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Heuristics for selecting and using behavioural design methods

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Design for behaviour change is a young and developing practice grounded in the belief that using insights from the behavioural sciences leads to more effective interventions for behaviour change. Although a wide range of tools, techniques and methods exist to support this, few are well introduced in terms of their underlying values or paradigm for understanding behaviour. As a result, designers are often limitedly aware of why and how methods fit their personal beliefs and way of working. This not only obstructs professional development; it decreases the effectiveness and efficiency of behavioural design. In this paper we present an initial set of heuristics for designers to anticipate the appropriateness of a method, given the task at hand and their preferred way of working. These heuristics have been developed through an analysis and comparison of nine behavioural design methods. We conclude with discussing their potential in framing and staging behavioural design methods and studying method usage.

design for behaviour change, method usage, heuristics

1 Introduction

The notion that we can affect behaviour through the design of an intervention has spurred the development of new professionals and institutes. Around the world we witness a growing number of design agencies and consultancies focusing on behaviour change, and several countries adopted the UK model of a behavioural insights team to advice governments in policy making and execution. To support this new practice of what we can call 'behavioural design', the large and growing body of knowledge around behaviour change is being transformed into methodological support. This has led to an abundance of strategies, principles, models, frameworks and methods directed at design for behaviour change (e.g., Niedderer, Clune, & Ludden, 2017).

Although methods, tools and techniques are popular amongst designers, and an often anticipated result of (design) research (Blessing & Chakrabarti 2009) , there is generally little knowledge of their

usage (Daalhuizen, 2014). But when one wishes to use a method, this often leads to a number of questions: How should the plethora of methods be navigated? What method fits the task best? What method fits me as a designer best? Once selected, how should a method be adapted to a specific context and applied? And how should a method be communicated to team members and stakeholders so that they buy into it and are involved? Although methods typically promise specific results, they often do not communicate well how they do so, nor why this is a good way. Productive use of a method typically requires a 'method mindset' (Andreasen 2003, Daalhuizen 2014) that is appropriate for the specific method or type of method. That is, to choose an appropriate method in a given situation, and to use the method productively, one needs to understand for example the mechanisms that underlie the method, have know-how about the application of the method, and be able to judge (intermediate) results. Yet many methods do not include information that allows practitioners to make such judgements to a sufficient extent. As a result, designers are often little aware of possible mismatches between their way of working and the prescribed way of working advocated by the method. For example, a behavioural design method that prescribes qualitative field work to gather empirical data about people's behaviours and attitudes might not explicitly mention that the user of the method needs competences to perform qualitative research. But it requires skill to perform semi-structured interviews or observation techniques, as well as to analyse qualitative data and translate it to inspiring insights for innovation. If such a method is chosen by a team who typically work with quantitative research, it is likely that the use of the method leads to poor results and frustration in the team. Just like professional tennis players select their gear adjusted to their personal ergonomics, playing style and the type of court they will play at to optimize their performance, so too should designers (or method users in general) be better aware of what methods and techniques will actually improve design performance for them.

The contribution of the paper is twofold. First, it is to propose an initial set of heuristics to help practitioners navigate the body of methods that are available in the field of design for behavioural change. This set has emerged from analysing a small, yet varied sample of methods and therefore explicitly serves as a starting point for more work in this area. Second, the paper intends to spark a debate within the behavioural design community as to how methods ought to be presented, evaluated and compared in order to best serve the community of practitioners and researchers.

The remainder of the paper is structured as follows: first, we discuss the role of methods in design in general, after which we introduce the value of heuristics in supporting method selection for behavioural design. Next, we introduce a study to understand how differently a set of behavioural design methods support the shift from analysing the behavioural issue to synthesizing a solution. This results in an overview of nine methods, their fundamental characteristics, and how differently they support various stages in this design process. Based on this study, we propose two process-heuristics and four method-heuristics that can aid the designer in selecting and applying a behavioural design method given the task at hand and their preferred way of working. We end with discussing the limitations of this study, the preliminary stage of the heuristics, and avenues for future research.

1.1 The role of methods

In general, methods are developed to mediate the learning of procedural knowledge, defined as knowledge exercised in performing a task. This means that methods are 'intermediates' that support people to learn how to do certain things, either based on the experience or insight of others or based on theory (Daalhuizen 2014). Although the core function of methods is to transfer knowledge about how to reach a specific goal, they often include declarative knowledge about this goal as well (particularly in the field of behavioural design). For example, the Persuasive Systems Design method prescribes five main steps to get from starting point of a project to design of a system (procedural knowledge), yet it also includes a set of principles that contain declarative knowledge about behaviour (Oinas-Kukkonen & Harjumaa, 2009). One example of such a principle is 'social comparison', which states that people are more likely to be motivated to perform a target

behaviour, when they can compare their own performance with that of others. Thus, declarative knowledge refers to for example theoretical explanations of specific phenomena, in this case behaviour. Whereas procedural knowledge refers to knowledge about how to perform a task, possibly including statements on how and when to use specific declarative knowledge in the process. In fact, many behavioural design methods are grounded in specific models of behaviour or behavioural change.

Methods in design have long been conceptualized as systematic instructions for good design: they need to be followed to reach optimal design outcomes (Jensen & Andreasen 2010). Underlying this conceptualization is a model of human beings as rational actors – a point illustrated by Bousbaci in the context of design (2008), who are willing and able to follow instructions as they are spelled out in a method. However, the way methods are being conceptualized is changing (Dorst 2008, Andreasen 2011), with implications for their use. Whereas the 'traditional' view of methods as 'instructions to be followed' implies a passive – one could say obedient - role for the user of methods, a view of methods as 'mental tools' puts the method user in a pivotal position. In the latter conceptualization of methods, the method user is the one who actively selects and uses methods to enhance or learn new capabilities and to perform at a higher and more consistent level. It also acknowledges that the use of a new method requires learning and motivation before it can be used beneficially (Andreasen 2003). Perhaps more importantly, it acknowledges that human beings are mostly non-rational actors, and that their motivation and ability to actually use a new method cannot be presumed by method makers.

