between the wrong and right type of commitment. Therefore, this study opted to also use an objective measure of escalation of commitment using the expected present value of the project along with in‐depth scenario pretesting using experienced practitioners. Although the use of such an objective factor alleviates some of the insecurities, future research could use and compare different measures of escalation of commitment.

Last, this study investigated escalation of commitment at the project level. Organizations can however also learn from projects that fail in terms of objective measures, yet are continued to accrue important market, regulatory, and/or technological knowledge for other projects in the same NPD program (Baum and Dahlin, 2007; Deichmann and Van den Ende, 2013; Drummond, 2014). Future research could take a program perspective to investigate this possible tension between learning from failures and escalation of commitment.

References


Supporting Information

Additional Supporting Information may be found in the online version of this article.
Each topic within the development report could be clicked on to reveal additional explanation of that particular topic.

Idea Gate Development report.
Each topic within the development report could be clicked on to reveal additional explanation of that particular topic.

Concept Gate Development Report.