RESEARCH ARTICLE

Choosing among alternative new product development projects: The role of heuristics

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Abstract

The initial screening decision that marketing managers make is critical. It requires the selection of what innovation project to invest in, which is fundamental to marketing success. However, our knowledge of how managers make these decisions and how this impacts performance is limited. By drawing upon cognitive psychology and the managerial decision-making literature, we address two critical questions. The first question focuses on identifying specific decision-making types (e.g., specific heuristics, intuition) used when making an innovation screening decision. Based on this analysis and prior research, we develop specific decision-maker profiles about how an individual manager decides. The second research question is about connecting these profiles with performance. Specifically, it addresses what the consequences of different decision-maker profiles are on the perceived accuracy and speed of decision-making? Data were collected from 122 senior managers in these industries. We find that when heuristics are used alone, or concurrently with intuition, managers make decisions that are as accurate as when they rely on analytical decision-making. However, the process is significantly faster. The findings provide an important step toward a more comprehensive understanding of decision-making at the front-end of innovation.

KEYWORDS
decision-making, heuristics, innovation, intuition, product screening

1 | INTRODUCTION

While traveling on a delayed train from Manchester to London, an idea for a fantasy novel came to J. K. Rowling. After about 6 years working on it, the debut book of the Harry Potter series—*Harry Potter and the Philosopher's Stone*, was ready. It took 12 rejections in a row before Bloomsbury Publishing accepted to publish an initial print run of just 500 copies. The reaction of readers far exceeded expectations, and the book became one of the greatest publishing successes in history, selling over 100 million copies worldwide (Time, 2013). The phenomenal success of Harry Potter has greatly benefited the

publishers, Bloomsbury, and has been one of the main drivers of their growth in the past decade. Almost certainly, it caused a lifetime of regret for those publishers who declined Rowling's book. How did managers, with considerable expertise in their field, look at the same manuscript and decide not to invest in one of the best-selling books of all time?

The case of J. K. Rowling, and her book *Harry Potter and the Philosopher's Stone*, is not unique. In the marketing context, many managers flounder when it comes to deciding what innovation projects to select for development. Such decisions are one of the most challenging marketers encounter since they are made under

conditions of high uncertainty using relatively vague and often neb-ulous criteria. Managers simply lack sufficient knowledge that would enable them to predict customer reactions accurately, market potential, feasibility, and risks (Hammedi, van Riel, & Sasovova, 2011; Loch, Solt, & Bailey, 2008). Some scholars refer to this early stage in the product development process as the "fuzzy front-end of in-novation" (Hauser, Tellis, & Griffin, 2006; Smith & Reinertsen, 1992). Deciding what innovation project to pursue is strategically important and has direct consequences for organizational competitiveness and success (Chao & Kavadias, 2008). Moreover, the innovation screen-ing decision will result in substantial investment commitment and opportunity costs. It is a crucial element highlighted by Hauser et al. (2006, p. 702) in their seminal review on research on innovation who note that "early decisions in product development processes have the highest leverage."

This study focuses on innovation screening decisions and has two main objectives. First, it explores how managers make choices when deciding among different innovation projects by addressing both analytical and nonanalytical processes of decision-making. The key contribution we make here is that while there is substantial con-ceptual work on how managers make choices and research based upon specific examples of decision, there has yet to be a compre-hensive review utilizing existing typologies. In so doing, it takes an important step to recognize and identify the full range of processes in innovation screening decisions. It explores the extent of reliance on specific decision-making types, that can be analytic and nonanalytic. Analytic decisions are systematic and made by managers and leaders based upon reliable data, together with other information and have often been seen as the superior mode that managers should pursue (Baron, 1998; Dawes, Faust, & Meehl, 1989). One example would be Coca Cola's focused use of big data analysis on social media aimed at aligning the brand with consumer interests (Marr, 2017). On the other hand, a nonanalytic decision is one based upon unaided human judgment (Meehl, 1954). An example would be the decision by Stefan Pierer, CEO of KTM Motorcycles, who ultimately refocused the company away from off-road motorcycling to the street bike market without any evidence, merely claiming: "I wake up in the night and have a feeling that I should do it differently" (Matzler, Bailom, & Mooradian, 2007). This focus is essential because knowledge of how marketers make decisions is limited (Van Bruggen & Wierenga, 2000; Wierenga & Van Bruggen, 1997).

Second, we explore the consequences of different decision-maker profiles in terms of perceived decision-making accuracy and speed. A decision-maker profile focuses on how a manager makes a decision. More specifically, the profiles arise from the extent to which a manager relies on different decision-making types, which are de-veloped based on theory (and are refined based on data). In doing so, it addresses the call by Wierenga (2011) to examine interactions between different decision-making types and provides insights on how heuristics and their interaction with analytical and instinctive processes affect decision-making performance. The research seeks to provide a comprehensive framework depicting different decision-maker profiles in selecting innovation projects and their

consequences. Such an understanding has practical relevance as clearly noted by Wierenga (2011, p. 89), who observes that "the quality of managerial decision making is the single most determining factor for the success of marketing management." It would be useful from the outset to consider definitions and provide further examples.

We begin with an assessment of the theoretical background to decision making with a focus on its application to marketing practice with a specific focus on decision-making in new product development (NPD), intuition, heuristics, and performance. It then provides an explanation and justification for the method applied and an assess-ment of the results. Thereafter, we place the results into context with the discussion, and the theoretical and managerial implications are reviewed.

2 | THEORETICAL BACKGROUND

2.1 | Decision-making in NPD

Decisions in the fuzzy front-end of innovation are one of the most challenging and essential that managers make. It is challenging be-cause such decisions are often made under substantial uncertainty in terms of, for example, consumer preferences or risks (e.g., Hammedi et al., 2011). Such decisions are important because of their impact on the success of the organization (Chao & Kavadias, 2008). Given the importance and difficulty of screening decisions that require the selection of innovation projects to pursue, it is not surprising that researchers and practitioners exhibit a keen interest in tools that can enhance the effectiveness of such decisions.

