

Using Decisive Constraints to Create Design Methods to Guide Ethical Impact

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Abstract

Numerous methods have been designed to aid practitioners in identifying ethical concerns, imagining potential futures, defining values, and evaluating existing systems. However, there is little scholarship that addresses the design of these methods, including how ethical concerns are operationalized in these methods. In this paper, we report results of an interview study with twelve ethics-focused method designers, investigating their process of instigating, creating, and disseminating their method. We conducted a top-down thematic analysis using the Biskjaer and Halskov framework of decisive constraints, identifying intrinsic, extrinsic, and self-imposed constraints alongside iterative and evaluative resonance-seeking activities. This analysis provides a rich conceptual vocabulary to better describe the design of methods for ethical impact from the perspective of researchers and practitioners.

Keywords

design methods, ethics, decisive constraints, method designers

Research Highlights

- We use the language of decisive constraints to describe how methods are shaped
- We identify how design methods operationalize ethical perspectives through constraints
- We indicate opportunities for methods to support ethics-focused design processes

Design methods are a means by which the processes, value, and content of design work is communicated, spurred on by the modern *design thinking* movement (Brown 2009) and the production of a range of texts intended to document, systematize, and disseminate methods to support design practice (e.g., Martin and Hanington 2012; Muratovski 2015; Van Boeijen et al. 2014). These texts have been used to educate designers across a range of expertise levels and have increased the adoption of design-oriented practices in industry settings, building on decades of design studies scholarship that relates to methods (cf., Cross 1980; Jones 1970; Rittel 1984). However, little is known about how methods are created (cf., Daalhuizen 2014; Gray 2022). Where do design methods come from? How are they formed, and with what purpose(s)? How does the method designer—anyone who creates methods for dissemination and use by other designers—ensure that the method will feel resonant with authentic design contexts (cf., Stolterman 2008)?

In tandem with greater interest in ethically-focused design outcomes that are socially responsible—both from academia (Friedman and Hendry 2019; Shilton 2018) and from non-profit organizations (“Center for Humane Technology,” n.d.)—the role of methods that ensure or encourage the ethical character of the designer and their outcomes is a useful point of entry to considering possible means of impacting practice through methods. Beyond the use of codes of ethics to serve as guardrails for ethical activity, the selection and use of methods also has the potential to shape one’s ethical awareness and the potential for action—what Nelson and Stolterman (2012) describe as a designer’s *character*. But how are ethical concerns operationalized and inscribed in these methods by method designers (MD)? Is the language in the method text effective in translating often stilted moral and ethical philosophy into concepts and activities that are tractable for a range of design practitioners? This frames our primary focus of inquiry: **How do method designers create and shape design methods to activate and support ethical design practice through the introduction of constraints?**

In this paper, we address this complex and understudied space, reporting on an interview study with twelve MDs who have created and disseminated a design method that has an explicit and stated focus on ethics or values. Building upon an existing theoretical framework of *decisive constraints* from Biskjaer and Halskov (2014), we identified how each MD accounted for

complexity in instigating, creating, evaluating, and disseminating their method, including a particular focus on the kinds of knowledge that were imbued into the method and the ways in which ethics or values were operationalized. Using an iterative top-down thematic analysis approach (Braun and Clarke 2006), we identified a range of constraints that method designers reported they used to create a new design method.

Our contribution through this paper is two-fold: 1) For design researchers, we provide a vocabulary of methodological constraints to increase the precision of discussions about methods, facilitating further explication of the complexity of creating and using design methods; and 2) For design and ethics researchers, we identify aspects of design and ecological complexity relating to ethics, revealing the operationalization of ethical paradigms as constraints and potential opportunities to create ethical support through design methods, highlighting resonance with design practice.

2. Background Work

2.1 (Ethics-Focused) Methods in Design Practice

For decades, design researchers have studied the role of methods in terms of their function in design activity (Gray et al. 2015; Harrison, Back, and Tatar 2006), the use of methods in design processes and practice (Stolterman and Pierce 2012; Gray 2016a; Roedl and Stolterman 2013), and the types or potential categorization of methods (Rittel 1984; Jones 1970; Biskjaer, Dalsgaard, and Halskov 2010; Friedman and Hendry 2019). While our goal is not to provide a comprehensive review of design methods in a definitional sense, we do seek to cast a wide net in identifying the types of knowledge that designers can use to structure, support, or shape their design work. Design methods have previously been defined by Stolterman as “tools, techniques, and approaches that support design activity in a way that is appreciated by practicing interaction designers” (Stolterman et al. 2008), and this definition can be reasonably applied to designers in any design domain that use external supports to inform their design work. An older definition from Cross (1980) articulates other important qualities of methods: they are “step-by-step, teachable, learnable, repeatable, and communicable procedures to aid the designer in the course of designing” (p. 242). Finally, Gray (2016) describes design methods broadly as “any intellectual or practical support that a practitioner might use to support the design process in a

positive way.” More recently, Gray (2022) has described the complexity of the knowledge contained within design methods through the application of three different stances: 1) the codification of instructions that guide the potential for method use; 2) the performance of method in context by a designer; and 3) the presentation or format of the method. Our engagement with design methods in this paper is complementary with all of these definitions, and we do not seek to gatekeep which formations of knowledge do or do not constitute “methods” in this paper. Because our focus is on the creation of methods, our analytic framing is most consistent with the codification-oriented stance from Gray (2022) which foregrounds prescriptive knowledge that is propositional or procedural in nature. This analytic focus limits our inquiry to design methods that include “instructions” or other formal guidance.

