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A research agenda for studying managerial decision making through the lenses of simple heuristics

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Abstract

Management practitioners often rely pre-consciously on simple heuristics when approaching ill-structured decision problems. Simple heuristics research suggests that those simple cognitive strategies are not only a fast mode of deliberation, but may also be effective. Yet, the influx of empirical research using the simple heuristics as a theory of managerial or organizational cognition remains thin. To stimulate empirical research, we propose concrete avenues for research, which start with the empirical problems and then consider how simple heuristics can be used as a lens to address these issues. We exemplify our argument by focusing on empirical problems involved in project decisions. Specifically, we discuss three problems that pose both a challenge and an opportunity for simple heuristic research: decision (or problem) framing, the acquisition and use of unstructured information, and identification of options. We discuss these challenges along two views: the use of heuristics through the practitioner, and the development of heuristics in context of the organizational environment. The article contributes to the research on project decision making through concrete guidance to design empirically relevant research within the simple heuristics paradigm, and to the simple heuristics community by extending the research into novel empirical problems and methodological approaches.

1. Introduction

Managers often face ill-structured decision problems, for which classical analytical approaches are unavailable or unfit (Simon, 1973, 1956). In such cases, these practitioners often – though not always openly so – rely on their intuition or tacit ‘expert judgement’ to deliberate the decision problem and choose a course of action (Akinci and Sadler-Smith, 2012; Dane and Pratt, 2007; Hodgkinson and Sadler-

29 Smith, 2018). With this paper, we discuss the simple heuristics programme (Gigerenzer et al., 2011) as a
30 lens to study the cognition of managerial decision-making, and to shed light on the processes of expert
31 judgement and intuition.

32

33 Simple heuristics are cognitive strategies that enable ‘fast and frugal’ inferences for complex decision
34 problems by drawing only from a small sub-set of the available information, and processing this
35 information through simple algorithms (Gigerenzer and Gaissmaier, 2011). Herbert Simon proposed such
36 heuristics as suitable strategies to solve ‘ill-structured’ problems in organizational decision-making (1956).
37 More recent contributors, such as Artinger et al. (2015) or Mousavi and Gigerenzer (2014), emphasize this
38 theoretical suggestion, and the academic interest in heuristics in managerial and organizational decision-
39 making is continuously growing (Loock and Hinnen, 2015).

40

41 However, the research paradigms accepted in management research and the simple heuristic research
42 program differ significantly. The first is eclectic, inspired by a variety of disciplines such as sociology,
43 political sciences, and economics (Tsoukas and Knudsen, 2005), while the second is firmly grounded in
44 psychology, and as such paradigmatic and mostly positivist. In consequence, management scholars pursue
45 different research problems, questions and, accordantly, use different methodologies than those used in
46 the study of heuristics. Owing to the paradigmatic difference between the fields, we cannot just transfer
47 research questions and methodologies from the heuristics research program into management contexts.
48 Such transfer would imply asking questions and making contributions that are usually considered less
49 interesting or relevant to managerial contexts (Zahra and Newey, 2009).

50

51 We propose an alternative approach to study heuristic in management contexts inspired by organization(al)
52 research, extending the previously suggested ‘heuristics in the wild’ approach (Gigerenzer et al., 2011). Our
53 first suggestions is to begin the research with the problem, not the theory, and then explore how the

54 theory can explain behaviours related to the problem. As such, when studying management decisions, we
55 suggest that scholars need to develop a rich understanding of the context and the idiosyncrasies it carries.
56 Such a shift from research driven by theoretical questions, studied in controlled contexts, to research
57 driven from 'real life' problems, studied in rich decision contexts 'in the wild' has obvious implications for
58 the methodological design of studies. We therefore investigate alternatives, in particular qualitative
59 methodologies, which we argue are fruitful research opportunities of simple heuristics in management
60 contexts.

61

62 In order to illustrate our points, we need to focus on a specific context and its specific managerial
63 challenges. We focus on decisions in projects as our empirical context. For reasons we will detail in the next
64 section, projects are, from both the practical and the theoretical stance, an empirically relevant,
65 theoretically accessible and researchable context to study managerial decision-making. We therefore ask:
66 'How can we research decision-making behaviour of individuals in projects through the lens of simple
67 heuristics?'

68

69 In the spirit of this question, this paper intends to contribute to the academic communities of both
70 managerial decision-making and simple heuristics. For managerial decision-making research, we will
71 provide concrete guidance to design empirically relevant research within the simple heuristics paradigm.
72 For the simple heuristics community, we will contribute to the 'heuristics in the wild'-research by discussing
73 challenges that result from the particular empirical circumstances, and by suggesting how to address these
74 challenges through careful formulation of the research problem and use of novel methods.

75

76 The paper is organized as follows: in the next section, we introduce the empirical context of project
77 decision-making, pointing to particular challenges within the context. Thereafter, we will provide a brief
78 summary of the key notions of the simple heuristics paradigm and the current research on heuristics of

79 managerial practitioners. Building on this, we connect theory and context in the fourth section to a
80 comprehensive research agenda. We conclude the paper with a discussion of the research agenda and an
81 outlook for future research.

82

83 **2. The problem: Behavioural decision-making in projects**

84 This section introduces projects as a managerial context for the study of simple heuristics. We first argue
85 why we have chosen projects as an illustration. We then situate this paper within the research on project
86 decisions and describe two typical problems of that context: the challenge of uncertainty for the definition
87 and assessment of the 'good decision', and the institutional influence on individual cognition.

88

89 **2.1. Why projects?**

90 Projects are temporary vehicles used to perform a unique and complex endeavour, and thereby transform
91 the status quo. We have chosen to study project decision-making for four reasons.

92 First, projects are all around us, from the construction of an iconic building to the merger of large
93 corporations. In financial terms, spending in infrastructure projects globally is assessed at US\$6 to US\$9
94 trillion annually, which is equivalent to 8% of global annual gross domestic product (Flyvbjerg, 2014).

95 Projects affect not only infrastructure. They have become a dominant form of organizing in business and
96 society (Lundin et al., 2015). It is through projects that companies deliver innovation, new strategies or a
97 new marketing campaign. Moreover, several industries are solely organized through projects, such as
98 consultancy, construction, media and films, to name a few.

99

100 Second, while multi-project organizations aim to streamline the execution and management of their
101 projects, many projects remain unique in their own complex system of stakeholders, tasks, dependencies,
102 goals etc. and have limited useful historical data. As such, repeatability is harder to identify than in other

103 management context where operations are cyclical and repetitive. Thus, for many project decisions
104 practitioners will need to rely on generic decision strategies based on heuristics, rather than learned and
105 developed strategies (Artinger et al., 2015). Yet, even in highly complex contexts, we can find aspects that
106 are repetitive, and cannot be outsourced to machineries, such as reading people's feelings, phrasing
107 intelligent and appropriate questions, making sense of status reports, among others. For these recurring,
108 yet fuzzy, instances, we expect that practitioners have developed heuristics that help them navigate the
109 situation. Thus, projects provide a rich context to research the development of fast and frugal heuristics.