1.2 Models of the user

When developing interventions to change behaviour, models of the human being are inherently embedded in the eventual design. Beliefs or assumptions about what interventions will be effective explain how people are being modelled in the targeted context by designers. Are people motivated to change? Are they willing to absorb information? Do they have the capacity to oversee consequences? Although such assumptions may not always be explicitly addressed during a design for behaviour change project, the resulted intervention does model people on such dimensions. Lockton and colleagues performed a study to investigate how exactly designers see the anticipated users of their design (Lockton, Harrison, & Stanton, 2012). Based on a set of twenty-five clusters of statements, labelled from 'users are stupid' to 'users want a choice', the authors propose a 'pinball-shortcut-thoughtful' spectrum in modelling users. In their explanation, the metaphor of a pinball frames the user as someone "who only reacts simply to inputs, doing the same thing each time the same stimulus is applied, and does not think about any decisions" (p.9). On the opposite side of the spectrum, designers can frame people as thoughtful human beings "who think about what they are doing, and why, analytically – they are able to set and modify their own goals" (p.10). As an intermediate category, they argue how the user can be framed as taking short-cuts, as someone "who is boundedly rational, who makes choices to minimise energy or cognitive expenditure" (p.10). What Lockton and colleagues argue is that a variety in models is probably best to design for, since all forms of human systems in driving behaviour exist. Nobody can be said to be just one of these three 'models'. On the contrary, we all embody these models to a greater or lesser extent and depending on the context.

Alongside the fact that awareness of such modelling helps designers in targeting behaviour more effectively, we argue designers should equally consider their choice from a moral viewpoint. Which contexts allow for more steering interventions based on the pinball model (e.g., when they concern safety), and when do you wish to compromise on effectiveness just for the sake of providing people with a learning opportunity? In this regard, Tiemeijer and Anderson (2014) talk about 'untamed' and 'domesticated' issues. When issues are still untamed and people have a large variety of in disposition to the matter, like for instance the case of organ donation, implicit guidance of actions and choices are considered immoral. Yet when an issues is uncontested, like in case of the obliged use of seatbelts, implicit influence is considered acceptable. Given similar characteristics of

employed strategies, Tromp, Hekkert and Verbeek (2011) argue that designers should estimate the relationship between individual and collective concerns in the matter. They suggest this relationship (do they align or collide?) defines the type of influence that is appropriate given its salience and force. In similar fashion, Zachrisson, Storrø and Boks (2011) introduce guidelines to consider the level of control interventions may impose on people's behaviour. For instance, they propose that interventions should not violate with user values and norms to increase the level of acceptance, or strategies are allowed to be obtrusive when the issue is urgent or important. Deciding on the level of control and the level of implicitness of interventions when changing people's behaviour are considered ethical decisions. Yet to what extent such aspects of behavioural design are considered in practice is not only informed by one's moral stances in life, but heavily depends on one's model of the user. Regarding people as lazy and in search for efficiency in life would probably frame an implicit intervention as rather helpful, whereas the same intervention would be considered highly unethical when one regards people as thoughtful and deliberative actors.

In sum, behavioural design methods generally exist to make the development of a behavioural interventions more effective and efficient. Yet how a method does so, can vary greatly. This implies that success of the method in doing so (will it indeed improve performance?), depends on the interaction between a variety of variables. Figure 1 explains a few of these variables. It explains how performance depends on the match between, amongst others, the values, beliefs, and working style of the designer/method user, the type of task at hand, and whether it involves for instance a tamed/domesticated and clear-cut/messy issue, and the characteristics of the method, its underlying values, how it models people, and what working principles it embodies.

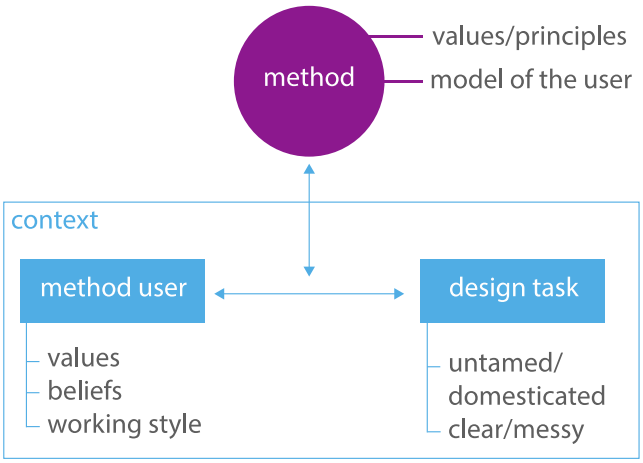

Figure 1 Relationship between method user, design task and method. The image explains how a variety of interacting variables affect whether method use will indeed improve performance.

1.3 Why heuristics?

When developing a way to support designers, both students and practitioners, to navigate a body of methods and tools, it is tempting to follow some logic to come to a structured system. That is, it is tempting to 'make the choice' for those designers by offering them a set of parameters they can set, resulting in an automatically generated choice for a method by the system. However, we argue that - rather than making the choice for them through some algorithm - it is better to provide designers with a set of heuristics for selecting and using methods for behavioural design. First, because such an approach will empower them to make such choices more consciously, connecting their choice of methods to the complex set of factors they find themselves in for any given project. Such conscious decisions will also help them to take responsibility for their choices, and learn to make better decisions as they gain experience. Second, this approach is more future-proof as it still valid when new methods for behavioural design are introduced and become part of the choice set.