Methods are known to enable designers to navigate their design process and result in the production of design outcomes (Jones 1970), enable design thinking (Gray 2016b; Hanington 2003), function as mental tools (Daalhuizen 2014), act as a form of design knowledge (Löwgren 2013), and guide designers through design argumentation and dialogue (Rittel 1984). The types of methods listed in the design theory literature include first-generation methods that in the 1960s were intended to “unmask” and rationally describe creativity and innovation (Jones 1970), second-generation methods in the 1970s to enhance design dialogue (Rittel 1984), and other framings in the decades since including creativity methods (Biskjaer, Dalsgaard, and Halskov 2010), critique-based methods (Vermeeren et al. 2010), generative methods (Sanders and Stappers 2012), discipline-focused methods (Van Boeijen et al. 2014), and ethics-focused methods (Friedman and Hendry 2019). In this paper, we use methods with an ethical or value-sensitive framing as our empirical focus, although the impact of our work points towards insights about the design of methods more broadly, which we will return to in the discussion section.

In parallel to these design theory-focused efforts, it has been a goal for Science and Technology Studies (STS), HCI, and design researchers over the past two decades to provide supports, strategies, techniques, philosophies, and methodologies that aid designers in shaping value-centered design work (Shilton 2018). The existing methods landscape includes popular methodologies for value implementation in design processes, including Value Sensitive Design (VSD; Friedman and Hendry 2019), Values at Play (Flanagan and Nissenbaum 2014), and other

ways of describing or guiding the potential for ethical action such as Value Levers (Shilton 2013). In addition, these methodologies and approaches have been used to stimulate and guide the design of methods that have an explicit ethical orientation; for instance, 17 value-sensitive methods are described in Friedman and Hendry (2019). However, despite the existence of numerous value-conscious design methodologies and methods, relatively little is known about how methods are created—with intention and through design—to have intended impact, or how practitioners use these methods to incorporate ethical perspectives in their everyday work (see limited examples such as Chivukula et al. 2020; Shilton 2013; Shilton and Anderson 2017; Steen 2015). Additionally, while some empirical accounts have focused on the complexity of method use and adaptation in practice (e.g., Daalhuizen & Cash 2021; Gericke, Roschuni, & Kramer 2015; Gericke et al. 2020), few studies have connected ethical valence and method in an explicit way (e.g., Hendry, Friedman, & Ballard 2021).

Hereafter, we refer to design methods that have a stated ethical or value-related focus as *ethics-focused methods*. For a method to be considered “ethics-focused,” it must include an explicit intention to encourage ethical or socially responsible outputs or otherwise include a clear ethical valence (e.g., inclusion of human values, ethical paradigm, or relationship to a form of critical theory) that frames the potential performance of the method. Ethics-focused methods are design methods that include an explicit acknowledgement of ethics and values that have the potential to shape potential performance by a designer through inscription and downstream impact, codified into the description of the method. We define the designers of these methods as *ethics-focused method designers* (MDs), positioning method design as a particular genre of design work that can be undertaken by professional designers that practice in one or more traditional design disciplines, or by educators or researchers.

The use of methods has been shown to be dependent on contextual and situational factors (Stolterman et al. 2008; Stolterman and Pierce 2012), where the designer *adapts* or *appropriates* a method according to the designer’s skill, interest, and requirements (Daalhuizen & Cash, 2021; Gray 2016a; Gray, 2022; Harrison, Back, and Tatar 2006). There is continuing research that has sought to address how designers use methods “on the ground” or “in the wild” in relation to their intended use or codified form (Gericke et al., 2020; Gericke, Roschuni, & Kramer, 2015; Gray

2016c; Shilton 2018; Wong et al. 2020), which in this paper we use as a means of questioning the *resonance* of a method with the complexity of practice and *embedded knowledge* (referred to by Gray, 2016c as its “core” or “script”, building on Akrich, 1992; also referred to by Woolrych et al. (2011) as a constitution of “ingredients” that inform “meals”) that a method must include in order to be resonant with the designer’s intentions in everyday practice. In this paper, we seek to describe the creation of ethics-focused design methods, including how embedded knowledge is selected and framed, how the design complexities of practice are considered, and how ethical concerns are operationalized and inscribed. We specifically do not intend to study the success of this inscription process or whether the planned resonance by the MD is realized.

2.2 Building on Design Theory Vocabulary

Design studies research has previously defined various constructs related to design activity, facilitating description of concepts such as design process, methods, concepts, problem, solution, constraints, and others. Since there is virtually no literature that addresses the design of methods in a specific way, we seek instead to build links among existing concepts that are established in the design theory literature to allow us to begin describing method designers’ activity as it relates to constraints. In this paper, we rely upon a set of terminology and definitions we have adapted from the design theory literature that enable us to describe constraints that the MDs used to design their ethics-focused method.