110

111 Third, while akin to the decision contexts of middle and top managers, and knowledge workers, the
112 decision challenges faced in projects are magnified due to an increased level of uncertainty, in particular
113 concerning the complex technical and social systems involved in projects (Davies and Mackenzie, 2014;
114 Geraldi et al., 2011). Thus, using projects as an illustrative case can serve as useful guidance for subsequent
115 considerations of other managerial decision contexts.

116

117 Fourth, projects are temporal organizations that form and dissolve (Lundin and Söderholm, 1995). This
118 temporary existence makes their boundaries more easily defined and researched. Additionally, a project
119 typically has stakeholders who meet repeatedly and intensively through the period of the project. These
120 interactions provide room for learning and sharing of decision-making heuristics or routines. This makes
121 projects an excellent opportunity to study the development of shared heuristics, and how contextual
122 aspects shape the selection of individual cognitive strategies.

123

124 **2.2. What's the decision?**

125 A project can be seen as a vast collection of decisions (Stingl and Geraldi, 2017). They span from strategic
126 decisions, such as the decision to launch or terminate a project, to mundane and day-to-day decisions, such
127 as what information to share in a meeting, or whether to accept minor changes in the project plan

128 (Rolstadås et al., 2014). These choices will shape the project, and are a core mechanism through which a
129 project manager and other stakeholders can influence the direction of the project. Therefore, it is
130 important to study decisions to enhance our understanding of projects.

131 Possible definitions of decisions in organizational and project studies span a wide range, including explicit
132 decision events, messy 'emerging decisions', or inaction and indecisiveness (March, 2001). For the purpose
133 of the paper, we will focus only on *explicit decision events*, involving conscious judgement or choice (if only
134 for inaction) by an individual or a group. This delimitation does not imply a depreciation of other concepts
135 of managerial or organizational decision-making, which acknowledge non-explicit or entangled decision
136 processes. Yet, it is necessary because the research following the simple heuristics paradigm requires
137 specific instances of judgement and choice.

138 When exploring decisions as events in projects, we further acknowledge that actors in projects (and
139 elsewhere) are not rational decision-makers. A core interest of the research in project decisions is how
140 project practitioners *do* make their decisions, if not according to standards of normative rationality (Stingl
141 and Geraldi, 2017).

142
143 As projects are vehicles for change (Turner and Müller, 2003), they are inherently uncertain. Specifically,
144 uncertainty in this context means the limited and unreliable nature of available decision-relevant
145 information. This uncertainty results from the complexity of projects as a socio-technical system, the
146 ambiguity of meaning and definitions across actors, and the lack of knowledge about both the present and
147 the future (Hällgren et al., 2012). Particularly this fluid nature of ambiguity, complexity, and a dynamic and
148 unpredictable future creates a context in which project decisions conform rather to Knight's (1921)
149 definition of uncertainty, rather than to risks with specified probability (Daniel and Daniel, 2018). From this
150 uncertainty we derive the three main challenges to project decision-making: Lack of reliable information,
151 ambiguous definition of 'the good decision', and inherent misalignment of interests and perspectives across
152 actors.

153

154 Lack of reliable information manifests across all types of project decisions, albeit often for different
155 reasons. The novelty of projects limits the availability of historical or experiential information, time-
156 pressure reduces the potential to gather information, and the complexity of the technical and
157 organizational aspects of the project limit the potential to analyse dependencies and relationships in full
158 (Geraldi et al., 2011). Moreover, the forward orientation of projects, embedded in a dynamic environment,
159 creates a challenge that decision-relevant aspects simply are unpredictable in the moment of the decision
160 (Daniel and Daniel, 2018).

161 Furthermore, relevant information in projects is often buried in more noise than signal, highlighting the
162 need for project practitioners to capture weak signals (Ramasesh and Browning, 2014). This challenge puts
163 a particular highlight on the question how practitioners search for information or selectively place attention
164 towards specific informational aspects (Ocasio, 2011).

165 In summary, the information environment in project decisions is often unstructured, information is
166 captured in different forms, often ambiguous, and the alternative paths to decide upon are undefinable.
167 Thus, project decisions depend often on the ability of the project manager to capture the right information,
168 and envision and create options, rather than only choose one (Gil, 2007).

169

170 The ambiguous definition of ‘the good decision’ results from diverging priorities or goals across
171 stakeholders, and the fuzzy relation between successful project management and a successful project. First,
172 projects often serve multiple, sometimes contradictory purposes, such as creating profits vs. being a vehicle
173 for sustainable or social change, and usually different stakeholders will defend different purposes (Davis,
174 2014). Consequently, the notion of a good decision will vary between stakeholders, as ‘good’ is a subjective
175 judgement of the individual actor. Secondly, decision outcomes will manifest in the future and may be
176 subject to unpredictable developments on the way there. Thus, project researchers have contested an
177 unequivocal relation between ‘good’ project management practice – including decision-making practices –

178 and 'good' project outcomes (Cooke-Davies, 2002). A particular observation made with regards to project
179 decision making is the attention paid to making 'resilient' rather than 'optimizing' decisions, i.e. prioritising
180 the ability to react and adapt in the future over aiming for the best possible outcome (Kutsch and Hall,
181 2016).

182

183 Misaligned interests and perspectives emerge as projects typically require the collaboration and
184 coordination between a variety of stakeholders sometimes coming from different organizations and
185 representing different skills and capabilities (Davies, 2018). This creates different interpretative frames and
186 incentives across the actors, giving rise to misunderstandings, conflicts, and ambiguity. Thus, project
187 managers may need to evaluate not only the potential costs, delays, and stakeholders reactions, but also
188 consider how different stakeholders will frame the situation and what decisions will emerge from such
189 framings. As such, there is no clear definition of what a decision should be, and instead, the framing of the
190 decision itself is part of the making of decisions in projects (Tryggestad et al., 2013). The complex
191 interdependencies between stakeholder groups (and technologies) can further exacerbate the challenges
192 involved in the decisions, as consequences of actions are very hard to determine upfront (Geraldi et al.,
193 2011).

194

195 Hence, the uncertainty of many project decisions creates a setting, where there is no one 'best' decision
196 that can be found through careful analysis. Similarly to what has been suggested by Simon (1955), project
197 practitioners aim to find the 'good enough' option. In that case, 'good enough' means balancing the
198 (ambiguous) objectives for the decision outcome, the expectations how the decision taken will lead to
199 specific outcomes, and the boundaries of the decision context in terms of information availability or cost of
200 (information) search. Moreover, in the context of uncertain information and ambiguous objectives, project
201 practitioners face the challenge that there is no clear definition of what the decision is about. Thus,

202 together with the described unstructured informational environment, and an undefined number of
203 potential options, project decisions are akin to ill-structured problems (Simon, 1956).

204

205 When researching ill-defined problems, we favour descriptive over prescriptive research. Here, descriptive
206 research means the investigation into how practitioners *make* decisions in practice, rather than how they
207 *should* make these decisions. Because of the argued complexities inherent to the definitions of ‘good’
208 decisions in projects, and hence the difficulties to establish what would be a ‘better decision’, we suggest
209 that descriptive research provides the more valuable avenue as it allows novel theorizing in the context of
210 the decision.