Heuristics are defined as means of support that aim to guide cognitive processes of their users by providing prompts for information processing that can assist in learning, decision making, problem solving and reflection (Daalhuizen, 2014). Heuristics are characterized by their aim to support their users to achieve satisfactory results using minimal information, as opposed to achieving optimal results using complete information, which is characteristic for systematic methods. This definition of heuristics builds on Gigerenzer and Brighton's definition of heuristics: "efficient cognitive processes that ignore information" (2009, p. 107).

Heuristics are particularly useful in two types of situation. First, in situations where complete information is not available or when processing complete information would be too time- or resource consuming. And second, when optimal results are not needed or cannot be expected to be achieved (e.g. due to the inherently bounded cognitive ability of the decision maker). Arguably, the activity of choosing an appropriate method in real-life projects typically fulfils both the abovementioned criteria.

2 Study

The reason for this study was a question of the Behavioural Insights Team that is part of the ministry of Infrastructure and Environment in The Netherlands (BIT-IM). This team is developing a method for policy makers to include behaviour into the equation when working on policy development and new interventions for policy implementation. In doing so, they wish to work as evidence based as possible, while equally supporting policy makers to think as creatively as possible. In working with their method to support this, they experienced difficulties in moving from analysis to synthesis: how to 'think creatively' about the issue without losing the scientific rigour embedded in the analysis? They asked us to investigate how different methods support this shift in the process, and argue how insights from this investigation could be used to improve their way-of-working and ultimately their method.

For this, we analysed and compared nine methods that deal to a greater or lesser extent with behaviour change. The three authors collaborated on this relatively small project, which took about sixty hours in total during roughly one month. Since time and budget were both limited, the setup of the research was done as pragmatic as possible. This meant for instance, that many of the methods included in the analysis were selected because one of the authors had experience with or knowledge of the method. Additionally, methods were selected based on an assumption that it would expand or complement the thinking of the members of BIT I&M. Regarding Figure 1, we made sure that we included methods that deal well with *clear-cut problems* and methods that are more suitable for *messy problems*. For instance, Design with Intent (Lockton, Harrison, & Stanton, 2010; 2016) focuses on redesigning existing products or services to change the behaviour that occurs in interaction. This immediately sets the stage for developing solutions. Whereas Frame Creation (Dorst, 2015; Dorst et al., 2016) focuses on reframing the (behavioural) issue at hand, which means large part of the design effort is spent on developing a new frame to understand the issue first, before any solution can be developed. Additionally, we ensured variety in *the model of the user* that is embedded within the method. For instance, Practice-Oriented Design (Shove, Watson, Hand, & Ingram, 2007; Kuijer, 2014) models people as part of and shapers of practices. It explains how people's actions are historically shaped over time due to interactions between cultural developments, the adaptation of the physical environment, and the development of human capabilities. Such a model, informed by sociological theory, explains a contextualized and detailed view of human beings. Whereas Brains, Behavior and Design focuses on fundamental theory about human decision making by distinguishing emotional, social and psychological factors that affect it. This method is heavily rooted in behavioural economics and models people as having bounded rationality. Finally, we ensured methods dealt differently with the shift from analysing the problem to generating solutions, since this was key for BIT I&M. We assumed policy makers would deal with this shift differently than designers do. Hence, we included the policy development method MINDSPACE (Dolan et al., 2010; 2012) next to our more

familiar design methods. Also, we included a very structured approach to solution generation, i.e., Systematic Inventive Thinking (Goldenberg, Horowitz, Levav, & Mazursky, 2003), since this would balance the more intuitive design approaches. An overview of the nine methods can be found in Table 1.

2.1 Approach

To study and compare the nine methods, we first developed method sheets for each method in which each method is described according to a predefined framework.

The framework defines 4 levels of abstraction on which a method can be described. The first, most abstract level was that of 'values and principles behind the method'. On this level, we described the values behind the way of working a method prescribes. For example, the persuasive systems design method emphasizes the value of 'transparency' in the way a solution aims to change peoples' behaviour from an ethical perspective. Similarly, the same method emphasizes the principle of 'working systematically' in making sure that the results from behavioural analysis inform the design of interventions.

The second level describes 'phases and steps', i.e. the process level. On this level, we described the main phases that were prescribed by the method, typically delineated by an intermediate deliverable, and the individual steps that ought to lead to those deliverables. For example, the Social Implication Design method prescribed four phases: 'debriefing', 'anticipating the future', 'goal setting' and 'developing the intervention', each with their own deliverable. Then, for each phase, a number of steps prescribe how to achieve those results.

The third level is that of 'tools, templates and models', i.e. the methodology level. On this level, we describe the tools, templates and models that are suggested to support the steps described in the previous level. For example, the Persuasive by Design model offers five behavioural lenses that can be used to support the organization of the insights from research into the target group's behaviour and to inspire idea generation later on in the process.

The fourth level is 'staging', i.e. the practical level of applying the method. On this level, we describe practical tips & tricks on how to apply the method in a real-life context and/or what to be aware of when applying the method. For example, the Social Implication Design method requires quite a high level of abstract thinking from its users, and thus the staging level included the tip to assess whether a team that is going to use the method is able and willing to do so.

For an overview of all the methods and their fundamental characteristics, see Table 1. For an example of a method sheet that describes one method in more detail, see Figure 2.