Prior research has focused on various criteria that managers con-sider in evaluating alternative new product ideas (e.g., Behrens, 2016; Blau, Pekny, Varma, & Bunch, 2004; Carbonell-Foulquié, Munuera-Alemán, & Rodríguez-Escudero, 2004; Cooper, Edgett, & Kleinsch-midt, 2001; de Oliveira, Rozenfeld, Phaal, & Probert, 2015). Therefore, by way of example, Behrens (2016) reports that financial ratios, demand uncertainty, competitive advantage, and risk, are essential criteria for managers when deciding what projects to focus on. A survey of 77 managers found that managers use more criteria in the fuzzy front-end of innovation (Carbonell-Foulquié, Munuera-Alemán, & Rodríguez-Escudero, 2004). An examination of how specific criteria relate to outcomes of innovation projects shows that the use of market and technical criteria are positively related to the competitiveness of firms. In contrast, strategic criteria were not (Martinsuo & Poskela, 2011). Besides, scholars have also focused on the extent to which using formal procedures for choosing among new product ideas affect outcomes. These research findings provide conflicting results with some reporting that formality of evaluation is related to positive outcomes (e.g., Eling, Griffin, & Langerak, 2016; Kock, Heising, & Gemünden, 2015).

Overall, research on nonanalytical processes in screening deci-sions, and marketing decision-making in general, has been limited. An important conclusion is that managers do not just use analytical methods in decision-making. They also rely significantly on their in-tuition and the application of readily available heuristics (Dane &

Pratt, 2007: Gigerenzer & Gaissmaier, 2011; Kolbe, Bossink, & De Man, 2019; Wierenga, 2011).

2.2 | Intuition

Intuition plays a central role in managerial decision-making, including decisions related to NPD. For example, the launch of the sports car Dodge Viper and the prime time launch of "Who Wants to Be a Millionaire" were reportedly based upon managers' intuition (Hayashi, 2001). Despite such examples, marketing and management scholars have yet to agree on what intuition is; what it does; and even when it can be used effectively. We do not attempt to settle the controversy here; instead, we seek to understand better the evaluation process typically used when choosing between alternative NPD projects. We recognize that in common usage, and often in the media (e.g., NPR, 2006), intuition is often associated with having a "hunch," a "gut feeling," or having "insight."

Much research in the area has treated intuition as a process (a way of sorting data) or an outcome (something that you recognize) or both (Dane & Pratt, 2007). This study follows the latter approach. The suggestion here is that intuition is a *fast nonconscious thought process that leads to an outcome* that, in our case, is based upon the marketing environment. Intuiting necessitates a fast process of retrieval (Gigerenzer & Goldstein, 1996) and recognition of often several thousand chunks of information stored in long-term memory (Agor, 1989; Shirley & Langan-Fox, 1996) rather than a guess. Interestingly, when someone intuits, there are no requirements for awareness of rules of knowledge to be used (Shapiro & Spence, 1997), and the final defining nature of intuition is that it involves affect-based judgments often accompanied by excitement and harmony (Hayashi, 2001). We now turn to heuristics.

2.3 | Heuristics

Much of management decision-making may be positioned in the realm of bounded rationality (Simon, 1955), logic, probability, and heuristics (Barnes, 1984). Bounded rationality argues that assumptions of full rationality and complete knowledge in decision-making are unrealistic (van Bruggen & Wierenga, 2000). Although people attempt to make rational decisions, the decision-making process adopted often necessitates a compromise. An example would be the situation of a firm setting an advertising budget that attempts to balance a variety of objectives (Kolsarici, Vakratsas, & Naik, 2020; West, Ford, & Farris, 2014) or deciding upon where to site a manufacturing plant in Asia (Bingham & Eisenhardt, 2011). However, while the latter authors take a process approach to explain the use of such applied heuristics, we instead employ conceptually underpinned heuristic types. Notwithstanding, their findings that managers tend to use a small portfolio of rules, fits well with our perspective. In the case of logic, the focus is on mental models and cognition to solve well-structured problems. At the same time, probability works

alongside logic to reach an inductive rather than a deductive conclusion. Taken together, logic and probability underpin the process of decision-making based upon a detailed examination of available data. Also, the inductive process recognizes that samples of information are prone to error and necessitate risky "bets" on the future state of the market.

Heuristics consist of methodologies that seek to solve problems within the boundary of rationality using loosely applicable information based upon selective judgment (Zuckerman & Chaiken, 1998). Heuristics consist of ordered cues that offer a means to minimize noise and, thereby, often outperform the cognitive advantages of logic and probability (Åstebro & Elhedhli, 2006). By using heuristics, decision-makers can "forget" data and focus on pertinent issues. As a result, heuristics simplify decision-making because they provide "good enough" solutions to problems (Bingham & Eisenhardt, 2011; Wollschlaeger & Diederich, 2020).

Although a range of heuristics has been reported from specific tests and experiments in the literature, these can be grouped into nine broad types. First, the most basic is "default" that represents the choice made that is most similar to what would typically be done (Johnson & Raab, 2003). For example, the management of a company that manufactures faucets for use in kitchens is most likely to choose new product ideas that fit with the materials and styles that it regularly uses. Second is "recognition" where a choice is made based upon a previous encounter or knowledge (Goldstein & Gigerenzer, 2002). Using the same example, management at the faucet manufacturer might pick a new product based upon previous experience as to what is popular amongst its retail distributors. "Recognition" is closely linked to the third heuristic of "fluency," which involves making a choice based upon the outcome that can be most quickly recognized (Schooler & Hertwig, 2005). Continuing with the faucet company example, management would choose a new project based upon a style and materials already used to save time. The fourth heuristic of "take-the-best" may also be grouped with the "recognition" group of heuristics with a choice made based on what is thought to be best (Gigerenzer & Goldstein, 1996). Here our faucet company management would make a choice of faucet style and materials that they believe would make the best use of their resources in terms of likely market return. The fifth heuristic is that of "satisficing" that requires more cognitively demanding processes. A decision is made by adopting the first choice that exceeds objectives and ignores the rest, thereby saving time and effort (Simon, 1955; Todd & Miller, 1999). In this case, the management would prioritize time and effort and choose the style and materials of a new faucet that can meet their objectives while ignoring other viable alternatives. The sixth heuristic of "tallying" takes "satisficing" further (Dawes, 1979) and involves scoring each option with the final choice being the one with the highest score. Faced with a choice of several styles and material combinations, the management of the faucet company would assess the positive and negative features scores of each design separately, opting for the design with the highest score. The seventh heuristic of "experience" is based on social interactions, with the choice ultimately made by whomever the team agrees possesses the most experience (Boyd & Richerson, 2004). With