211 As suggested by Stingl and Gerald’s (2017) literature review on behavioural decision-making in projects,
212 most descriptive research on project decision-behaviour takes place in separated schools of thought that
213 either frame human cognition as a source of bias, or treat it as a black-box that underlies the observable
214 individual and group behaviour that is the interest of the research. Specifically, the prevalent heuristics and
215 biases research in the tradition of Tversky and Kahneman (1974), puts the attention to *what* the individual
216 ultimately decides. In contrast, descriptive research on adaptive, simple heuristics opens opportunities to
217 probe into the question *why and how* an individual arrives at the observable decision by identifying and
218 comparing possible cognitive strategies without *a priori* labelling this cognition as inherently biased, or
219 wrong. We therefore believe that the descriptive stream of simple heuristics offers the theoretical
220 foundation to study descriptive decision behaviour in project contexts.

221

222 **2.2.1. What is the decision context?**

223 Projects are embedded in an institutional context: the temporary organization created to execute the
224 project is connected to the parent organization or organizations that have initiated the transformation (e.g.
225 the new building, or the merger, or a new product). As the temporary organization is created for each
226 project, and expected to ‘die’ when it fulfils its function, it will adopt and mirror the managerial practice of

227 their surrounding organizations (Grabher, 2002; Sydow and Staber, 2002), while also profiting from a
228 certain degree of autonomy. The consequence is that decision-making structures will vary from project to
229 project.

230

231 Hence, decision makers will exploit their existing expert intuition, that is, they will draw on their experience
232 and adapt it to the new project conditions. At the same time, we can expect them also to learn and develop
233 new forms of decision-making in the course of a project, and potentially even creating shared ways of
234 making decisions and creating meaning across the project organization (where are we? What action is
235 appropriate for that situation?) (Abatecola, 2014; Oliver & Jacobs, 2007). The shared decision strategies in
236 each project could be seen as explorative knowledge developed for the project.

237 Moreover, ambidextrous capability – the ability to both exploit strength and explore new opportunities –
238 has been a core concern in the management of projects (e.g. (Brady and Davies, 2004; Turner et al., 2016).
239 However, we lack insights on the cognitive setup that allows individuals to navigate between exploration
240 and exploitation in messy project contexts. Thus, the study of *individual cognition* and its interactions with
241 context is promising and could shed light into the static and dynamic facets of expert intuition in use in
242 projects. Simple heuristics address this challenge by looking at adaptive behaviour to a specific context.

243

244 **3. Simple heuristics as a theory of the cognition of individual decision-making**

245 **3.1. Heuristics in managerial decision making**

246 Managerial studies have provided ample evidence of heuristics at the foundation of managerial decision-
247 making, either as ‘intuition’ or ‘gut feel’ (Dane and Pratt, 2007; Leybourne and Sadler-Smith, 2006), or as
248 explicit ‘mantras’ (Eriksson and Kadefors, 2017) or ‘simple rules’ (Bingham and Eisenhardt,
249 2011). Publications of recent years have increasingly reflected the work of Gigerenzer et al. and the simple

250 heuristic programme as theoretical framing for the study of heuristics in organizations (Loock and Hinnen,
251 2015).

252

253 Simple heuristics, as a theory of cognitive sciences, posits that human judgement and decision-making is
254 based on a set of adaptive cognitive strategies that make fast and frugal use of a subset of available
255 information in form of cues (Gigerenzer and Gaissmaier, 2011). This conceptualisation follows a
256 widespread (though not uncontested) notion of cognitive science, which states that the mind possesses a
257 repertoire of cognitive strategies to approach decision and judgement problems (Einhorn and Hogarth,
258 1981; Pachur and Bröder, 2013). Simple heuristics, in that view, are ‘adaptive tools’ that decision makers
259 consciously or pre-consciously select and apply in different decision contexts (Gigerenzer, 2000; Marewski
260 and Schooler, 2011).

261

262 This simple heuristics programme researches the structure of these cognitive strategies and the question
263 how individuals develop and select between them. The programme encompasses questions of both
264 prescriptive nature (‘What is an efficient decision strategy for this context?’) and descriptive nature (‘What
265 decision strategies do individuals apply in a certain context?’). The interest in heuristics in managerial
266 decision-making has exhibited a strong lean towards the prescriptive stream, i.e. a focus on the statistical
267 evaluations of the ecological rationality of selected heuristics for a specific decision problem
268 without investigating managers’ actual cognitive strategies.

269

270 However, some descriptive studies have aimed at identifying specific heuristics used by managers and
271 management teams. As argued in the introduction, our study focuses on the descriptive stream of heuristic
272 research. Managerial decision problems researched in this stream investigate cognitive strategies of
273 selecting target customers (Bauer et al., 2013; Persson and Ryals, 2014; Wübben and Von Wangenheim,
274 2011), making investment decisions (Berg, 2014; Gamble and Allport, 2015), forecasting future financial

275 performances (Cianci and Kaplan, 2010), selecting personnel (Luan et al., 2019), or judging credit ratings
276 (Summers et al., 2004). A common denominator of those studies is that they are examples of recurrent
277 decisions that take place in similarly structured information environments. Many of them additionally used
278 the typically abundant data environment to subsequently test the performance of the identified heuristic
279 and decision-behaviour towards a specified success criteria.

280

281 These studies focus on the question whether managerial decision-makers use heuristics, and if so, which
282 heuristics, by comparing observed decision behaviour with expected decision-behaviour that a model of
283 a specific heuristic would predict.

284 For example, in Persson & Ryals' (2014) analysis of marketing decisions in the Nordic banking
285 sector, the decision problem is defined as 'determining the status of the customer as active or inactive', the
286 cues are directly linked to the data structure of the Banks' information system, and a clear success criteria
287 for the correct status determination is provided. Thus, this approach defines the decision problem as a
288 specific question, provides explicit cues, and – in case of prescriptive intents – evaluates the judgement
289 based on a success metric defined by the researchers.

290

291 Alternatively, a few other studies discuss heuristics at the organizational or group level as guiding principles
292 embedded in narratives (Oliver and Jacobs, 2007), as shared mantras or catchphrases (Eriksson and
293 Kadefors, 2017), or as simple rules (Bingham and Eisenhardt, 2011; Davies et al., 2017). These works refer
294 to the simple heuristics programme and in particular to its claim of such heuristics being ecologically
295 rational (for a critique of this claim, see Vuori & Vuori, (2014). However, these works are less concerned
296 with the individual cognitive strategies and their development, which are likely to form the foundation of
297 the explicit and observable shared organizational heuristics. Yet, these studies point towards the important
298 issue that heuristics can act as a shared interpretative tool that potentially co-evolves on the cognitive level
299 of the individuals within a group and facilitates shared decision-making (Abatecola, 2014).

300

301 In summary, the current research on simple heuristics follows two separated paths: the structural
302 exploration of individual heuristics for specific, relatively well-defined problems, or the study of shared
303 rules at organizational level, which are decoupled from a specific decision problem and the cognition of the
304 individual.