Table 2. Characterization of the set of methods used in the analysis

	Method	**Synopsis** (of the method):	**Paradigm underlying model of the user** (embedded in the method):	**Key values/working principles** (underlying the method):
1.	**MINDSPACE** (Dolan et al., 2010; 2012)	Mindspace is a framework that describes 9 ways in which policymakers can influence behaviour. The framework is embedded in a structured process for policy development, and is intended to emphasize behavioural components in existing policy development processes.	Rooted in behavioural economics	• Evidence-based Innovation • Iterate • Practice what you preach • Be context-sensitive
2.	**Persuasive by Design** (Hermsen, Renes, & Frost, 2014; Hermsen, Mulder, Renes, & Van der Lugt, 2015)	The method offers a set of 'behavioral lenses' that help to clarify behavior of a target audience. It does so by asking questions during the design process and by offering ideas for intervention strategies in a design. The behavioral lenses help to define how to approach a project, and with making informed decisions, contributing to a project's decisional accountability.	Rooted in cognitive/social psychology	• Cross-disciplinary collaboration • Define behaviour • Evidence-based
3.	**Brains, Behaviour and Design** (Pfarr & Gregory, 2010)	The Brains, Behaviour & Design toolkit offers methodological tools to understand and change decision processes. The toolkit offers a behavioural economics perspective on decision processes and behaviour and helps to come to testable solutions based on existing theory.	Rooted in behavioural economics	• Cross-disciplinary collaboration • Science-based design
4.	**Practice-oriented Design** (Shove et al., 2007; Kuijer, 2014)	The practice-oriented design method prescribes an analysis of individual behaviour as part of a social practice that is time- and context-dependent. Through the analysis, one sees behaviour as a performance constituting of meaning, skills and materials. The method suggests taking a wide scope for understanding behaviour and in doing so offers new opportunities to change behaviour.	Rooted in sociology	• Respect the complexity of behaviour • Accept small steps • Involve the end-user

5.	**Social Implication Design** (Tromp & Hekkert, 2018)	The Society-Centred Design Method is based on a tested method (Vision in Design) and distinguishes between a societal and individual user perspective, emphasizing that the core problem of much undesired behaviour is rooted in a conflict between individual and societal interests. The method focuses on achieving behavioural change through resolving such conflicts from a future-oriented perspective. The method requires the design team to take an explicit stance regarding the future perspective they take.	Rooted in science, yet informed by the context/Depending on method user	• Effect-driven (independent of the design manifestation) • Anticipate the future • Take responsibility
6.	**Frame Creation** (Dorst, 2015; Dorst et al., 2016)	Frame Creation is a method that helps to tackle today's open, complex, dynamic and networked problems in organizations. It applies 'design thinking to generate new approaches to understand - and frame - the problem situation itself.	Depending on method user	• Study the context • Postpone judgement • Embrace complexity • Zoom-out, expand and concentrate on themes • Seek patterns • Detail themes • Clarify frames • Be prepared (the process takes time and effort)
7.	**Design with Intent** (Lockton, Harrison, & Stanton, 2010; 2016)	The Design with Intent toolkit helps to understand environments, products, services and systems to guide behaviour and to consciously design interventions. The toolkit contains a card set, worksheets and 8 lenses that can be used to view design for behavioural change. Each lens helps to recognize different patterns of behaviour, with a total of 101 patterns.	Variety of models	• Be aware of your model of the user • Use your influence responsibly
8.	**Persuasive System Design** (Oinas-Kukkonen & Harjumaa, 2009)	Persuasive system design integrates theories and principles of persuasion. The method offers a way to develop interactive technology (called Persuasive Technology). The work is focused on how technology can be used to change behaviour, yet offers a	Rooted in social psychology	• Be transparent • Be true to human principles (interventions cannot be too intruding, unusable, or useless)

		way to systematically develop interventions in other domains as well.		• Be precise • Work systematically
9.	**Systematic Inventive Thinking** **(**Goldenberg et al., 2003)	The Systematic Inventive Thinking method helps to come to come to new ideas in a systematic manner and with available means (inside the box). The method supports the manipulation of existing products or services using 3 starting points, 5 thinking patterns, along 6 steps.	Depending on method user	• Closed-world principle • The innovation sweet-spot (balancing newness and acceptability) • Function follows form