this heuristic in mind, the management, faced with several new faucet choices, would defer to the manager with the most experience and best track record. The eighth heuristic is termed "majority" and is also centered on social interaction, but here the choice is based upon what the majority wants (Boyd & Richerson, 2004). Here the management team would discuss the faucet options and hold a majority vote to decide. Finally, the "equality" heuristic covers the situation where no single choice is made, and resources are instead allocated "equally" across all competing options (Gigerenzer & Gaissmaier, 2011). This option has considerable resource implications and typically cannot be applied across multiple alternatives. Using the faucet example where management needs to decide among several potential new faucet designs, the decision is made to allocate resources across all options. No choice is effectively made, and each design option is allocated an equal share of the budget.

These heuristic types discussed above collectively form a central component of this study. They are critical elements in the decision-maker profiles that will be discussed in the results section.

2.4 | Decision-making performance

The theoretical discussion on heuristics has often revolved around accuracy and speed trade-offs (Gigerenzer & Gaissmaier, 2011). The premise is that during decision-making, some information is ignored, so that a decision-maker can save time and effort and come up with quicker decisions at the expense of accuracy. As a consequence, heuristics are often reported as leading to both suboptimal decisions (Barnes, 1984; Kahneman & Tversky, 1979; Mezias & Starbuck, 2003) as well as quick and accurate decisions (Bauer, Schmitt, Morwitz, & Winer, 2013; Goldstein & Gigerenzer, 2009; Holte, 1993; Prabhaker & Sauer, 1994; Wübben & Wangenheim, 2008). However, an emergent theme gaining saliency in the literature and offering a competing premise, is what is known as "fast and frugal heuristics." By applying knowledge and computation in a minimal amount of time, more noise is filtered out, and quicker and better adaptive choices are made in any given environment. In short, heuristics can produce decision outcomes that are often equal or even better than those made by analytics (Gigerenzer & Goldstein, 1996; Oppenheimer, 2003). Indeed, several simulations have shown that simple heuristics often outperform more complex integrative investigations (Czerlinski, Gigerenzer, & Goldstein, 1999; Makridakis & Hibon, 2000).

What do managers actually do? There is a large body of empirical work in cognitive psychology focused on distinguishing the decision-making performance of experts and nonexperts. Comparing managers to students has been the most common approach, with several studies suggesting that managers outperform such "proxy" novices. Managers have been found to make decisions more quickly (Day & Lord, 1992; Fredrickson, 1985; Isenberg, 1986); to be unaffected by context (Fredrickson, 1985) and to require less information (Isenberg, 1986). Managers have also reported outperforming statistical forecasting models in predicting the likelihood that an

invention reaches the market (Åstebro & Elhedhli, 2006). They have also been found to keep their heuristics portfolio small and prune the number of heuristics used as they gain experience (Bingham & Eisenhardt, 2011). Besides, managers have also been found to be only slightly below par to commercial databases in identifying potential high-value lifetime customers (Wübben & Wangenheim, 2008). Nevertheless, managers have not always been found to have universal superiority over novices (Armstrong, 1991; Hoch, 1988). Moreover, the literature does not provide a clear picture of how heuristics affect decision-making performance.

One explanation for these conflicting findings may be that the decision-making benefits that heuristics can achieve are context-dependent (Chang & Wu, 2012). This is supported by the concept of ecological rationality, which suggests that the effectiveness of heuristics, and other decision-making types, is dependent on the environment (Bauer et al., 2013; Deshpande & Zaltman, 1984; Gigerenzer & Gaissmaier, 2011). Notwithstanding the competing findings, the literature does underline the role of heuristics in the effective screening of innovation decisions. We, therefore, set out to address two crucial questions:

- **RQ1:** *What specific decision-making types do managers use when making an innovation screening decision?*
- **RQ2:** *What is the relationship between different decision-maker profiles, and perceived accuracy and speed of decisions made?*

3 | METHODOLOGY

3.1 | Measures

Given the absence of prior empirical research on the types of heuristic employed by managers in the innovation selection processes, an exploratory approach to survey development was adopted. It was developed from 10 interviews with UK senior managers in the creative industries whose jobs involved choosing between creative projects. Four managers were in advertising (clients and agencies), three in publishing and data management, two in high-tech manufacturing, and one in the marketing of financial services. Each face-to-face interview was semi-structured with a protocol and conducted by one of the researchers and lasted between 16 and 45 min (median 32 min). After each meeting, the researchers considered the notes and agreed on common themes. This process was undertaken with the literature in mind but without any a priori theoretical perspectives. Themes were identified through an iterative process of refinement and reformulation (Arnould & Wallendorf, 1994) immediately after each interview. The interview process sought to ensure consistency and comparability of the questionnaire, and each commenced by asking informants about their knowledge and experiences of project development. Each interview followed a funnel approach starting with a short general discussion of project selection that quickly moved to a more specific discussion on the embryo questionnaire (Belk, Fischer, & Kozinets, 2012). Given the focus on

the questionnaire development, the role of these initial interviews was advisory. We recognize that by including four industries, and in the case of the advertising industry including both clients and agencies, our survey instrument gained in terms of breadth at the expense of depth. No transcripts were recorded or coded since the intent was to fine-tune the final instrument. Typical statements by participants were: "try to make the introductory text shorter" and "with Q1, I guess I need to pick whether it is external or internal. The remaining options could be shown as a multiple-choice." Another noted, "I immediately set off on the wrong track assuming from Q1 that the survey was about creative ways to make a decision (i.e., creative decision-making processes)." These comments were used to refine the questionnaire and generate clusters. The researchers followed this process up as the interviews progressed. A systematic, iterative procedure of moving back-and-forward between the initial clusters and the relevant literature to strengthen the clusters was pursued (Strauss & Corbin, 1998). This process sought to identify common connections and patterns between the identified themes to create the final clusters. As the interviews progressed, the researchers sought to ensure that each emerging cluster appeared reasonable based on the themes as these developed across the interviews (Glaser & Strauss, 2017). The qualitative interviews lead to the identification of two different heuristics termed "hierarchy" and "defer." "Hierarchy" bears some similarity to the "experience" heuristic and involves choosing the option that senior managers wanted while "defer" involves hiring an external consultant to make the decision.