305

306 **3.2. Expanding the study of managerial decision making through simple heuristics**

307 Considering the complex, subjective, and dynamic context of decision making as described in the project
308 context, and the review of heuristics in managerial literature in general, we identify two white spots: first,
309 we found no descriptive research regarding the individual cognition in a nuanced and turbulent decision
310 context; second, we found no research on the role that the organizational environment plays in
311 the development of individual cognitive strategies. This latter area would aim at establishing a link between
312 simple rules and individual cognitive strategies. We argue that both areas of investigation would benefit
313 from increased attention through the descriptive stream of heuristic research, from which follows our
314 proposed research agenda.

315

316 First, simple heuristics, as a theoretical frame, allow identifying, describing, and comparing individual
317 cognitive strategies of decision-makers. The simple heuristics view investigates *why and how* an individual
318 arrives at the observable decision by identifying and comparing possible cognitive strategies. These
319 investigations have yielded abundant structural description of heuristics, such as satisficing (Selten, 1998;
320 Simon, 1955), recognition heuristics (Gigerenzer and Goldstein, 1996), one-clever-cue heuristics, or take-
321 the-best heuristics, amongst others. The reviews by (Artinger et al., 2015; Gigerenzer and Gaissmaier,
322 2011) provide a comprehensive overview of these different heuristic structures. Common to these
323 structural descriptions is a rule-based approach to information search, information processing, and
324 decision-making. Moreover, simple heuristics research has demonstrated that through experience,

325 individuals develop consistently applied decision strategies in the form of simple heuristics (Dhmi, 2003;
326 Gacasan et al., 2016; Garcia-Retamero and Dhmi, 2009; Pachur and Marinello, 2013; Summers et al.,
327 2004). Thus, the simple heuristics research provides an appropriate angle to describe the cognitive
328 processes of judgement and decision-making.

329

330 Second, the conceptualization of simple heuristics as learned, contextually shaped, and (pre-)consciously
331 selected decision strategies, allows studying how the (organizational) environment shapes individual
332 decision behaviour. Hence, the programme offers an angle to study not only *that* expert intuition or expert
333 judgement follows heuristics, but also theories on *how* these experience-derived heuristics develop on an
334 individual cognitive level, and the role of the environment on this development.

335

336 Research on learning and selection of cognitive strategies has offered insights on how the learning
337 environment can influence the development and adoption of specific heuristics (Pachur and Olsson, 2012;
338 Rieskamp and Otto, 2006), or how an information environment provides cues for strategy selection
339 (Marewski and Schooler, 2011). A key finding of this research is, that the formulation of the decision
340 problem, its statistical and informational environment, and the manner how an individual receives
341 feedback on their choice shapes the development of specific types of cognitive strategies adopted in the
342 future (Pachur and Bröder, 2013). The organizational context thus shapes individual heuristics through the
343 learning environment it creates, as it influences reflection and feedback on the decision, and in
344 consequence creates the criteria for perceived success and failure. The simple heuristics programme thus
345 provides a theoretical framework to study how the environment shapes individual and shared decision
346 behaviour by conceptualizing simple heuristics as interpretative tools that evolve through interaction with
347 the environment.

348

349 Adopting the stance of descriptive cognitive research and its view on the dynamic development of
350 heuristics, we therefore use the following definition of simple heuristics: *Simple heuristics are cognitive*
351 *strategies for judgement and decision-making that make use of a small subset of the available information*
352 *through specific rules. Individual decision-makers use those strategies adaptively to choose a ‘good enough’*
353 *alternative for a specific decision or judgement problem. Environmental aspects such as feedback and*
354 *information structure shape how the decision-maker develops and adaptively selects among those*
355 *strategies.*

356

357 Reflecting the previously discussed complex, ambiguous, and uncertain context of project decision-making,
358 this definition invites three critical lines of inquiry: First, if a specific heuristic is applied only for a specific
359 decision problem, then what is the perceived decision problem the decision-maker considers? As many
360 project decisions are ill-defined problems, they follow ambiguous success criteria that are up for subjective
361 interpretation by the individual decision-maker. Thus, to be able to properly observe and analyse the
362 heuristics at play, research needs to understand the framing of the decision-maker regarding the decision
363 problem itself, and how the individual subjectively perceives ‘good enough’.

364

365 Second, if a heuristic only uses a subset of the available information, how can we determine what this
366 subset is, in an environment of largely unstructured and ambiguous information? Such information
367 environments are typical for the most salient and relevant decisions in project contexts.

368 Third, if a heuristic serves to choose the ‘good enough’ *alternative*, how does the decision-maker identify
369 the alternatives amongst which they choose?

370

371 Hence, research on project decision heuristics would benefit from an expansion beyond the question of
372 ‘What heuristics do project practitioners use in their decision-making?’, which aims at a merely structural

373 description of heuristics and the cues used thereby. In the next section we will discuss how research can
374 succeed stepping beyond this question.

375

376 **4. Discussion: A research agenda for studying behavioural decision-making in projects through the lens** 377 **of simple heuristics**

378 Departing from the empirical context of project decision-making, we structured the research agenda as a
379 framework of questions. The framework consists of two dimensions: the first dimension related to a static
380 or dynamic view of heuristics as cognitive strategies of decision-making, the second dimension to critical
381 questions resulting from the definition of simple heuristics when applied to the context of project decision-
382 making.

383

384 Throughout this section, we will use a specific example of a classical project decision: how to respond to a
385 requested scope change in a commissioned project, i.e. a project carried out for a customer. Commissioned
386 projects usually have a contractually agreed scope of deliverables and specifications. However, as both the
387 client and the project team learn more about the project – or as environmental factors change – the client
388 may identify needs and preferences that were not part of the original scope (Kreiner, 1995). For example,
389 they may ask for the integration of an interface to a particular software, or for a change in materials, they
390 may want to change the layout of the project site, or ask for additional functionalities in a software or
391 machine. The project manager and her team then have to decide – often under considerable time
392 constraints and with limited information – how to react to this desired change in scope. Typical reactive
393 modes are: accept the change without alteration to schedule and cost, prompt a formal change request
394 with impact on agreed schedule and cost, or inform the customer that the change cannot be
395 accommodated. Given the time pressure and constrained information availability in these situations, we
396 suggest that project managers will rely on heuristics to approach this decision. However, studying these
397 heuristics requires an extended set of questions and methodologies that we will discuss in the following.

398

399 **4.1. Level of analysis: Static vs. dynamic view on simple heuristics**

400 The first dimension of our research agenda follows prototypical questions encountered in the literature on
401 individual decision behaviour in projects, focusing on either the observed decision-behaviour, or the
402 antecedes of that behaviour. Thus, we consider heuristics through either a static view – focusing at the
403 heuristics that practitioners use for a specific decision in a specific point in time – or a dynamic view, asking
404 how the organizational environment shapes over time the heuristics that experienced practitioners use.