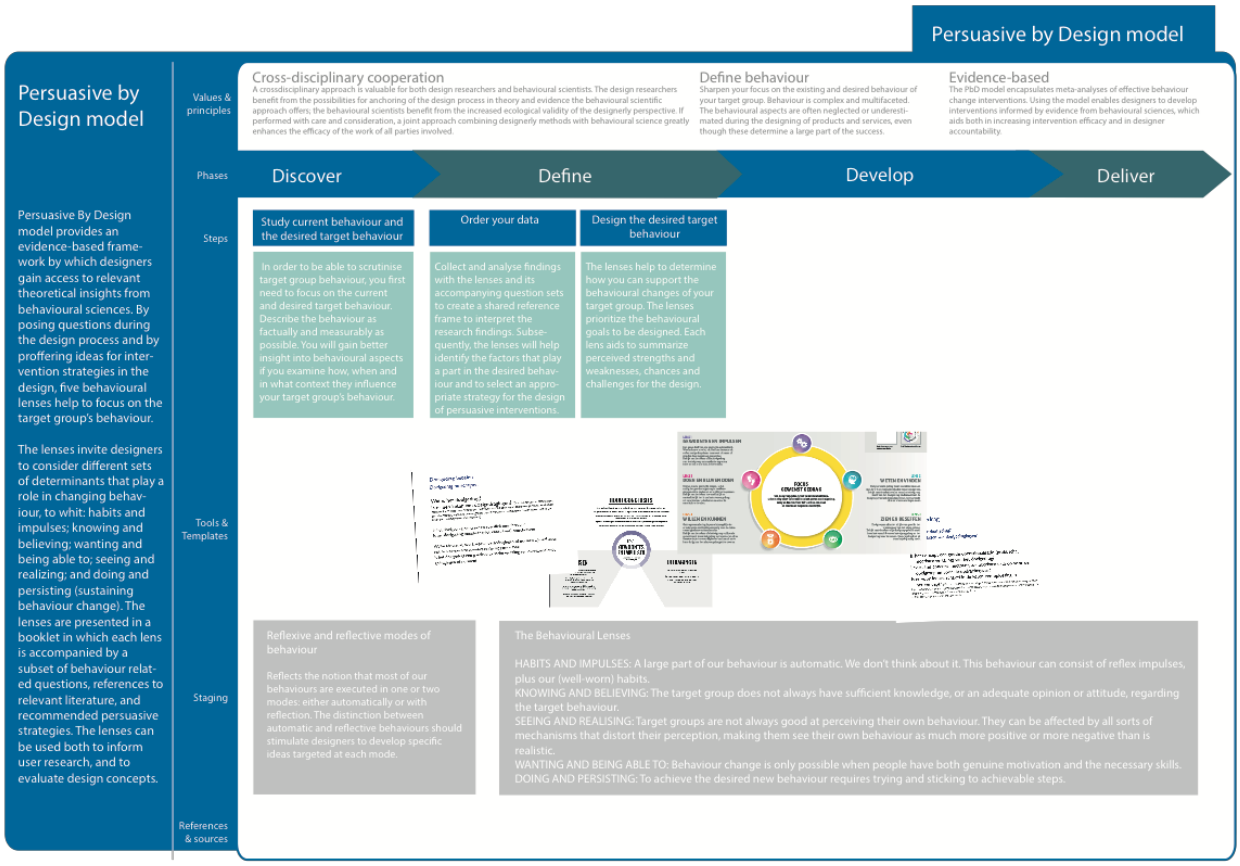

Figure 2 The Persuasive by Design model (Hermsen, Renes, & Frost, 2014).

The improved understanding of the nine methods allowed for more systematic comparison between methods. Since BIT-IM was especially focused on methodological support for moving from analysis to synthesis, we compared methods for each of the first three stages in de double-diamond model: discover, define and develop (see Figure 3).
For the discovery stage, the leading question was: what type of approach to information gathering does the method promote? For the define stage, leading question was: how is the designer supported in making decisions? For the develop stage leading question was: how does the method structure ideation? In comparing the different ways in which the methods supported each staged, i.e., the discover, define or develop stage, we recognized distinct differences. For instance, in the

discovery stage some methods help to better understand the behavioural problem at hand, while others support a broader investigation of opportunities for behavioural change.
Answers to these questions were generated by the first and last author, and discussed and refined through an iterative process with the second author. For each of the three stages, we eventually identified two dimensions that helped to describe how this stage could be supported by a method in different ways. Finally, these dimensions have been discussed and evaluated with BIT I&M. In the next section, we will present the results.

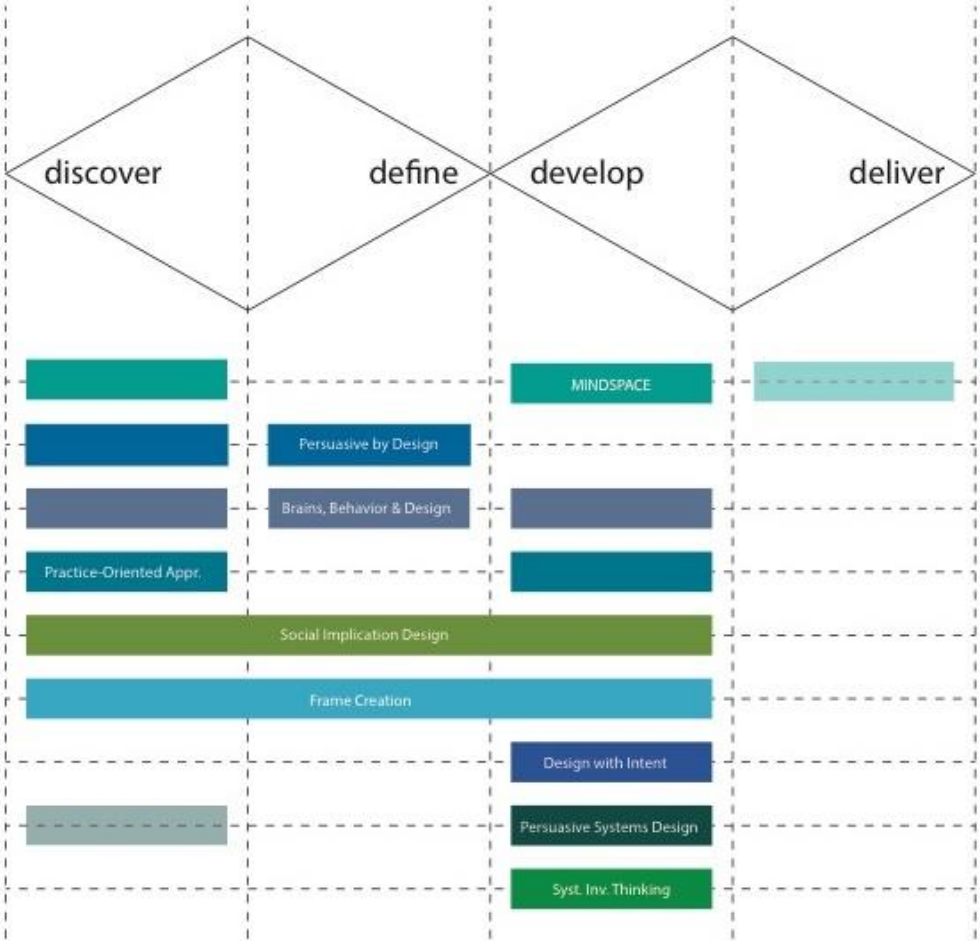

Figure 3 The figure shows which stages of the Double-Diamond model are supported by each of the nine methods.

2.2 Results

For each stage, we identified two dimensions that helped to describe the different ways in which methods support discover, define and develop-related activities. These two dimensions can be depicted as two axes, resulting in a graph in which each of the method can be plotted. As such, it visually presents commonalities and differences between methods. Next, we will explain these graphs for each of the stages. But before doing so, we wish to stress that placement of the methods are indicative, and should foremost be seen as a starting point for discussion rather than an uncontested truth. Our main goal is to highlight the dimensions of the graphs, and their potential value in generating heuristics for selecting and using methods for behaviour change.