Typical knowledge about the creation of an artifact, in our case a method, is usually described in the form of sequence of events that involves rapid “co-evolution” (Dorst and Cross 2001; Dorst 2019) of problem and solution frames; the designer is then able to reflect and iterate upon this co-evolution by producing “problem frames” that bring certain constraints into consideration and background or ignore others (Schon 1984; Dorst 2015). Due to the limitations of data collection for this paper, we cannot explicitly draw the sequence or process of the creation of the method through post-hoc recall of our interview participants. Instead, we have chosen to focus on the *constraints* that the MD used or considered, the *precedent* materials they built upon or consumed (Gray 2020), the *primary generators* they cultivated (Darke 1979), the *design knowledge* they used or relied upon (Kolarić, Beck, and Stolterman 2020; Goodman, Stolterman, and Wakkary

2011), and the *desiderata* that guided their intentions for the method (Nelson and Stolterman 2012). These concepts are described in additional detail in Section 4.

We frame our work through the language of “decisive constraints,” a concept proposed by Biskjaer and Halskov to further characterize the creativity constraints that can act as both *restrainers* and *enablers* of design activity. As defined by Biskjaer and Halskov (2014), decisive constraints in a designer’s process include two components: 1) they must relate to *radical decision-making*, “applying a radical, self-imposed creativity constraint to stimulate the process” (p. 40); and 2) they must represent a creative turning point, being “related, beyond a reasonable doubt, to the final creative outcome of the design process in being of crucial importance to redefining the (new) solution space” (p. 44). Biskjaer and Halskov identified various kinds of decisive constraints such as incidental (intrinsic, imposed) and essential (self-imposed) across a continuum of hard vs. soft constraints (constraints that are formal or material in nature vs. genres or conventions; cf., Elster 2000). In this paper, we have used this language as a point of departure to characterize how ethical concerns and knowledge are operationalized in the creation of these methods and how the MD has framed their design space through these constraints to encourage exploration of ethical issues alongside practical considerations of use contexts and other forms of design knowledge.

3. Method

To describe the kinds of constraints that were used by MDs to shape their design space, including their goal of supporting the potential for ethical impact through their method, it was important for us to understand the process they reported using to create these methods. We conducted 60–90 minutes semi-structured interviews with twelve ethics-focused MDs (Table 1) to identify the instigation, creation, and dissemination of their methods. Through our analysis, we answer the following research questions:

1. What intrinsic or extrinsic constraints did method designers report using to shape the creation of their method?
2. What self-imposed constraints did method designers report using to shape the creation of their method?

- How were constraints used by method designers to increase the potential for future resonance between the method and intended use contexts?

Table 1. Method designers and descriptions of the methods they created.

Method Designer	Year Created	Role when Created	Method Description
Colin M. Gray (MD01)	2015	Postdoc	<i>Empathic Walkthrough</i> (Gray et al. 2015): For engineering design students to encourage creativity and ideation through empathy using guided steps.
Margaret Burnett (MD02)	2016	Academic Researcher	<i>GenderMag</i> (Burnett et al. 2016): For software developers to be gender inclusive and improve the quality of software through guided steps.
Shadi Kheirandish (MD03)	2019	Doctoral Student	<i>HuValue</i> (Kheirandish et al. 2019): For designers to provide a comprehensive toolkit to consider human values while designing.
Stephanie Ballard (MD04)	2019	Industrial Intern	<i>Judgement Call the Game</i> (Ballard, Chappell, and Kennedy 2019): For practitioners to review technology from multiple stakeholders perspectives through a game.
Dan Lockton (MD05)	2010	Doctoral Student	<i>Design with Intent</i> (Lockton 2010): For a wide range of designers to design against manipulation and influencing people’s behavior in a card-based form.
Patricia Gestoso (MD06)	NA	Industry Practitioner	<i>The Ethics and Inclusion Framework</i> (Gestoso 2019): For product or service creators to identify ethical and inclusion considerations through reflective guidance.
Richmond Wong (MD07)	2017	Doctoral Student	<i>Privacy Futures Design Workbooks</i> (Wong et al. 2017): For academic researchers to engage in design fiction to explore privacy related ethical concerns.
Peter Wells (MD08)	2019	Practitioner	<i>Data Ethics Canvas</i> (“The Data Ethics Canvas,” n.d.): For all technologists dealing with data to improve and better plan for data ethics through a framework and guidelines.
Michael Dieter (MD09)	2019	Academic Researcher	<i>Chrono-Design Methods</i> (Dieter and Gauthier 2019) : For academic researchers to engage with performance optimization of websites.
Nick Merrill (MD10)	2019	Postdoc/Lecturer	<i>Adversary Persona Cards</i> (Merrill and Ma, n.d.): For practitioners to speculate about adversaries in digitally-mediated threats through heuristics.
Taghreed Alshehri (MD11)	2020	Postdoc	<i>Scenario Co-Creation Cards</i> (Alshehri, Kirkham, and Olivier 2020): For academic researchers to build rapport with participants while engaging in cultural-specific critical thinking through examples and guidelines.
Ben Rydal Shapiro (MD12)	2020	Educator	<i>Re-Shape</i> (Shapiro et al. 2020b): For educators to allow CS students to reflect about their data management through guided steps and reflection.

3.1 Sampling Strategy

Our sampling of MDs began with systematically building a collection of over 60 existing ethics-focused methods, part of a larger project. To form this collection, we sought to identify methods

from a range of disciplinary traditions, including Human-Computer Interaction (HCI), Science and Technology Studies (STS), and Privacy and Cybersecurity. Through searches on Google Scholar and the ACM Digital Library, along with searches including the keywords “values,” “ethics,” and “design” on Google, we identified a wide range of methods, published by a diverse range of stakeholders, including academic researchers, students, educators, and practitioners. All methods were published in the last two decades, and many in the past five years.