405

406 The *static view* explores the heuristics used by project practitioners at the point of the research. It thus
407 connects to prior heuristics research embedded in other contexts, which inquired specifically into the cues
408 that the individuals acquire and potentially consider in their decision-making, and the cognitive processes
409 how these cues inform the decision. This view investigates *why and how* an individual arrives at the
410 observable decision in the given decision instance by identifying and comparing possible cognitive
411 strategies. As such this view is aligned with the classical research problem of the ‘heuristics in the wild’
412 programme: ‘*What strategies do experts and lay-people rely on in real-world decisions?*’ (Gigerenzer et al.,
413 2011, p. xix). Yet, following the lines of critical inquiry introduced before, we can develop relevant sub-
414 questions that inform and support this overarching research question, and, as we will show, point to other
415 practical problems of project decision-making and decision-making research, which can be investigated
416 through a simple heuristics lens.

417

418 The *dynamic view* investigates how specific heuristics cognitively develop through influences and feedback
419 from the environment. This focus on the development and selection of specific heuristics for specific
420 decision problems through influences from the environment connects to the questions addressed by the
421 literature concerned with the learning and selection of heuristics.

422

423 The findings of this stream of the literature put forward that the context can dynamically shape the
424 development and selection of heuristics at the individual level through knowledge creation, feedback
425 provision, and the structure of the informational environment. In other words, simple heuristics research
426 suggests that the organization may provide wittingly or unwittingly a learning and informational
427 environment that influences the selection of heuristics applied by their members in particular decision
428 situations. In consequence, the dynamic view allows exploring how the interaction between the individual
429 and the organization influences the development of preferences for the selection of heuristics for specific
430 decision problems. The dynamic view thereby investigates differences across contexts, in particular across
431 time (*Do heuristics of individuals change as they familiarize themselves with a new project? Do individual*
432 *strategies converge within a project team over time?*), or across different projects that are exposed to
433 different environmental conditions.

434
435 This evolving and dynamic view of heuristics also offers to investigate broader phenomena of
436 organizational decision-making and behaviour, in particular the phenomenon of organizational
437 sensemaking (Weick, 1995). This follows from two consideration: first, heuristics are cognitive strategies
438 that guide the perception and interpretation of environmental cues or stimuli; second, as suggested by
439 Abatecola (2014), the heuristics that guide these interpretation are likely to co-evolve amongst members of
440 the same organizational or informational context. Following Weick's initial conceptualization of the
441 sensemaker's individual cognition as '*a frame of mind [...] that is best treated as a set of heuristics rather*
442 *than as an algorithm*' (1995: xii), converging heuristics across individuals may thus provide a cognitive
443 explanation for convergence of meaning. This view supports Sandberg and Tsoukas' (2015) call to study the
444 micro-foundations of organizational sensemaking through the individual cognition of the sensemakers.

445

446 **4.2. Three critical challenges: Problem framing, information use, and identification of options**

447 The second dimension reflects the assumptions and concepts of simple heuristics against the challenges of
448 the project decision-making context. For this dimension, we follow the three critical questions introduced
449 before:

- 450 (1) What is the perceived decision problem the decision-maker considers?
- 451 (2) How does the individual search for, and elicit cues from an unstructured and ambiguous
452 information environment?
- 453 (3) How does the decision-maker identify options?

454

455 **4.2.1. Individual framing of the decision-problem**

456 Decision framing refers to the subjective perception of what the decision is about, entailing both the
457 identification of the problem that requires a decision, and the understanding of what purpose the decision
458 should serve, i.e. the understanding of a 'good' or 'successful' decision.

459

460 Such framing is missing for many types of project decisions. For one, many project decision instances are
461 reactive to changing environments, and are not embedded in processes that dictate a timing or purpose of
462 a decision. Secondly, the variety of values, preferences, beliefs, and goals across a project team (e.g.
463 (Atkinson, 1999; Flyvbjerg, 2014), and the variable time-spans over which success may be evaluated (Davies
464 et al., 2017) creates an ambiguous success definition, that trickles down to each decision within the project.
465 Thus, what constitutes a 'good' decision in the eye of the decision-maker eventually will reflect subjective
466 preferences, values, and individual experiences (Kreiner, 2014).

467

468 Hence, other than classical simple heuristics research, the perceived decision problem as such is not
469 necessarily clear to the researcher, or even the decision-maker. This latter view reflects a common
470 argument of organizational studies, depicting decision-making not as events but rather as processes in
471 which meaning is created (Kreiner, 2012; March, 1994).

472

473 Taken the example of the change request, the project manager has – in absence of an explicit process
474 within her organization – no formal trigger for the decision-making, nor a formulated decision-problem. In
475 her perception, the client's request to change thereby may concern various problems: Is this change
476 technically feasible? Is this change covered by the contract? How can I avoid additional costs? How and
477 when should I respond to the request? Etc.

478

479 Thus, in order to research which heuristic the project manager applies to solve a problem, we first need to
480 establish which decision-problem she actually perceives to be facing. While studying the heuristics of pre-
481 defined problems is valuable for the establishment of the simple heuristics theory, understanding the
482 problem framing and its origin is critical to understand the lived experience of project practitioners (Cicmil
483 et al., 2009, 2006). In that regard, the simple heuristics lens can provide a fresh view on how new
484 information or specific stimuli – such as an e-mail by the client asking for a change – is cognitively
485 processed, leading to first a problem definition, and second to a decision or decision-equivalent behaviour.

486

487 Kaplan & Simon (1990) suggested that heuristics can play an important role in the framing of the
488 ambiguous or ill-defined problems we might typically encounter in project decision-making. Thus, a
489 potential research angle may ask: *(How) Do heuristics inform the framing of the problem? And: Which cues*
490 *from the environment are chosen to be considered relevant for the decision-framing?*

491

492 While the static view explores the problem framing, and heuristics that support the problem framing for a
493 specific point in time, the dynamic view investigates how the organizational environment and prior
494 experiences led to the particular observed problem framing. For instance, we might observe in our
495 example, that the project manager and her colleagues might frame the change request consistently around
496 a decision about contractual compliance, while in a different project a similar stimuli may trigger decisions

497 about technical feasibility. The dynamic view would therefore ask how the organizational environment
498 shaped this framing and the heuristics in place that lead to that framing. Characteristics that we could
499 explore in that regard are questions of feedback, routines of reporting and communication, shared
500 preferences, formative events, etc. Thus, the questions of the dynamic view are: *Which organizational*
501 *characteristics shape the heuristics that project practitioners apply to frame a decision problem? How do*
502 *these heuristics for decision-framing change over time in more or less turbulent environments? Under which*
503 *circumstances do the heuristics applied for decision-framing converge among members of the same project*
504 *or organizational unit?*

505

506 **4.2.2. Individual use of information as cues**

507 The informational context of project decisions is typically unstructured and ambiguous, where anything can
508 become a cue – the position of a cable in a technical drawing, the raised eyebrow of a colleague, the 5.45
509 am time-stamp of the client’s e-mail, etc. In our example, there are countless potential information
510 sources, that the project manager may consider – technical designs and bills of quantities, opinions and
511 attitudes of team members, prior and current behaviour of the client, current financial and competitive
512 situation of the company, personnel planning sheet, etc.