2.2.1 Discover-stage

For the stage of discovery, at the start of the project, we saw variety in the approach to discovery each method supported, along two lines: the way each method defined or expanded the scope of the research, and what type of design research it supported or stimulated.

The scope refers to a problem-focused scope on the one hand, and an opportunity-driven scope on the other (see Figure 4). What we see is that methods that are grounded in behavioural sciences and then transformed to design methods generally focus the research around the problematic situation. They help to better understand and actually deconstruct the context in which the problematic behaviour arises. On the other hand, methods that are originally design methods that allow or even stimulate knowledge from the behavioural sciences to enter the process, support opportunity-driven research in the discovery stage. In such an approach, not only the context of the behavioural problem is relevant, but even more so the broader context that may reveal levers for change. In such an approach, information may serve inspiration rather than explanation, and as such, information is not necessarily relevant, but *potentially* relevant.
The type of research that is encouraged through the method can vary from being driven by empirical data to being driven by theory. Some methods encourage empirical research within the context of use and with people whose behaviour is targeted for change, embracing the complexity of reality. Other methods rely strongly on theory from the behavioural sciences and emphasize the value of generalizable principles. However, it follows logically that there must also exist behavioural design methods that explicitly call for both, stressing the importance of linking theory to the context of application.

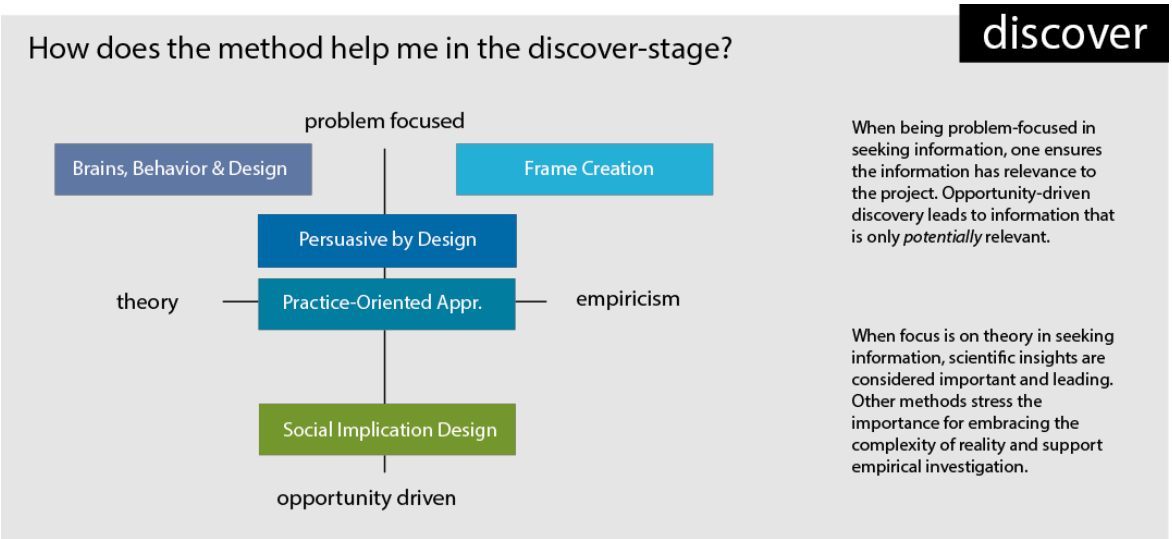

Figure 4 Organisation of the behavioural methods along two dimensions that describe relevant ways of working during the discover phase: work problem-focused versus opportunity-driven, and focusing on theory versus engaging in empirical research for behavioural insights.

2.2.2 Define-stage

For the stage of defining the focus or goal of the design project, we first of all observed that very few methods explicitly support this stage in design for behaviour change (i.e., only four of the nine methods, see Figure 5). Most of the methods consider the outcome of the discovery stage the start of the development stage, where the design team should be able to define focus without any support. However, in moving from analysis to synthesis, the bridging step of 'defining' may actually be quite crucial. In comparing the four methods that do explicitly support this stage, we see variation in how the design team is supported in defining the goal. On the one hand we see methods that allow for decisions to be guided by the designer's intuition. However, especially the methods grounded in the behavioural sciences promote a rational and nearly deductive form of reasoning to define the design goal. Yet, this deductive reasoning may actually conflict with the reasoning form that underlies design reasoning, which is called 'design abduction' and which is needed to generate original and appropriate solutions (Dorst, 2011; Roozenburg, 1993). On the other hand, we see a difference in the role of values in taking this decision. Some methods consider design decisions

informed by science as value-neutral decisions, while others explicitly support designers to let values enter the design process and guide decision making.