We included a question for each of the 13 decision-making types namely: "instinct," "analysis," "default," "recognition," "fluency," "take-the-best," "satisficing," "tallying," "experience," "majority," "equality," "hierarchy," and "defer." In answering the 13 questions, respondents were asked to think about the most recent innovation project for which they needed to make a screening decision. Following a clear explanation of each decision-making type, they were asked to state the extent to which they used the approach described in each item in their decision-making. Each response was captured using a 7-point Strongly disagree/Strongly agree Likert-type scale.

We also measured two distinct aspects of decision-making performance: perceived confidence in decision-making accuracy and decision-making speed. Perceived decision-making accuracy was assessed by asking managers to report the extent to which they believed they made the right decision on a 100-point scale. This item was adapted from the decision-making effectiveness scale by Hammedi et al. (2011). We argue for the use of managers' subjective self-report judgments, noting that objective measures of accuracy are inappropriate as the performance of innovation projects is influenced by many factors that cannot be foreseen at the initial innovation decision-making stage. The item to measure perceived decision-making speed was taken from Baum and Wally (2003) and was kept as a reverse-scored item. This item asked participants to indicate the extent of time spent on the project on a 7-point scale. The reason for using different scale points and a reversed score for the dependent variables was to diminish the risk of

potential common-method bias (Podsakoff, Mackenzie, Lee, & Podsakoff, 2003).

In addition, demographic information about respondents and their organization and market were collected. Individual demographics consisted of gender, age, and job title while market environment and business information collected consisted of the type of business, size of the company, and how long the company had existed. Since the role of the experience of managers in heuristics decision-making is often highlighted in the literature (e.g., Fredrickson, 1985), respondents were also asked for their reaction to the question: "I have considerable creative decision-making experience." The item was followed by a 7-point strongly disagree/strongly agree Likert-type scale.

Common-method bias in the data collected may have occurred because of two reasons. First, no external data for the dependent variables of decision-making accuracy and speed were available, and second, single informants were used for measuring both the dependent and independent variables (e.g., Harrison, McLaughlin, & Coalter, 1996). Therefore, several procedural remedies and testing recommended by Podsakoff et al. (2003) were applied to address the potential presence of common-method bias. First, clear definitions for "instinct," "analytic," and "heuristics" were provided in the questionnaire to minimize potential item ambiguity. Second, to further ensure that the questionnaire was clear and understandable, the items used were amended to reflect the findings from the qualitative interviews with managers. Third, to minimize the risk of evaluation apprehension, respondents were allowed to remain anonymous. Also, while the questions in the first two clusters were all 7-point Likert-type scales, the two questions in the last cluster made use of a 100-point scale anchor for the perceived decision-making accuracy measure and a reversed 7-point scale for decision-making speed. Finally, common-method bias was subsequently formally tested using Harman's single factor test (Harman, 1960). The analysis showed the presence of five factors with an eigenvalue over 1, and the first factor explained 23.17% of the variance. These findings suggest that common-method bias is not likely to be a significant concern.

3.2 | Sample and data collection

The sample consists of managers in the creative industries. There are several reasons why creative industries represent a promising setting to study innovation screening decisions. First, creative industries are regularly faced with investment choice decisions among innovation projects. Examples include: "what book to publish?" "what film to produce?" and "what software development project to pursue?". Second, innovations are significant for creative industries. Third, screening decisions in creative industries are highly challenging because they cannot be based entirely on analyses and are characterized by demand uncertainty and infinite variety (Caves, 2000). Their decision-making types are nonanalytical and likely to include heuristics and instinct. As was the case with the Harry Potter and the Philosopher's Stone example, a publisher wishing to choose a manuscript for publication from among a range of submissions by different

authors is unable to resort to a set of algorithms. Finally, the relevance of creative industries comes from the substantial economic importance of the sector. The UK creative industries are estimated to be worth the equivalent of US$1.15 trillion per year to the economy (Government, 2017).

We purchased a list from Dun & Bradstreet (D&B), made possible by funding provided by the British Academy to reach the sample. The list used consisted of senior managers in four preselected UK creative industry sectors, namely: advertising, digital, publishing, and software. These sectors were partly chosen because D&B was able to identify specific managers from each of these sectors, and partly because they proved highly representative, accounting for 74% of all employment in the industry (Department for Digital, Culture, Media & Sport—DCMS, 2018).

We piloted the questionnaire using a convenience sample of 50 managers who were selected randomly from the database. The purpose of the pilot was to ensure the integrity and readability of the questionnaire. The selected managers received a cover email that explained the motivation of the study.[1] We collected data via a link to the questionnaire on Qualtrics. Two days later, follow-up telephone calls were made to managers who had not yet replied. Ten managers had not received the email, possibly because the survey link included in the cover email led to it being treated as spam. The opportunity was taken to discuss a variety of tactical aspects of the survey with nonrespondents who provided their advice despite not having completed the questionnaire. A total of eight versions of the initial questionnaire were each piloted with 50 respondents (8 × 50 = 400 in total), over 3 weeks.

At the end of this process, it became clear to us that the questionnaire receiving the highest response rate consisted of the version that was the shortest and, interestingly made use of the respondent's first name in the covering email. It was decided that it was necessary to make a trade-off between the length of the survey to be adopted (given the busy professional sample used), and obtaining the desired response rate (given the evidence of an inverse relationship of length and response). As such, somewhat controversially, the study decided to make use of single-item measures to capture several variables of interest.

The decision was not made lightly, knowing it was flying in the face of the conventional multi-item convention. The simple fact was that from a practical perspective, the key finding from the eight tests was that the version with single-item measures worked best. Evidence suggests that this may be because single items help eliminate redundancy and avoid negative feelings by reducing the boredom and frustration that long multi-item questionnaires can foster (Robins, Hendin, & Trzesniewski, 2001). Such questions are also quicker to complete and more flexible than multi-item scales (Nagy, 2002). Besides, there was the nature of the sample to consider. It has been reported that managers have much less trouble understanding and responding to basic concepts than

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[1]The details of the cover email sent, and the questionnaire used can be obtained from the lead author.