In the first round of sampling, we selected five MDs based on various characteristics of the methods we had collected, including diversity in: the published format of the method (research paper, physical deck or web-based blog), the audience targeted (students or practitioners), the variety of disciplines targeted, and the specificity of context of use of the method. We used this range of characteristics to iterate upon our interview protocol. Once the protocol was validated through these interviews, we identified an additional seven MDs to interview, continuing to build out the diversity of methods included across a range of methods descriptors.

3.2 Participants

In total, we conducted interviews with twelve ethics-focused MDs. The diversity of the MDs selected were intentionally varied based on the kinds of methods they had created, and not on the participant’s own demographic characteristics. Our sample was also limited based on the geographic areas where methods were most often published, leaving our dataset with a focus on design methods which appear to have a North American or European origin. We received signed consent forms from each participant as part of an institutionally approved human subjects protocol; this consent form allowed them to select whether they wished to waive anonymity and be directly linked to their method with their identity being revealed. All participants selected this option; hence the real names of the participants are used throughout the paper alongside their published method to better represent their expertise, identities, and individual approaches to method design. Table 1 provides details of the participants.

3.3 Data Collection

We chose to use an interview study to more deeply understand the motivations and experiences of MDs since observational work to study the design of methods was deemed impractical and would not allow us to understand the design practices that related to design methods that were

already published. We conducted a 60-90 minute semi-structured interview with each MD. Our interview protocol focused on eliciting the MD's reported *process* of instigation, creation, and dissemination of their ethics-focused method through a range of "how" and "why" questions to deepen our understanding of how the method designer made particular decisions. Additionally, we asked the MD about their general understanding of the role of methods in practice and how they felt these methods could or should impact the design process of the target audience. At this stage, we had not selected the Biskjaer and Halskov framework, and our goal was to understand as much as possible about the origins of the method, key design decisions and assumptions that the MD made regarding the method's eventual use, the role the MD hoped the method may have in support ethics-focused design practices, and the MD's conjecture on how their method may function in everyday design work.

Prior to the interview, the researchers reviewed the available description of each method (e.g., academic paper, website) to understand the basic structure and specific vocabulary related to that method, including the way in which the method was described, the kinds of guidance provided, and the apparent audience. This aided the researchers in contextualizing the participant's experiences through the creation of the method and allowed the researchers to probe specific dimensions of the method that appeared salient based on the review. All interviews were conducted through video conferencing software or in person. The interviews were voice recorded with the consent of the participants. The voice recordings were transcribed using an online transcription tool and were subsequently cleaned to remove verbal clutter and correct inaudible instances.

3.4 Data Analysis

The analysis was completed across three iterative rounds. In the first round, three of the initial transcripts were open coded by three researchers (Braun and Clarke 2006), with each researcher coding two transcripts each. After initial open coding, the three researchers came together to discuss the open codes and their descriptions. This initial round of coding helped familiarize the research team with the data, aiding us in identifying the potential framing of the research report. Based on our early findings, we realized that we needed a more precise vocabulary through which we could describe the design work that the interviews referenced. One of the key insights

from our open coding was the variety of sources of inspiration, constraining factors, and expectations of use that framed the MDs' work, which led us to connect our inquiry to a framework of *decisive constraints*. We intentionally used this framework to build on already existing vocabulary regarding this aspect of design work, informing our top-down thematic analysis approach for the remainder of our analysis process.

For the second round of coding, we adapted the framework of decisive constraints by Biskjaer and Halskov (2014) to further clarify the MD's process and intentions when creating the methods. This framework was used as a means of further investigating the "design" of the design methods, and the process by which this meta-design activity was shaped and defined by the developer. According to Biskjaer and Halskov (2014), the breadth of decisive constraints includes the goal of "leverag[ing] some of these challenges [that] hold a distinct potential that reaches beyond interaction design and into other creative domains and disciplines." The types of decisive constraints defined by Biskjaer and Halskov include *intrinsic*, *imposed*, and *self-imposed* constraints, describing these constraints in the original text in the context of art installations and physical design practices. Based on our adaptation of this *a priori* framework from these other design contexts to the design of methods, we conducted a top-down thematic analysis (Braun and Clarke 2006) on the same transcripts from the first-round analysis. These

efforts led to the creation of our final codebook of operationalized decisive constraints—intrinsic, extrinsic, and self-imposed—as described in Table 2.

Table 2. Decisive constraints used by method designers to define the instigation, creation, and dissemination of their methods.