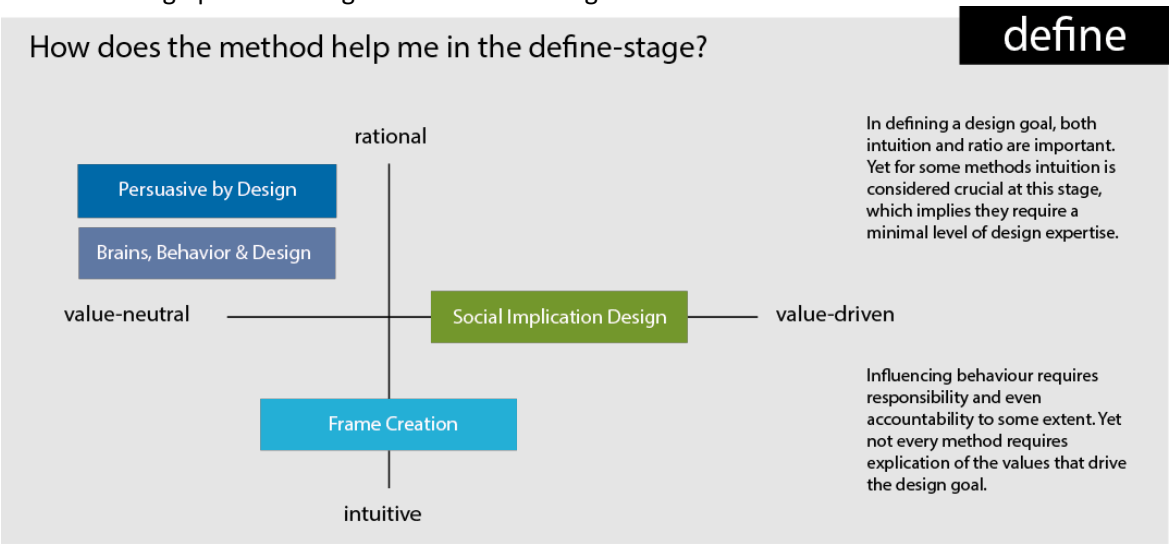

Figure 5 Organisation of the behavioural methods along two dimensions that describe relevant dispositions in the stage of define: be driven by ratio versus intuition, and be value-neutral or value-driven.

2.2.3 Develop-stage

For the development stage, we see mainly a difference in guidance in two ways: in their directive style, and in how they structure this stage (see Figure 6). Some methods are letting the designer free, supporting a divergent way of generating design ideas based on processes of association: opening up as many possible routes to solving the problem as possible. Such methods aim to help generate a high number of ideas across the solution space. Other methods are actually limiting the designer, supporting a more convergent process of ideation. In this case, the designer is guided by stimulating strictness in coherence with previous stages. For instance, the development of ideas is guided by a vision of its interaction with people, a selected analogy that fits with this vision, or the underlying frame or working principle. While both can have a clear behavioural goal to start from, convergent processes narrow down and actually 'limit' the number of ideas by becoming more specific in defining how the goal should be achieved.

Additionally, methods can support a step-by-step way of working, building a clear rationale for accepting or rejecting proposed ideas. Or they are more open-ended, and trigger a reflective attitude with designers. The latter methods allow for a process in which design ideas may be proposed 'out of the blue', and where a rationale for selecting or rejecting the idea emerges from the ideation activity.

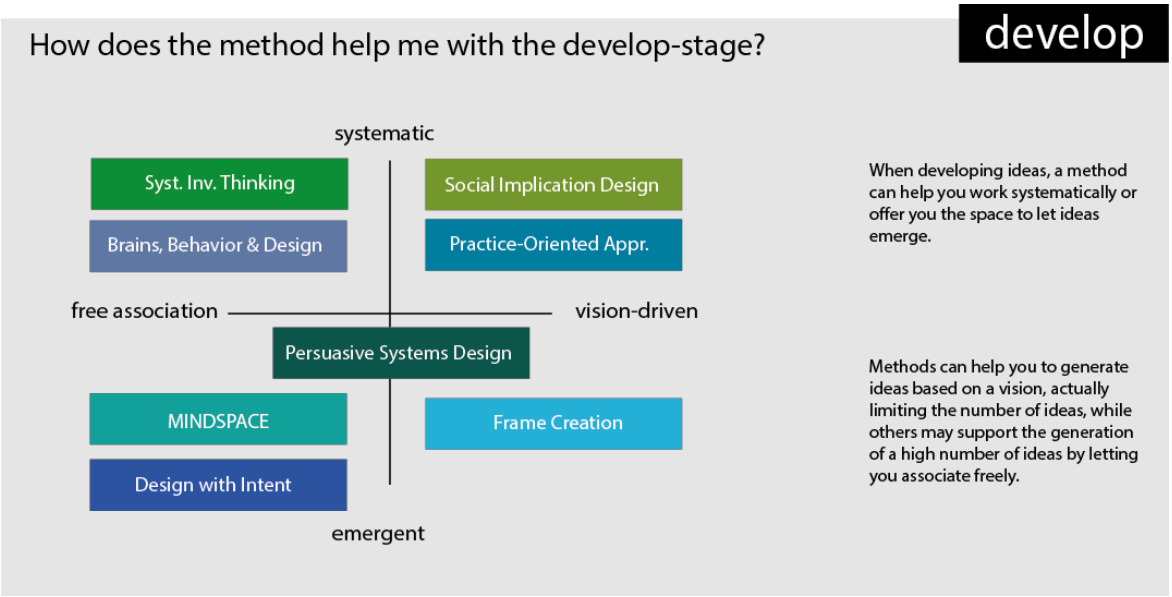

Figure 6 Organisation of the behavioural methods along two dimensions that describe relevant forms of generating ideas: systematic generation versus emergence, and free association versus working vision-driven.

2.3 Conclusion

The axes presented in figure 4-6 help to understand what way of working can be supported through a method for each of the three stages. As such, we imagine they can serve as heuristics for designers and other method users in deciding which method to choose. That is, they will help anticipate which method will fit one's personal way of working and the design task at hand. In ordering these heuristics, and exploring how they might guide method selection in practice, we distinguish two types of heuristics: process heuristics, and method heuristics. Process heuristics refer to dimensions about the general process to follow that are quite dominantly shaping one's approach. The method heuristics describe variations of taking steps within the process. We therefore anticipate it will be most beneficial to first work with the process heuristics to define a sub-set of suitable methods, followed by the more detailed method heuristics to define specific ways of working within that process (see Figure 7).

2.3.1 Process heuristics

The first step in choosing behavioural design methods, is to determine what kind of underlying process is desired or required. We defined two heuristics that support practitioners with this choice. The first heuristic helps to determine the nature of the first stage of a behavioural design process, covering the 'discover' and 'define' phases (see Figure 7). The second heuristic helps to determine the nature of the second stage of a behavioural design process, covering the 'develop' phase.