"normal consumers" thereby making the use of single-item measures particularly suitable (Pfeffer & Salancik, 1977; Piercy, 1987). Despite some concerns being raised regarding psychometric properties of short scales (e.g., Harrison et al., 1996), single-item scales are robust (Wanous, Reichers, & Hudy, 1997) and help reliability (Drolet & Morrison, 2001). Besides, when an underlying construct is unambiguous and unidimensional, it may not suffer from loss of validity or explanatory power (Bergkvist & Rossiter, 2007; Rossiter, 2002; Sackett & Larson, 1990). As such, the decision was made to use single-item measures for the variables.

The final survey of the research instrument was sent by email to 780 participants identified as key in the four creative industries targeted. Recipients were requested to pass on the questionnaire for completion to the most senior marketing person in the company if this did not happen to be them. Out of the emails sent, 172 "bounced back;" 26 were incomplete, resulting in 122 usable questionnaires or an effective response rate of 21.0%.

Respondents were 80% male with a mean age of 49.3 (SD 8.76). Just over 65% were Directors (Account/Development/Digital/Commercial/Creative/Marketing/Sales) and 16% were CEOs. This gender gap in our sample is reflective of managerial positions in general (e.g., Tuncdogan, Acar, & Stam, 2017) and creative industries in particular (DCMS, 2017), both of which are characterized by a greater proportion of males. Respondents were predominantly from firms in advertising (29.5%) and publishing (18.9%). Most were small to medium in size with just 17% describing their firm as large to extremely large, and a majority (59.8%) of firms had existed for between 11 and 30 years. The decision-making experience of respondents was 5.92 (SD 1.22) on a 7-point strongly agree/strongly disagree Likert-type scale.

Nonresponse bias was assessed by contacting 30 nonrespondents by phone. The overwhelming majority indicated that they were "too busy" or needed to abide by company policies not to respond to surveys. The means for replies to five items taken at random from the questionnaire as provided by the first quartile and the last quartile of respondents were compared and provided no statistically significant differences (Armstrong & Overton, 1977). The reported findings suggest that nonresponse bias is not likely to be a severe concern for this study.

4 | RESULTS

4.1 | Decision-making types

Responses to the 13 items capturing decision-making types were employed to create decision-making descriptors (see Table 1). The first cluster consisting of the items capturing "instinct" and "analytic" where each used to provide two dimensions while the 11 items that captured "heuristics" provided the third dimension. At over 17% and 19%, the top two heuristics that receive scores greater than five are "take-the-best" and "tallying," respectively. These were followed by the "instinct" and "analytic" dimensions at just over 14% and just

TABLE 1 Measurement items with descriptors

		Mean	SD	Scores > 5	%
Decision-making strategies (1–7 scales)					
Analytic	The one that proved best based upon analyzing the data	4.31	2.03	42	13.77
Instinct	We followed our instincts	4.27	2.03	43	14.10
				85	27.87
Heuristic types					
Tallying	One with highest number of favorable points	5.09	1.70	58	19.02
Take-the-best	One we thought would be best	4.43	2.35	52	17.05
Experience	One most experienced person in team wanted	3.39	2.04	24	7.87
Majority	One most people wanted	3.37	1.86	17	5.57
Recognition	One most recognized	3.09	1.97	16	5.25
Default	One most like what we normally do	2.79	1.85	14	4.59
Hierarchy	One that senior managers wanted	2.73	2.01	16	5.25
Satisficing	First one that exceeded our objectives	2.51	1.87	11	3.61
Fluency	One we recognized quickest	2.32	1.57	7	2.30
Equality	We allocated resources equally	1.57	1.32	5	1.64
Defer	We hired a consultant to make the choice	1.12	0.46	0	0.00
Perceived decision-making performance				220	72.13
Decision-making accuracy (1–100)	How confident are you that you made the right choice?	81.43	15.59		
Decision-making speed (reversed)	A lot of time is taken to reach the choice	3.36	1.90		

Abbreviation: *SD*, standard deviation.

below 14%, respectively. The "default," "recognition," "fluency," "satisficing," "experience," "majority," "equality," and "hierarchy" heuristics ranged from 8% to 2%, while "defer" received no scores in the 6–7 range.

Our initial analyses involving a correlation among the items measured revealed several interesting associations. The correlations matrix appears in Table 2. The "Equality" and "Defer" heuristics show no correlation with any of the other heuristics, the decision-making types, or the decision-making performance items. Among the heuristics investigated, there are strong correlations between "Fluency" and "Recognition" ($r = .60$; $p < .01$) and between "Experience" and "Hierarchy" ($r = .47$; $p < .01$). The analytic decision-making type is

TABLE 2 Correlation matrix

	1	2	3	4	5	6	7	8	9	10	11	12	13	14
Decision-making strategies														
1. Analytic	1													
2. Instinct	.00	1												
Heuristics types														
3. Tallying	.36**	.30**	1											
4. Take-the-best	.26**	.10	.29**	1										
5. Experience	.01	.50**	.19*	.10	1									
6. Majority	.31**	.33**	.23*	.27**	.34**	1								
7. Recognition	.15	.39**	.18*	−.04	.31**	35**	1							
8. Default	.09	.22*	.01	.06	.16	.24*	.41**	1						
9. Hierarchy	.00	.38**	.15	.05	.47**	.27**	.39**	.29**	1					
10. Satisficing	.07	.19*	.13	.23*	.16	.16	.02	.07	−.10	1				
11. Fluency	.16	.32**	.28**	.10	.20*	.41**	.60**	.30**	.29**	.16	1			
12. Equality	−.04	.06	−.08	.09	.00	.08	.05	.08	.07	.00	.05	1		
13. Defer	.11	.09	−.03	.12	.00	−.04	.07	.01	.16	−.07	−.01	.04	1	
Perceived decision-making performance														
14. Decision-making accuracy (1–100)	.21*	.20*	.09	.24**	.03	.18*	.10	−.02	−.08	.20*	.05	.06	−.01	1
15. Decision-making speed (reversed)	.34**	.09	.28**	.16	.17	.22*	−.02	−.14	.18*	.11	.01	.02	.21*	.02

*$p < .05$.
**$p < .01$.