Decisive Constraints	Description	Example Constraints
Intrinsic	The method designer’s theoretical conception of a method as an ontological category which defines how they treat “ <i>a method</i> ,” expressing their epistemological framing and how it is activated through a method.	Beliefs about what a method is (e.g., bridge, mindset, tool); surface the conversation about values embedded through artifacts (e.g., framing methods as communication-oriented); pragmatically activate socially or environmentally beneficial actions (e.g., organized around consequences)
Extrinsic	The method designer’s externally imposed constraints that led to the instigation and creation of <i>their method</i> , including stakeholder requests and any employment condition(s).	Employment or specific stakeholder requests (e.g., being hired to create a tool); requirements of their intended user group (e.g., a group of designers requesting something within a company); adoption and dissemination goals (e.g., design students or practitioners); activating prescribed values (e.g., requirement that the method focus on a specific value such as privacy)
Self-Imposed	The method designer’s self-imposed constraints that they identified and applied in the process of constructing, designing, iterating, and inscribing values into the method. These constraints take three different forms: the identified requirement or need for a method, the selection of particular opportunities present in the dissemination context, and the design knowledge used to form the structure, content, and purpose of the method.	Intentions for the final tool to be practical; take a specific form or medium (e.g., a game or a deck of cards); map to a specific value (e.g., sustainability); builds upon existing tools or methodologies (e.g., VSD; other methods from their company)

In the final round of analysis, we conducted confirmatory coding of all transcripts using the codebook in Table 2. Throughout this process, we continuously and reflexively engaged with the data, both as individual researchers and as a research team (Braun & Clarke 2019). We used the coding software (Dovetail) to generate an audit trail, allowing us to check the coding of fellow researchers, discussing each code application until we reached full consensus. Because the codes also required a certain degree of interpretive flexibility, we also used regular discussions among

the research team as researcher memos to document our changing understanding of constraints in relation to design methods (Maxwell 2004).

4. Findings

In this section, we present the results of our thematic analysis to answer the three research questions we posed. We answer RQ1 to describe MDs engagement with intrinsic and extrinsic constraints (Section 4.1 and 4.2); RQ2 to describe MDs use of self-imposed constraints (Section 4.3); and RQ3 to describe how MDs iterated on their methods to support the potential resonance of their methods in practice (Section 4.4).

4.1 *Intrinsic Constraints*

The intrinsic constraints allow MDs to express their theoretical conception of methods which includes relevant methods vocabulary and the purpose and functioning of a method, which was not always particular to their method. MDs framed their development efforts in relation to their prior understanding of *what methods are*, and then activated these beliefs about methods as they formed and manipulated the design space for their own desired method. We refer to these prior beliefs and their impact on the design process as the MD's theoretical conception of methods. The *epistemological framing* includes the core beliefs or vocabulary used by the MD to talk about methods in general or their method in particular, while *pragmatic activation* includes action-oriented goals defined by the MD that were employed in their method. These framing statements relating to methods served as constraints that impacted the performative potential of the method; however, these intrinsic constraints often emerged primarily in language that *frame* the method rather than having a clear and tangible presence as an *element* of the method, and thus are somewhat more abstract than extrinsic and self-imposed constraints .

4.1.1 *Intrinsic: Epistemological Framing.*

As MDs engaged their core beliefs about methods, including how they positioned the role of the methods in design practice, they used a range of terms, such as: tools (MD03, MD04), activities (MD12), mindset (MD03), approaches (MD12), experience (MD04), design language (MD01), bridge (MD01), and supports. These terms were used by the MD as an epistemological frame, pointing towards their use of methods as a theoretical resource in their design work and the

potential of use in the hands of other designers. These framings relied upon underlying assumptions that the MDs had about the ontological status of methods and their epistemological function in design action, including the degree to which methods are intended to guide and prescribe versus inspire and evoke. These terms also provide a vocabulary that foregrounds the MD's methodological assumptions, evidenced by comments about how methods create a structure or language during decision making or link the perceived role of methods to design action.

When discussing the flexible nature of her method, Kheirandish (MD03) focused on how designers using the designed value frameworks in her method could “learn and just *find the mindset of the tool*,” with the goal of “*chang[ing] their way to look in anything*.” In this case, the developer highlights the importance of the designer's mindset resulting in flexible use of a method, rather than seeking to provide a prescriptive way to use the method. Another type of flexibility we observed was the use of disciplinarity to guide assumptions of use; for Gray (MD01), when designing a method that introduced empathy to an engineering design context, he wanted the method to be “*a bridge that led [student designers] to other interesting things*.” Ballard (MD04) also addresses their assumptions about the understanding of methods' use in industry contexts, stating the goal of creating methods that are not a burden to use, with the ultimate outcome of “*distill[ing] a lot of these ideas into something that was really light touch*.”

4.1.2 *Intrinsic: Pragmatic Activation.*

As the MDs described their methods, they defined various actions associated with the role of methods in decision making. These action-oriented goals ranged across the performance of design approaches through methods, including: building sense of responsibility and accountability (MD01, MD05), surfacing conversations in everyday work (MD03, MD04, MD05, MD06, MD07), influencing or shaping design thinking (MD01, MD04, MD05, MD10), bridging various disciplinary concerns or frameworks (MD01, MD02, MD05, MD07, MD12) and educating users about sensitizing concepts based on the purpose of the methods (MD03, MD05, MD07, MD09).