513

514 In brief, there is a large amount of information, different ‘data-formats’ from qualitative to quantitative,
515 uncertainty inherent in this information, different availability and costs of information search, and limited
516 control regarding to which information the decision-makers actually pay attention (even when discounting
517 the political processes working in the background). The study of simple heuristics in such context would
518 need to address therefore the questions *How do decision makers make sense of all this information? How*
519 *do practitioners encode fuzzy information into cues? How do practitioners search their information*
520 *environment for salient cues? And: Which cues are actually used?* In particular, we suggest that the role of

521 social cues, derived from the behaviour and expressed opinions of other individuals in the project, merits
522 increased attention in the study of managerial heuristics.

523

524 While heuristics build on the notion that only a few cues inform the decision, there is ambiguity as regards
525 the unit of the cue. In practice, cues may not be clear-cut informational units such as a number, a colour, a
526 physical presence, etc. Rather, cues in organizational practice may derive from situational patterns: various
527 elements of interactions with a client lead to a classification as 'favourable' or 'unfavourable', or the
528 cumulative aspects of a specific technical problem are judged as 'complex' or 'simple' (Shan and Yang,
529 2017).

530 Learning theory suggest that with experience, practitioners become able to aggregate cues or signals into
531 patterns ('chunks') and therewith increase the amount of information they can consider in a decision
532 (Miller, 1956). This aligns with findings of the naturalistic decision making literature on the role of
533 recognized patterns, that give indications for appropriate choices of action (Lipshitz et al., 2001). This
534 suggests that cues are indeed not only distinct pieces of information provided by the environment but can
535 also be self-generated by the decision-maker through holistic consideration of a situation or aspect of the
536 situation, where the aggregated judgement of the situation provides the cue.

537 The aggregation of information can take various forms, with regard to the amount of information
538 aggregated, and the formulation of the aggregated cue. In the most simple form it may relate to an
539 encoding of a numeric value into a categorical value – such as expensive/cheap, or long/short. In a more
540 complex form, encoding of cues may take whole patterns. Stingl et al. (2018) have provided examples how
541 executives of a project-based organization consider various circumstantial cues of a project bidding
542 opportunity to formulate binary cues such as 'Is the tender preparation feasible in time?' or 'Can we beat
543 the competition?'. The practitioners then applied these self-generated cues in one-reason heuristics for the
544 de-selection of project opportunities.

545 In consequence, research on heuristics in project practice can investigate which aggregated cues inform
546 decisions, and how potential underlying heuristics (introduced as 'nested heuristics' by (Shan and Yang,
547 2017) support the formulation of these aggregated or encoded cues.

548
549 Thus, we may ask: *How do individuals aggregate and encode information into cues or meta-cues that*
550 *represent patterns of information?* Studying the role of heuristics in information aggregation or encoding
551 would be relevant both to the development of individual decision experience in complex settings, and to
552 foster organizational contexts that increase agility of decisions by aggregating information in line with
553 individual cognitive strategies.

554
555 Again, the dynamic view expands the question by a longitudinal or comparative dimension, enquiring into
556 the shaping role of the organizational environment. Three organizational characteristics in particular are
557 likely candidates for exploration.

558 First, organizational signals on the salience and significance of particular cue. Feedback, reporting
559 structures, or other routines may establish interpretative patterns that serve as cues in the subsequent
560 decision. In our example, the project manager may have developed an understanding – for example
561 through negative experiences or discussions with colleagues – that different functionalities of the
562 commissioned system are differently sensitive to changes. In consequence she may thus first consider the
563 cue 'Does it affect a critical functionality?' in approaching the change request. In a different project, the
564 project manager may however rely on other cues, such as information related to timing, involved people,
565 location, etc.

566 Second, the organizational context may foster the development of higher fluency in interpreting particular
567 types of information or data as an easily usable cue. Fluency to interpret information as cues is relevant as
568 it reduces the cognitive load, which in turn favours the selection of a particular cognitive strategy (Pachur
569 and Bröder, 2013). Fluency may result from accessibility of information presentation – for example easy to

570 read red-amber-green charts or yes/no formats – but also the relative familiarity with a fuzzy cue. For
571 example, Gantt charts, the most prevalent visualization tool for project scheduling, provide a simple
572 depiction of the project progress. Deviations and their implications in the overall project duration are –
573 even by novices – easy to identify, and potential mitigation strategies, like speeding up other tasks, become
574 more readily cognitively available.

575 Third, the availability of different types of information within the organization is likely to affect the
576 decisions following differences of costs of information (Pachur and Bröder, 2013) – both monetary costs,
577 but equally time, effort or cognitive capacities. Thus, organizational structures and routines, related to
578 reporting and other forms of data capturing, proximity and friendly relationships to colleagues, language
579 differences, or simply trust in a source as sole information provider can shape the selection of heuristics.

580

581 Thus, the dynamic view can ask: *How does the organizational context shape the perceived salience of*
582 *specific cues? How does the organizational context support the development of fluency in interpreting*
583 *particular information as cues? How does the availability of information favour the development and*
584 *selection of specific heuristics?*

585

586 **4.2.3. Developing of, and deliberating between alternatives**

587 As ill-defined problems, most project decisions do not have a clear-cut set of options or alternatives to
588 respond to the decision-problem. When it comes to taking a particular action, the alternatives are
589 potentially unlimited and the decision-maker therefore needs to identify, frame, and screen those
590 alternatives with regard to the perceived decision-problem.

591

592 In our example of the change request, this could mean that even if there is a clear problem framing, such as
593 choosing a response action that creates the lowest financial exposure to the project, the potential action
594 alternatives that the project manager may consider are not set. She might draw some alternatives from

595 experience, e.g. requesting an amendment to the contract increasing the price, or politely refusing the
596 change, but she might also explore novel solutions particular for the request. Following Kaplan and Simon
597 (1990) the problem solving literature highlights the important role of heuristics in the development and
598 screening of potential solutions. Specifically, heuristics can restrict the search space and create focus by
599 providing rules for responses that can or cannot be followed in the particular situation. In our example, the
600 project manager may know that it is against the strategic interest of the project to refuse reasonable
601 change requests, or that the area affected by the change is of low technical criticality. She may use those
602 cues and heuristics as boundaries for the exploration of potential alternatives. Secondly, heuristics can
603 support the screening and selection of these identified alternatives (Albar and Jetter, 2013).

604

605 The resulting questions for this line of research are therefore for example: *Which heuristics guide the*
606 *search for response options? How do heuristics act as boundaries in the search for solutions? What*
607 *heuristics do practitioners use to screen and select responses?*

608

609 When adopting the dynamic view, the question expands to how experience and feedback within the
610 organizational environment, combined with information availability, shapes the heuristics that guide the
611 identification of action alternatives, and the heuristics that allow selecting among the identified
612 alternatives. In particular, knowledge sharing or feedback practices, reporting structures, or interpretative
613 frames of organizational narratives may lead to the development of particular heuristics within the
614 members of a project.