TABLE 3 Results of the OLS regression analyses predicting decision-making accuracy and speed

Variables	Dependent variable: decision-making accuracy β (SE)	Dependent variable: decision-making speed β (SE)
Prior experience	.24** (1.18)	.07 (0.14)
Analytic	.16 (0.76)	−.27** (0.09)
Instinct	.25* (0.85)	.05 (0.10)
Tallying	−.07 (0.95)	−.16 (0.11)
Take-the-best	.14 (0.66)	.03 (0.08)
Experience	−.13 (0.83)	−.08 (0.10)
Majority	.14 (0.91)	−.14 (0.11)
Recognition	.15 (0.95)	.10 (0.11)
Default	−.08 (0.81)	.20* (0.10)
Hierarchy	−.10 (0.84)	−.20† (0.10)
Satisficing	.10 (0.77)	−.12 (0.09)
Fluency	−.13 (1.13)	.09 (0.13)
Equality	.04 (1.06)	−.04 (0.12)
Defer	−.04 (3.07)	−.17** (0.36)
$R2$	.24	.29
F	2.37**	3.15***

Note: Values are standardized coefficients. Standard errors are in parentheses.

Abbreviations: OLS, ordinary least squares; SE, standard error.

†$p < .10$.
*$p < .05$.
**$p < .01$.
***$p < .001$.

correlated with the heuristics for "Tallying," "Take-the-best," and "Majority" while the instinct decision-making type is strongly correlated with the heuristic for "Experience" ($r = .50$; $p < .01$) as well as with all the others heuristics including "Majority" and "Tallying" but not "Take-the-best." The analytic decision-making type is correlated with both items of decision-making performance. In contrast, the instinct decision-making type is only correlated with the decision-making accuracy item of performance.

In addition, we undertook a series of multivariate regression analyses using decision-making accuracy and speed as dependent variables, and decision-making types as independent variables were performed. The results are presented in Table 3. The results suggest that the instinct decision-making type was the strongest and most consistent predictor of decision-making accuracy. Put differently, the use of instinct was positively related to making more accurate decisions. The results also show that multiple decision-making types impacted decision-making speed. In particular, "Analytic," "Hierarchy," and "Defer" were associated with being slower in decision-making while "Default" was associated with a faster decision.

4.2 | Decision-maker profiles

Based on the results related to decision-making types and prior research, we identified specific managerial decision-maker profiles. These profiles focus on identifying how managers make a decision; that is how an individual manager combines different decision-making types. To that end, the data "instinct," "analytic," and "heuristics" were treated as three dimensions that could be either dominant or not dominant, with a score higher than five treated as dominant. These combinations enabled the identification of eight profiles used for making innovation screening decisions (see Table 4).

The results reveal that not all eight alternative decision-maker profiles are present in real life. Thus, the "instinct–analytic hybrid" decision-maker profile was not in evidence while, "analytic only" and "instinct only" decision-maker profiles were only reported by three and one respondent, respectively. These findings suggest that although conceptually possible, these three innovation decision-maker profiles are not commonly present in practice. Excluding these three profiles, leaves five common decision-maker profiles, namely: "low engagement," "heuristics only," "instinct–heuristics hybrid," "analytic–heuristics hybrid," and "full engagement." The results confirm that the use of heuristics is a pervasive decision-making type among managers. In the case of managers with "low engagement," operationalized as having scored 5 or less in each of the heuristics, instinct, and analytic, the suggestion is that the particular decision is one where managers are not concerned with achieving decision-making speed or accuracy. Over 60% of the primary decision-maker profiles relied on heuristics as a dominant type, either singly or jointly with another type. Table 4 also provides means and standard deviations for each innovation decision-maker profile by perceived decision-making accuracy and speed.

To assess the impact of the identified innovation decision-maker profiles on the two perceived decision-making performance items of accuracy and speed, we conducted multivariate generalized linear model (GLM). The analysis added respondents' subjective assessment of their business experience as a covariate to control for its effect on the link between the two sets of variables given the literature highlighting the importance of different levels of experience among managers in heuristics decision-making (e.g., Fredrickson, 1985). Box's test of equality of covariance matrix and Levene's test of equality of error variance were not significant, confirming that the assumption of homogeneity of covariance and variance has been met. The multivariate tests show a significant main effect when controlling for the covariate (Wilk's lambda = 0.81; $F_{[8, 220]} = 3.02$; $p < .001$) so the tests of between-subjects effects were investigated.[2] The univariate analyses for perceived decision-making accuracy and speed yielded significant main effects at $F_{[4, 112]} = 2.45$; $p < .05$ and $F_{[4, 112]} = 3.67$; $p < .05$, respectively. Further exploration of paired comparisons of different decision-maker profiles was then

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[2]Please note: we also looked at the age of participants as a proxy for years of experience, and the results were not significantly different. We opted to stick with perceived experience because it is a more direct measure of the construct we are interested in.

TABLE 4 Decision-maker profiles with descriptive statistics for decision-making accuracy and speed