As they talked about the overall “core” or central conceit of their methods, Gray (MD01) and Lockton (MD05) talked about how methods can help build a sense of responsibility in users as

they engage with the method *“to try to make the world better in some way [...] influencing more socially or environmentally beneficial actions”* (MD05), and realizing and supporting navigation through the complexity in social accountability *“which is far from elegant”* (MD01) by using a method. Many MDs talked about using methods as a way of *“surfacing the conversation”* about values embedded through artifacts *“out to other stakeholders”* (MD07), for designers interested in understanding people’s behavior *“to have conversations [...] about the topic, also to think through consequences of stuff”* (MD05), for checklists *“to open discussion about who is your users?”* (MD06), for reflexively discussing about situations where *“people talk through ‘why do they think each of these is problematic?’ ”* (MD07), for having a conversation with themselves to *“start with a very open mind and a very wide perspective of humanity and human values”* (MD03), and for a method to *“create [a] space to have a conversation that can be really difficult in a way that was not combative and didn’t center around like an ethical framework where people felt like they had to have a lot of ethical knowledge like about certain frameworks to have to participate in the conversation”* (MD04).

A few MDs believed that the role of methods in design work was to influence, shape, and expand design thinking. According to Lockton (MD05), this role allowed designers to view the situation at hand *“in a different way,” “to think through consequences of stuff,”* and *“switch between different ways of thinking”* as they look at multiple perspectives. Ballard (MD04) presented the opportunity to expand a designer’s boundaries of thinking where *“they never really thought about the social implications of technology, like they were still in the mindset that technology is value-neutral.”* Gray (MD01) sought to encourage new ways of thinking *“that led [the designer] to want to [identify] other interesting things.”* Merrill (MD10) also focused on identifying concerns in designed artifacts through the acts of speculation and anticipation as a way to look into and investigate ethical concerns (“relevant threats”) where *“they can actually take action to ameliorate the threat.”* Another common pragmatic dimension of a method involved bridging different disciplinary concerns/frameworks to activate a multi-disciplinary thought process. MDs used methods to combine frameworks and concepts from multiple disciplines, such as *“activities for computer science students that drew from kind of education and learning sciences literature”*

(MD12) and designers engagement with engineers who are only mostly involved in privacy conversations (MD07).

MDs frequently treated their methods as *educational tools*, anticipating use in educational contexts and as a means of educating technologists. For example, Dieter (MD09) described the purpose of Chrono-Design methods as building and guiding designers through “*technical curiosity and experimental mentality and approach and that they’re able to speak with much more precision about sort of specific questions that might arise around privacy and surveillance.*” Wong (MD07) aimed to educate designers about assumptions such as “*privacy as a situated and contested value. It’s not like it has a universal definition [...and] conveying that privacy has these local instantiations that are contextual and socially situated.*” Given that the MDs came into their work with the goal of creating an ethics-focused method, they leveraged action-oriented goals of a method to *operationalize ethics* for the designer. According to Ballard (MD04), her method was created with the assumption that designers need not have expert knowledge on ethical frameworks, focusing on the guidance they needed to engage in a conversation about the ethical implications of situation at hand.

4.2 Extrinsic Constraints

The extrinsic constraints describe the externally imposed framing of a particular method from a variety of sources. MDs framed the instigation and creation of their methods in relation to extrinsic constraints which included: the employment of the MD, specific stakeholder requests they received as a part of their employment, or explicit expectations and requirements of their intended user group. A MD’s state of employment included being funded by a research group and the need to address ethics-focused spaces defined by the interests of that research group. This type of employment had a strong influence on the MD’s framing of the method, such as: the sustainability framing of Lockton (MD05; “*had to frame in terms of sustainability*”); the ideation framing of Gray (MD01; “*my grant responsibilities required us to find more ways for people to adopt design heuristics*”); and the privacy focus of Wong (MD07; “*I’d known about her [research group lead] developing this for a while, how to how to think about the value of privacy.*”). This method framing also frequently aligned with the condition of their employment at the time of creation of the method, such as a professor doing HCI research (MD02), a

practitioner role in industry (MD06, MD09, MD12), a doctoral student working on their dissertation or related research (MD03, MD05, MD07), a research assistant (MD01, MD10, MD11), or an intern (MD04). MDs also shared their motivation for the creation of the method in relation to explicit requests from stakeholders. For example, Ballard (MD04) was contacted and “hired” by industry stakeholders to “*come on and develop a method,*” while Burnett (MD02) was approached via “*an email from a product manager for this company: [...] ‘turns out that women hate our software, please help.’*” These extrinsic constraints defined for the MD were often pragmatic, but not primarily altruistic, describing spaces where “market forces” dictated the goals of their method.

4.3 Self-Imposed Constraints

In this section, we describe how MDs identified and imposed constraints upon themselves in the process of developing their methods. Self-imposed constraints include constraints that were adopted as the MDs constructed, designed, iterated upon, and inscribed values in the method, which we will explore through three sub-types: 1) identification of methodological insufficiency, recognizing that there is a problem that they are seeking to address; 2) selection of salient aspects and opportunities from their ecological knowledge of the dissemination context; and 3) association of primary generator/desiderata with salient design knowledge to conceptually identify, support, or frame the method.

4.3.1 Self-Imposed: Identification of Methodological Insufficiency

As MDs described the initiation of their method, they pointed towards an identification of felt insufficiency that led to the creation or formulation of a specific problem frame that was then applied as a *self-imposed constraint* towards their method’s development. These aspects of insufficiency were commonly described as gaps in the current methods that were then leveraged to create their method. MDs identified three kinds of methodological insufficiency: 1) the lack of “practical” tools; 2) the need for new tools to augment existing toolsets; and 3) an iterative improvement of existing tools.