615

616 For example, if the steering committee of a project repeatedly focussed on the issue of cost overruns while
617 putting less attention towards technical issues or client relation issues, this may steer the project manager's
618 search towards solutions with low immediate effects on costs (but which may be detrimental to
619 performance or customer relations). Moreover, the availability of similar previous experiences can serve as

620 heuristics for the identification and selection of problem solutions (Reiter-Palmon, 2017; Simon, 1990).
 621 Thus, the main questions of the dynamic view asks *How does the organizational environment shape the*
 622 *heuristics used to identify, screen and select responses?* In particular, this question may also distinguish
 623 between ‘known’ decision-problems that share superficial similarities to problems that the decision-maker
 624 has encountered before, or new problems that may only share (some) structural similarities.

625

626 *Table 1 - Framework of the research agenda with illustrative research questions.*

	Static view: What are the cognitive strategies of the individual decision maker?	Dynamic view: How does the context or organizational environment shape over time these cognitive strategies?
<i>Framing: What is the perceived decision problem the decision-maker considers?</i>	(How) Do heuristics inform the framing of the problem?	Which organizational characteristics shape the heuristics that project practitioners apply to frame a decision problem?
<i>Information: How does the individual search for and elicit cues from an unstructured and ambiguous information environment?</i>	How do practitioners search for, and encode unstructured and ambiguous information into cues?	How does the organizational context shape the perceived salience of specific cues? How does the organizational context support the development of fluency in interpreting particular information as cues? How does the organizational context shape the ‘cost of information’ and in consequence favour specific heuristics?
<i>Options: How does the individual identify and select potential response alternatives?</i>	Which heuristics do practitioners use to identify possible responses? Which heuristics do practitioners use to screen and select a response?	How does the organizational context shape the heuristics used to identify, screen, and select responses?

627

628 **4.3. Methodological suggestions**

629 Following those three critical lines of inquiry within the static and the dynamic view, we see a need for a
 630 methodological expansion within simple heuristics research. The classic simple heuristics research provides
 631 established research methods to identify heuristics applied for well-defined decision-problems with clear-
 632 cut cues. However, for the discussed research problems, we need to take the subjective perceptions of the
 633 decision-maker, the fuzziness of information, and the potential shaping effect of the organizational

634 environment into account. We believe that to explore those aspects adequately, we need to incorporate
635 more qualitative or mixed method approaches into simple heuristics research. Considering that the
636 researcher will have a limited *a priori* understanding of the lived experience of the practitioner, a pre-
637 defined set of likely framings is at high risk of being incomplete or misrepresenting the actuality of project
638 decision-making. To overcome this limitation, qualitative methods allow exploratory or open investigations
639 that are helpful for the early inquiries into a specific decision-making phenomena, when no specific
640 decision-problem or set of cues is apparent to the researchers. Thus, qualitative methods are necessary for
641 the development of new theories or models regarding the role of heuristics in project decision-making.

642

643 **4.3.1. Qualitative and mixed methods for researching project decision heuristics**

644 Qualitative methodologies allow gathering insight on the framing of the decision problem, the acquisition
645 and use of information and cues, and the development of options. We expect those cognitive processes to
646 unfold in a manner that seems overlapping or intertwined to the external observer, thus the methods
647 suggested in the following are likely to produce insights on some or all of those aspects. Research can
648 follow two (not necessarily separated) streams of qualitative inquiry with different potentials and
649 limitations: observation and interview.

650

651 *Observational methods* capture data of any form on *what is done* and *what is said* during a decision
652 instance. Thus, they allow investigating the immediate behaviour of the decision-maker(s), without
653 influence of the researcher or post-rationalization of the behaviour. However, during observation the
654 researcher has no opportunity to clarify or inquire. Thus, such methods require a sufficiently confined
655 decision instance where aspects that are not at the centre of the research but may have an influence on the
656 behaviour are fixed or can be observed. For example, if the observational method aims at investigating
657 information use, the researchers would need to assure that the decision-problem and the options are
658 unambiguously clear to the observed individuals. If this cannot be assured, observational methods need to

659 include ways to capture data on the problem framing or option identification, such as interviews or
660 research design in which the participants formulates decisions or judgment in a way that reveals their
661 framing. Additionally, a confined decision instance also means that researchers have a near-to-full grasp on
662 the information that is available to the decision-maker, an assumption challenged by the expected use of
663 cues from memory.

664
665 The best level of control for observational methods can be achieved through realistic decision simulations
666 in which the participant comments on the information search and deliberation process in form of a think-
667 aloud-protocol. This method is suitable for decision instances with a well-defined information environment,
668 for example, when decision-makers typically receive only a limited set of formalized documents or
669 presentations. This method may also be suitable to research decision problems in very early stages, where
670 no prior information is available, or for high-level decision-making bodies that interact with information
671 about specific projects only within confined committee meetings. Another possible empirical context may
672 be decisions related to abruptly emerging situations.

673
674 A well-developed method for this type of simulation research is the active information search
675 method (Huber, 1997) that has previously been applied to study how project practitioners identify risks in a
676 new project (Stingl and Geraldi, 2019; Winch and Maytorena, 2009). AIS allows observing the information
677 search behaviour of an individual solving a specific decision or judgement task in an experimental setting
678 with a controlled informational environment. This method combines observation data on the information
679 search behaviour, with contextual data from a think-aloud-protocol on how the individual frames the
680 information in form of cues, or bases judgements or decisions on those cues. Thus, this method provides
681 insights both on heuristics that guide the information search, on cues that the decision-maker attends to,
682 on heuristics that inform decisions or judgment, and on contextual factors that may explain preferences for
683 the observed heuristics. However, the observation of a simulated decision context always bears the

684 limitations of laboratory research, through the simplification of a real world problem, a tighter temporal
685 frame, the potential absence of variations in 'cost of information acquisition' etc. Thus, the findings may be
686 indicative of real-world decisions, yet may not be an appropriate representation thereof.

687
688 An approach to study real-world decision-making without the limitations of simulations is shadowing of
689 project practitioners or observation of committee meetings, combined with document review and
690 interviews to gauge the thinking process of decision-makers. Yet, with this approach, the researcher may
691 have limited control over all instances of information acquisition outside the researched environment, such
692 as previously acquired information, informal chats, etc. Moreover, they might not be able to record the
693 practitioner's reflection on newly acquired information, which can be a valuable insight into the choice and
694 salience of specific pieces of information.

695
696 *Interviews* can overcome some of the limitations of observational studies – however introduce their own
697 limitations. In the simplest form, interviews can be semi-structured, directly asking for aspects such as
698 decision framing, relevant criteria, or choice of options, although with the risk of biasing the findings
699 through post-rationalisation and other pitfalls of explicit interview methods (Nisbett and Wilson, 1977).
700 Other, more nuanced techniques from other fields of decision research allow a combination of more subtle
701 inquiry, typically combined with a simulation step to validate the explicitly described approaches. Specific
702 methods include the applied cognitive task analysis (Militelto and Hutton, 1998) or the critical decision
703 method (Hoffman et al., 1998), both rooted in naturalistic decision making research (Klein, 2015). These
704 two-step methods first enable the experienced decision-maker to break down their tacit decision processes
705 into explicit individual elements of the task. Based on the results of the first step, the researchers then
706 develop decision scenarios for the second part of the method, in which the experienced individual engages
707 with the scenario to validate the task-decomposition elicited in the first step. The structure of the task-

708 decomposition typically depicts individual cue-like information elements of the environment, and
709 structures them similar to one-reason and multiple-cue heuristics.
710 Hence, these interview-based methods allow exploring how experienced practitioners structure their
711 decision problems, and which information or cues they rely on for the individual sub-tasks. These methods
712 moreover provide insights on how practitioners frame the decision problem, in particular their concept of a
713 'good decision' in the given context. The limitation of these methods lies within their time consuming set-
714 up that can reduce the willingness of highly experienced (and thus very busy) practitioners to participate.
715 Moreover, these methods are suitable only for the exploration of conscious decision processes, thus
716 potentially masking underlying pre-consciously processed cues that similarly may influence the decision.
717
718 While both observation and interview methods have their limitations, they allow identifying potential
719 framings of the decision problem, a set of potentially used cues and how they inform the decision through
720 heuristics.