|	Decision-maker profile	Definition	Operationalization	N	Perceived decision-making accuracy		Perceived decision-making speed	
					Mean	SD	Mean	SD
1	Low engagement	None of the decision-making types was dominantly used	Scored 5 or less in each of the heuristics, instinct, and analytic (0 0 0)	20	72.70	15.29	2.70	1.56
2	Instinct only	Decision was dominantly made based on instincts	Scored 5 or more in instinct; 5 or less in each heuristic and analytic (1 0 0)	1				
3	Heuristics only	Decision was dominantly based on one of the heuristics	Scored 5 or less in instinct and analytic; 5 or more in at least one of the heuristics (0 0 1)	33	78.67	16.86	3.06	2.00
4	Analytic only	Decision was dominantly based on analytic	Scored 5 or less in instinct; 5 or more on analytic; 5 or less on heuristic (0 1 0)	3				
5	Instinct–heuristic hybrid	Decision is made by dominantly using instincts and heuristics together	Scored 5 or more in instinct; 5 or less on analytic; 5 or more on at least one of the heuristics (1 0 1)	26	84.81	16.85	2.85	1.67
6	Instinct–analytic hybrid	Decision is made by dominantly using instincts and analytics together	Scored 5 or more in instinct and analytic; 5 or less in each of the heuristics (1 1 0)	0				
7	Analytic–heuristic hybrid	Decision is made by dominantly using heuristics and analytics together	Scored 5 or less in instinct; 5 or more in analytic and at least one of the heuristics (0 1 1)	23	85.27	10.46	3.83	1.61
8	Full engagement	Decision is made based on dominantly using all types	Scored 5 or more in instinct, in analytic, and at least one of the heuristics (1 1 1)	16	84.75	14.24	4.63	1.90
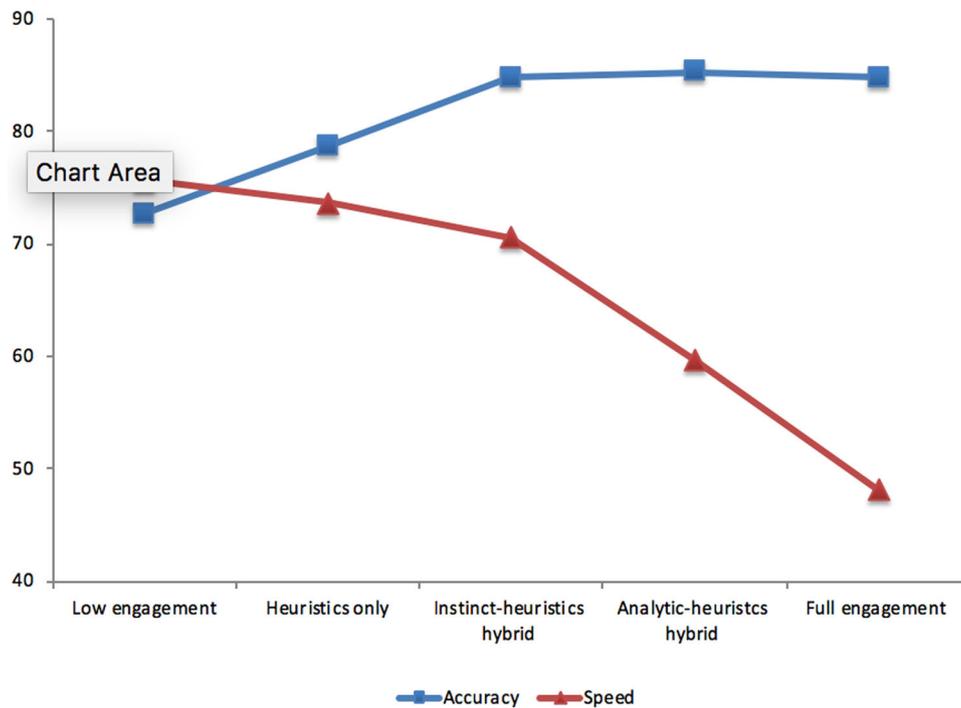
FIGURE 1   Decision-maker profile and decision-making performance[3] [Color figure can be viewed at wileyonlinelibrary.com]

undertaken. In terms of perceived decision-making accuracy, the "low engagement" decision-maker profile was significantly lower than "instinct–heuristics" ($M_{\text{difference}}$ = 10.61; $p < .05$), "analytic–heuristics" ($M_{\text{difference}}$ = 11.26; $p < .05$) and "full engagement" ($M_{\text{difference}}$ = 11.94; $p < .05$), but not with "heuristics only." With respect to perceived decision-making speed, the analysis revealed that the "low engagement" profile had a significantly lower score than "analytic–heuristic" ($M_{\text{difference}}$ = 1.13; $p < .05$) and "full engagement" ($M_{\text{difference}}$ = 1.93; $p < .01$), but not with "heuristics only" and "instinct–heuristics" profiles.

5 | DISCUSSION

5.1 | Overview of the findings

How do managers make decisions when they have to choose among alternative innovation projects? We suggest here that the top tools employed are the heuristics "take-the-best" and "tallying," followed by managers' "instinct" and an "analytic" processes approach. The heuristics of "default," "recognition," "fluency," "satisficing," "experience," "majority," "equality," and "hierarchy" are relatively less used. Managers seem to differ in terms of their reliance on their instinct, analytic processes, and heuristics in making decisions. Specifically, five main decision-maker profiles were identified, namely: (a) low engagement, (b) heuristic only, (c) instinct–heuristic hybrid, (d) analytic–heuristic hybrid,

and (e) full engagement. Except for decisions with low engagement, heuristics always play a role in decision-making. These are either used alone or jointly with other decision-making types. The evidence suggests that managers rarely make decisions purely based on "instinct" or "analytic" processes (see, e.g., Forlani, Mullins, & Walker, 2002).

The decision-maker profile that managers belong to has important consequences on their decision-making performance. Figure 1 illustrates these consequences for perceived decision-making speed and accuracy. Not surprisingly, when decision-making involved an "analytic" process, it was more accurate, but slower than low engagement decisions. Arguably the more critical findings from the study relate to the comparison of profiles when managers used at least one of the dominant decision-making types. Perhaps the most interesting finding is that managers that belong to an "instinct–heuristic hybrid" or a "heuristic only" profile were able to generate decisions that were perceived as accurate as managers who used data analysis in their decision-making. However, they were able to do so at a significantly faster rate.

We find that one reason why the employment of analysis in decision-making did not bring accuracy benefits might be related to the nature of innovation screening decisions. Such decisions are made very early in the NPD process, and at that point, the information upon which screening decisions are based may often be unreliable (Kester, Griffin, Hultink, & Lauche, 2011). It is notoriously difficult to have reliable information on many important factors that would be needed for making an effective screening decision. The information required includes data on customer reactions, competitor moves, and potential problems that might arise throughout the innovation process. Moreover, unforeseeable uncertainties or "unknown unknowns" (Loch et al., 2008) are likely to be extensive at the

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[3]The perceived decision-making speed scale is rescaled to 0-100 to facilitate comparison with decision-making accuracy.

front-end of innovation. This highly uncertain environment together with unreliable information may favor the effectiveness of "instinct" while diminishing that of an "analytic" process approach. Besides, the creative industry context of this study that is known to be characterized by high uncertainty about how customers react to innovations (Caves, 2000) may have further contributed to "instinct" proving more effective in making innovation screening decisions.