The lack of “practical tools” encouraged a focus on contextual or ecological needs and pragmatic use in a design process (cf., designerly tools; Stolterman et al. 2008). For example, upon receiving a stakeholder request for a tool to assess software for gender bias, Burnett (MD02) and

colleagues began to design GenderMag with the startling realization: “*we don’t actually have anything practical at all. I mean, what are we going to do? Send him a bunch of research papers? So that we realized at that point that we needed something practical. And so that’s when we started trying to figure out the method.*” Kheirandish (MD03) identified the need to create HuValue to present a comprehensive value list due to the lack of “*any practical ones and to be very handy in design practice*” in existing design and engineering ethics literature.

The need to create new methods allowed ecological and design opportunities to expand beyond existing known methods. For example, Wong (MD07) identified the pain points of practitioners dealing with “*privacy issues after a product was developed, and came up by government regulators stepping in and saying there’s a problem or a like journalists or some type of public backlash saying there’s a problem here,*” realizing that its “*often engineers at companies that are in the privacy conversation.*” This allowed MD07 to precisely identify the need for new methods that would envision “*the future that can try to provoke these conversations earlier on in the design process*” and “[*allow*] the UX people [*to*] contribute to the internal privacy strategy.” Similarly, Merrill (MD10) felt the need to “*expand security as a practice to different parts of the software development lifecycle*” as a means of supporting practitioners.

The need to improve current practices through appropriating or improving existing methods or tools also shaped the goals of MDs. For example, Shapiro (MD12) identified the need to improve existing practices of teaching ethics, since currently, “*a standalone ethics course at the typically at the end of seniors or at the end of a student’s experience in college is not the best way to do it,*” he felt that his method, Re-Shape, would help to fill this educational gap by building on guidance that already existed. Similarly, other MDs sought to improve disciplinary perceptions of creativity (MD01), involving stakeholders in ethical conversations (MD04) and “*re-purposing tools for social and cultural inquiry rather than for optimizing design*” (MD09).

4.3.2 Self-Imposed: Selection of Opportunities within the Design Ecology

As MDs identified the purpose and value of a method on their own or through external influences, they recognized the need to better understand the specific context for which the method was created. MDs often identified and self-imposed constraints through knowledge they gained to appreciate and act upon aspects of ecological complexity. The MDs gained knowledge

about academic and industry ecologies from the following perspectives: 1) beliefs about the roles and responsibilities of practitioners based on discipline, and 2) beliefs about their intended audience behaviors through on-site observations or literature review.

First, beliefs about roles and responsibilities included embedded disciplinary assumptions, insights from other studies, and observation in the specific context to expand the MD's knowledge about the environment where the method would be used. Embedded disciplinary assumptions acted as a constraint which motivated MDs to expand on potential changes through their method to push them toward behaviors or to decide on the form of the method. For example, Gray (MD01) introduced supports for empathy in engineering design, which is relatively unusual in extant educational practices; Wong (MD07) learned about the role of UX designers who are often not involved in "*privacy—it's often engineers at companies that are in the privacy conversation;*" and Gestoso (MD06) learned about ways in which they could make the concept of ethics resonant among multiple stakeholders. MDs built on insights from other related research studies that lead to new opportunities. For example, Gray (MD01) found new opportunities by reading past research on design reviews where he discovered that "*the students [did] primary research and then they're coming back to the crit with their professor and all the interesting juicy bits that spoke to social responsibility or accountability or empathy basically were shut down by the professor.*" Ballard (MD04) specifically mentioned her efforts towards understanding her ecological context by asking questions such as: "*What is the design context,*" and "*How can I design for this group of people [...] What is it that people who are working on these technologies actually do as part of their job? What are their constraints? What are their incentive structures? What is the design process like for them?*"

Second, MDs built on ecological knowledge to address the time required, patience of users, intended user interests, and potential value given versus their resource constraints. For example, Kheirandish (MD03) decided on the form of her method when she "*felt this booklet is too much for designers [...] They want one sheet to have all information at the same time in one look, and I was looking for memorable picture and the sequence.*" Ballard (MD04) described designers as "Post-It people" and based on this knowledge, sought to compensate for the extra work required to handling large quantities of Post-Its after activities structured in the MD's method. This

knowledge gained about the ecology was highlighted as a way to provide MDs self-imposed constraints that aided the developers to create methods in ways that increased their adaptability and resonance in the targeted ecological context.

4.3.3 Self-Imposed: Framing the Method with Prior Design Knowledge and Intention

MDs described their use of a defined conceptual vocabulary, problem frame, problem-solution orientation, or desired outcome in a variety of initial forms which functioned as a *self-imposed* constraint. As they identified the needs they wished to address by generating their method, it was essential for them to build on existing knowledge and precedent to form their problem frame. MDs expressed this through three approaches: 1) Identifying the primary desired outcome(s) or *desiderata* of the method; 2) the *primary generator* for the method; and 3) the *design knowledge* perceived to be salient that was used to build the method.