Heuristic 1: Problem-focused versus opportunity-driven scoping (Do you wish to work analytical and design more like an engineer, or are you more a design thinker and wish to allow for reframing the brief?)

Heuristic 2: Free association-driven versus vision-driven development (Do you like to brainstorm and allow for anything during ideation, or do you wish to work more vision-driven?)

2.3.2 Method heuristics

The second step in choosing behavioural design methods, after the underlying process has been determined, is to choose the specific methods that can support practitioners to perform the chosen process.

Heuristic a: Empiricism versus theory (Do you wish to do empirical research or are you more a theory-minded person, and what does the design brief require?)

Heuristic b: Intuition-driven versus ratio-driven definition of the goal (Do you prefer to take decisions rationally, or do you rather work more intuitively?)

Heuristic c: Value-neutral versus value-driven decisions (Does the brief require moral positioning, or do you wish to make values explicit, or not?)
Heuristic d: Systematic generation of ideas versus emergence (Do you wish to structure ideation, or are you more chaotic yet reflective?)

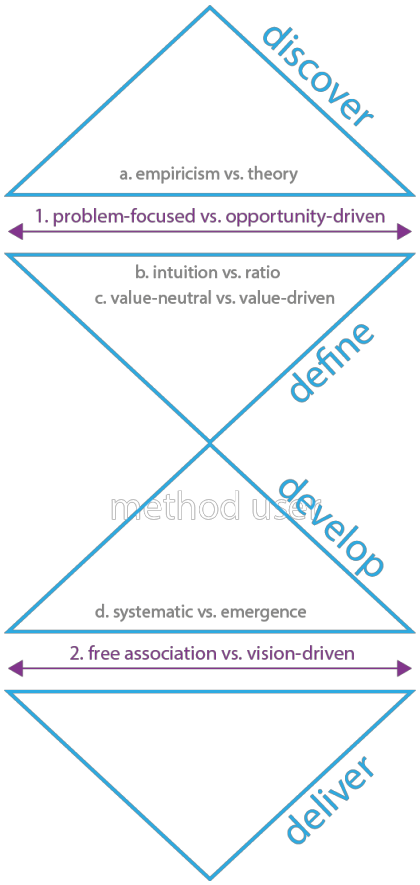

Figure 7 The Double Diamond model and how each of the two process heuristics shapes it. Additionally, the four method heuristics describe the various ways of working within the discover-, define- and develop-stage.

3 Discussion

The study in this paper should be seen as an attempt to advance methodological knowledge in design for behaviour change. Even when the rigour and internal validity of some of the behavioural design methods are well developed, their use in practice reveals issues academics have not yet found the answers to. The study presented in this paper dealt with one of these issues: the difficult shift from analysis, informed by behavioural science, to synthesis, driven by design thinking and the ways in which this is supported by a set of methods. In this section, we discuss the results of this study. We discuss the potential implications of these heuristics for the field of behavioural design, address the limitations of the study, and explore some avenues for future research.

3.1 Implications for research and practice

First and foremost, the heuristics proposed in this paper are intended to increase the understanding of students and professionals of the value of various methods and how they may differ. This understanding should support better selection and application of methods in design based on what way of working they support. A better awareness of and reflection on method usage is expected to benefit both the professional development of designers and behavioural design practice. However, we have not yet evaluated these heuristics, nor do we consider these heuristics conclusive. But since BIT-IM has expressed their appreciation for the delivered work, our colleagues have responded

positively to the work, and since we often refer to the heuristics in teaching design students, we wish to put forward the work for academic discussion.

Besides practical value, we hope to inspire design methodologists or academics in the field of design for behaviour change to consider the staging of their behavioural design methods. A better introduction of the methods we develop does not only improve the selection and use of methods in practice, it also helps to better assess and ultimately develop them. We can become more focused and targeted in both research and design when we explicate more specifically the paradigms, values and principles that have guided the development of the method.

3.2 Limitations and future research

It goes nearly without saying that this study is a limited study. As such, we do not claim we are conclusive, nor that the presented heuristics have shown to be valid. In fact, we very much intend to study them further and invite feedback and criticism. In fact, based on our reflection upon this study, we recognize two important avenues for future study.

First of all, the type of integration deserves closer study. Behavioural design integrates the behavioural sciences and design practice (including the design of policy), but there is still little knowledge on how this integration exactly happens or should happen to optimize performance. How to integrate deductive insights in design abduction? Through this study, we have witnessed great differences. Methods that are grounded within the behavioural sciences often support application of insights to design, whereas methods grounded in design thinking rather seem to support incorporation of behavioural insights within the design process. This is a big difference. It deserves further study to describe these differences in detail, find out what other forms of integration could be developed, and study how this affects behavioural design performance for whom, for what tasks and in what context.

Second, we see methods that rely on a single paradigm for behaviour change, systematically bridging this one viewpoint to design. Although such methods are often structured well and are internally consistent, they seem to run opposite to the fact that design is transdisciplinary by nature. Design teams generally incorporate insights from multiple disciplines to get grip on the issue at hand. In fact, the notion that behavioural design support should allow for multiple theories to adhere to as designer, and therefore allow for various models of people to design for, is often expressed (e.g., Bartholomew Eldrigde, Markham, Ruiter, & Parcel, 2016; Cash, Hartlev, & Durazo, 2017; Lockton et al., 2012). Limitation to only one behavioural viewpoint to the matter, whether it is a behavioural economic point of view, or a practice theoretical point of view, will obstruct natural behaviour of designers in creative resolution. We consider it crucial to better study how a science-driven paradigm of behavioural design can evolve without negotiating some of the key characteristics of design.

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