6 | CONCLUSION

By surveying senior managers from creative industries, we explored what decision-making types managers use when choosing new products to invest in and how these strategies affect decision-making performance. Interestingly, the results show that when managers trust their instincts solely or use these concurrently with simple heuristics, they achieve the best decision-making performance in terms of perceived accuracy and speed. Our findings set the stage for further theoretical progress toward a better understanding of the innovation decision-making processes.

6.1 | Implications

Our study has important implications for the marketing and decision-making literatures. First, it sheds light on how managers make decisions when selecting between alternative innovation projects to invest in. Research has shown that managers not only use analytic processes, but can also make new product portfolio management decision based upon their instincts and power dynamics (Kester et al., 2011; Kester, Hultink, & Lauche, 2009). However, the role of heuristics has remained largely unexplored. Heuristics have a central role in managerial decision-making and are widely used for important decisions (Bingham & Eisenhardt, 2011; Gigerenzer & Gaissmaier, 2011; Kolsarici et al., 2020; West, Christodoulides, & Bonhomme, 2018). This study provides some of the first empirical evidence to explain how managers use heuristics when choosing which innovation projects to invest in. It not only focuses on heuristics but also addresses the vital role of "instinctive" and "analytic" processes in decision-making. It, therefore, bridges and extends prior research on decision-making during innovation. The research has allowed the identification of specific decision-making types that are concurrently employed to assist decision-making as well as typical decision-maker profiles that managers belong to.

Our study contributes to the understanding of the consequences of decision-making types by extending prior research, which showed how the use of instinctive and analytic processes and the reliance on data can influence decision-making performance (Hammedi et al., 2011; Kester et al., 2011). This study takes these findings further by showing how the use of heuristics and its interaction with instinctive and analytic processes of decision-making affect perceived accuracy and speed of those decisions. The findings provide an important step toward a more comprehensive understanding of

decision-making at the front-end of innovation. Given the importance of such decisions for organizational competitiveness and success (Chao & Kavadias, 2008), this understanding is of great value both to marketing theory and practice.

We also provide implications for the broader psychology and management literature on decision-making. The current literature often assumes that heuristics and instinct increase perceived decision-making speed, but that they do so at the expense of accuracy (Dane & Pratt, 2007; Gigerenzer & Gaissmaier, 2011). The findings from this study show that in terms of the perceived accuracy-speed trade-off, this unfolds differently in the context of innovation screening decisions. Specifically, when heuristics and instinct–heuristic combinations are used concurrently in decision-making, perceived speed is increased without compromising perceived accuracy. Also, the extant literature has often focused on decision-making types in isolation (e.g., Wübben & Wangenheim, 2008) and does not consider interactions between different strategies. The findings in this study suggest that unique interactions between these strategies influence outcomes.

6.2 | Managerial implications

The core managerial implication of this study is that when managers are selecting what innovation project to invest in, they can rely on simple heuristics, such as selecting the project with the highest number of favorable points. By relying on heuristics, we find that managers can make decisions that are as accurate as when they rely on data analytical processes to inform their decisions. Moreover, they can do so much more quickly. Manager can trust their gut feelings as long as they combine it with simple heuristics. It is, however, worth noting that some studies suggest that the effectiveness of intuition compared to analysis is contingent on domain knowledge. Therefore, managers with limited expertise might be better off, relying only on heuristics rather than combining them with intuition (Dane & Pratt, 2007; Dane, Rockmann, & Pratt, 2012). Overall, our findings suggest that when both perceived accuracy and speed of decisions are important, reliance on instincts or heuristics or a combination of both can provide an optimal decision-making approach. Such situations are often encountered in the case of innovation screening decisions. Reliance on instincts or heuristics makes for quicker and just as accurate outcomes as involving analytical processes.

6.3 | Limitations and future research

The implications discussed above must be qualified in light of the limitations of this study. One limitation relates to the response rate and the sample size achieved. These are both comparable to other studies surveying managers in creative industries (e.g., Chaston & Sadler-Smith, 2012) and are therefore fairly representative of players in the creative industries (advertising, digital, publishing, and software). However, the generalization of the findings to different industries must necessarily be made with caution. The sample of

managers from creative industries was chosen because these industries are characterized by high levels of uncertainty about customer reactions and an infinite variety of potential new products (Caves, 2000). Other industries that do not share these properties might provide different results. The steps taken to control for common-method bias and testing for its presence using Harman's factor analysis test, suggest that this bias is not likely to be a serious concern. However, the possible presence of such a bias cannot be ruled out entirely, and future researchers might consider collecting data utilizing multiple sources for independent and dependent variables. As well, the respondents who commented and advised on the questionnaire were asked to think about a recent innovation project, but such projects can differ markedly and may represent radical, incremental, or disruptive innovations. Participants might have, therefore, thought about different types of projects and this may have impacted our results. Also, the results of the regression linking heuristics to performance outcomes are necessarily indicative. They need to be treated with caution because of the possible existence of multicollinearity among the independent variables. Finally, the cross-sectional design of the study limits the degree of certainty in determining causality. Therefore, future research might consider employing longitudinal or experimental designs to ensure the causal direction of findings.

In terms of future work, a natural extension of this study would be to address other important decisions made in the NPD process. The decisions we focus on in this study concerns those in the front-end of innovation, which is characterized by extremely high uncertainty (e.g., Hammedi et al., 2011; Hauser et al., 2006). As an original idea progresses through the different stages in the NPD process (e.g., concept testing, business analysis, prototyping, beta testing, etc.), uncertainty is reduced thanks to information and feedback acquired throughout. We encourage researchers to explore whether these differences matter in terms of reliance to and usefulness of different decision-making types. It is, for example, possible that managers rely less on their instincts once they have more data and feedback from consumers. Likewise, an analysis might only be useful when there is sufficient data. It would be fascinating to investigate whether similar decision-making types are used for other circumstances, situations, and industries. Besides, future research might also address organizational factors that might influence the choice of decision-making types and emergence of decision-maker profiles.

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CONFLICT OF INTERESTS

The authors declare that there are no conflict of interests.

DATA AVAILABILITY STATEMENT

The data that support the findings of this study are available on request from the corresponding author. The data are not publicly available due to privacy or ethical restrictions.

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