721

722 **4.3.2. Methods to research the shaping effect of the organizational environment**

723 The dynamic view extends beyond the mere identification of the simple heuristics, to comparative
724 investigations how particular organizational characteristics lead to the development of these heuristics for
725 an individual decision-maker, or a group of individuals acting in that environment.

726

727 Research on this interplay between organizational context and individual heuristics needs to gather data on
728 structures, routines, or processes within the project organization, its information context, and how
729 individuals navigate in it. Such data could stem from an ethnography type research (Fetterman, 2010) on
730 how people in the organization perceive and talk about the specific decision, or other types of qualitative
731 and quantitative data on when and how individuals in the organization encounter the decision and its
732 consequences. For example, to study heuristics used to select projects, important contextual factors may

733 relate to the way people in the organization discuss the success or failure of particular decisions, the
734 individual consequences related to 'good' or 'bad' decisions.

735

736 To explore the shaping effect of such characteristics research needs to follow comparative study designs,
737 such as multiple-case studies, longitudinal studies (in which characteristics change or can take effect over
738 time), or even experimental studies.

739

740 While this approach to research the interplay of organizational context and individual decision-making
741 promises interesting insights, the key limitation lies within the mono-directional orientation of the simple
742 heuristics framework. This theoretical approach inquires only into how the context shapes the heuristics,
743 yet it does not provide a theoretical proposition on how the individual and their decisions, in turn, shape
744 the organizational context. The simple heuristics framework thus may contribute to parts of the focal
745 interests of contemporary sensemaking theory, but is insufficient to reconcile the overall mechanisms of
746 reinforcing organizational and individual behaviour.

747

748 This limitation can also constitute an opportunity for the daring academic. Indeed, one of the core research
749 concerns in organizational theory is the mutual interplay between agency and structures, i.e. individuals
750 and organizations. As such, the theories suggest a variety of mechanisms through which individuals shape
751 organizations. Studies into how individuals influence organizational context, and the fuzzy interplay
752 between organization and individual have therefore the potential to make a theoretical contribution to
753 simple heuristics theory.

754

755 Finally, decision contexts in projects are dynamic, and what constitutes a fruitful organizational context in
756 one phase of a project may no longer be appropriate at a later stage, as the decision context changes, and
757 stakeholders start behaving differently. Hence, akin to concepts of core competence and dynamic

758 capabilities, prescriptive research could explore organizational contexts that foster not only selecting
759 fruitful heuristics, but also learning how to develop and select fast and frugal heuristics as the
760 organizational and decision contexts change.

761

762 **5. Conclusion and outlook**

763 Our research agenda aimed to move the discussion of simple heuristics from the potential applicability of
764 the theory, to an illustration how it can be applied. Particularly, we argued that the simple heuristics lens
765 provides a fresh angle to look at 'expert judgement'. Practitioners in organizations often make decisions
766 under high uncertainty and pressure for legitimacy, professionalism, and speed. We observe practitioners
767 camouflage their expert judgement and intuition with what sounds rational and legitimate, such as
768 analytical decision support tools and methods. Simple heuristics can provide an alternative view that values
769 intuition, reflection in practice, and nurtures rich experiences.

770

771 Simple heuristics allow looking into individual decision-making and its interaction with an organizational
772 context as a set of learned and (pre-consciously) selected cognitive strategies. This understanding of
773 heuristics as being shaped by the environment and co-evolving amongst individuals operating in the same
774 organizational and informational context sheds new lights on sense-making and provides a new theoretical
775 framing to study group decision-making.

776

777 This paper set out to review systematically the potential of the simple heuristics paradigm for the study of
778 project decision-behaviour, heading out from the practical problems of project decision-making, rather
779 than from the theory of simple heuristics. We hence sketched the main empirical problems and challenges
780 of project decision-making along the questions which heuristics the decision-maker uses (static view), and
781 how the organizational environment shapes these heuristics (dynamic view). We then explored for each of
782 these themes how a research approach of the simple heuristics paradigm can provide novel insights. In

783 particular, we provided illustrative research questions, suggested methodological approaches, and pointed
784 to the limitations and challenges of each such approach.

785

786 In conclusion, we have presented arguments that the simple heuristics paradigm can contribute to all key
787 areas of current research on project decision-making behaviour, and have indicated how it may do so. We
788 thus contributed to two academic fields: project decision studies, and simple heuristics research. We
789 contributed to project decision studies by providing guidance for empirical research within the simple
790 heuristics paradigm. We did so by starting with the empirical context of interest and connecting the
791 identified key research themes with avenues through which simple heuristics can provide new insights. We
792 thus inversed the argument previously brought forward for simple heuristics, which merely identified
793 managerial decision-making as suitable context that shares characteristics of contexts in which simple
794 heuristics arguably are likely to succeed. The approach we took in developing a research agenda for project
795 decision-making thus may serve as a blueprint for further applications of simple heuristics to other
796 empirical contexts of the managerial domain and beyond.

797

798 By rooting our approach in the empirical phenomena, rather than the simple heuristics paradigm, we
799 moreover contributed to the 'heuristics in the wild' research as we were able to point towards both
800 limitations and opportunities of the simple heuristics paradigm in a new empirical context. In particular, we
801 revealed the potential for simple heuristics to contribute to research on the cognition of project
802 practitioners when approaching ill-structured problems. Specifically, we discussed the potential of single,
803 nested, or sequential heuristics in the framing of the problem, the search for and encoding of unstructured
804 information, and the identification of options. Finally, we suggested alternative research methods that are
805 suited for the complex and dynamic empirical context of managerial decision-making.

806

807 Although aimed at academics, a practical implication of this paper is to expose practitioners to an
808 alternative approach to identify, describe, discuss, and validate expert intuition. While managers silently
809 accept that ‘gut feeling’ and ‘intuition’ is part of their decisions, organizations are more likely to accept
810 arguments based on procedural rationality. The consequence is that ‘gut feeling’ remains hidden, or
811 treated as a magic sixth sense that cannot be touched, discussed, or validated. Practitioners may use the
812 research methodologies offered in this paper to reflect and experiment on their own practice. The
813 methodologies will help them in the identification, development, and testing of simple heuristics in
814 organizations in areas such as forecasting, risk identification, or the navigation of dynamic social change.

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