Desired Outcomes or *Desiderata*. As the MDs identified the need for a method, they aspired for a particular desired social/ethical impact through the method's use in decision making—what Nelson and Stolterman (2012) refer to as a *desiderata*. In an opportunistic sense, MDs shared their intended outcomes through the method across multiple potential levels of impact: artifact, designer, stakeholders, and process. At an artifact level, their intended outcomes ranged from helping practitioners find the gender-inclusivity “bugs” that they had already inscribed in their software and re-design (MD02); incorporating human values as they “*wanted to design based on spirituality*” for spiritual designs (MD03); encouraging “sustainable behavior through design” (MD05); and specifically provoking considerations about values such as privacy (MD07) and security (MD10) through the designed artifact. At a designer level, the desired outcomes aimed at making the user “culturally and value sensitive” while communicating with users during research (MD11); supporting designers to realize their lack of critical knowledge through “sensitization” (MD01); validating assumptions such as: “*if you didn't think values are situated and went through this process, you would hopefully reflect on it*” (MD07); and reflecting on designer's actions as they “*look over their data over maps of race, politics, social media activity*” to “*think about what's our shared responsibility*” (MD12). At a stakeholder level, the desired outcomes aimed at influencing workplace practices, such as adopting “*security as a practice to different parts of the software lifecycle*” (MD10) and engaging in conversations relating to

privacy issues (MD07). At a process level, the outcomes aimed at influencing application of relevant strategies through examples (MD05); and engaging designers in speculative design action (MD07).

Primary Generators. As the MDs framed their desired outcomes, they identified precedent materials that drove and shaped design outcomes. We defined these constraints as *primary generators* of the method, building on a concept by Jane Darke of the same name (Darke 1979) that describes the conceptual “seed” or central metaphor of design work. The primary generators often helped the MDs to form, make tangible, or “language” their epistemological framing of the methods (intrinsic constraints), defined stakeholder goals (extrinsic constraints), and desired outcomes through the methods (self-imposed constraints). These primary generators included defining the overall form of the method such as “*doing it almost like a guide*” (MD05); being “*very resistant to designing a card set at all*” (MD04); identifying that they “*could create these workbooks*” (MD07); and ensuring that a “*deck of cards was facedown*” (MD11). MDs also described the intended mechanics of the method, such as “*add[ing] challenge without intimidating them*” (MD11); choosing to be “*less structured*” (MD05); realizing that the method “*had to be understandable by an ordinary software developer with no background in [psychology, HCI, or gender studies]*” (MD02), and wishing to “*keep them relatively open to interpretation, because we didn’t so want to enforce a story*” (MD11). MDs used evocative metaphors such as “*re-shape*” (MD12) and “*bubble of light*” (MD05) to define the essence of their methods and create a strong link from insight to action in relation to their method’s development.

Salient Design Knowledge. MDs reported that they drew on various forms of existing knowledge that they determined to be salient, such as theoretical concepts, approaches, existing design methods, and literature to provide them with conceptual vocabulary for their methods. The saliency was determined by the MD themselves as a design judgment, and we cannot speculate on all of the factors that may have made a certain type of design knowledge appear to be salient in the moment, or in retrospect. MDs often used *existing frameworks* such as ethical and critical theories (MD12), speculative design action (MD04, MD07, MD10), and value sensitive design (MD03, MD04, MD11) to ground their methods. For example, Shapiro (MD12) reflected on the

creation of Re-Shape: “[a] feminist approach to ethics is kind of thinking about reflecting on yourself as a way to start thinking about shared responsibility.” MDs also used sensitizing concepts and established *theoretical concepts* to define the method’s purpose and essence, including concepts such as culture (MD11) and human values (MD03, MD06, MD07, MD10). MDs used, relied upon, or adapted *existing methods or tools* such as the cognitive walk-through (MD01, MD02), personas (MD02), scenarios (MD04, MD07, MD10), design fiction (MD04, MD07, MD10), envisioning cards (MD10), and qualitative interviews (MD11). For example, Gray (MD01) expressed his thought process as follows: “*How can we take a method that is already known and [...] add in an ideation component explicitly? [...] So I picked the cognitive walkthrough.*” Shapiro (MD12) similarly built his method using existing methods from other disciplines such as “*geo-spatial tools and technologies that existed.*” MDs also explored *existing literature*, using theoretical frameworks to construct a foundation for their method. For example, Burnett (MD02) found inspiration in “*reading from the the CS inclusiveness literature as it started to emerge;*” Shapiro (MD12) built on the work of their colleagues and past collaborators “*in CHI [a large HCI conference] and computer science who inspired us;*” and Wong (MD07) built on “*some of the existing design research around—Bill Gaver’s design workbook methods, and some early speculative design and design fiction research.*” In some cases, MDs combined literature research with empirical research, as in the case of Kheirandish (MD03), where she conducted “*extensive empirical research on this and with almost 600 participants who grouped their value item and created a new value grouping.*”

4.4 Resonance-Seeking Activities

MDs discussed their goal of building resonance between their method and the ecology of design practice, seeking to better understand both how potential users might interpret the methods and how the ecological space might support the adoption of the method in practice and/or other contexts. The MDs shared three main types of resonance-seeking activities: 1) Evaluation of the method to identify potential for resonance; 2) Iteration and projected translation of the method to increase resonance with user’s requirements; and 3) Identification of the need or desire for ecological resonance. As MDs reflected on the creation and dissemination of their method, they described *evaluation* of the method based on other methods, knowledge, or direct evaluation with user or stakeholder engagement. Gestoso (MD06) shared her story of evaluating her method

to receive feedback, realizing: “*you put so many things they have to fill out that they are overwhelmed, and you know, that push people off.*” Based on this feedback, she iterated on the method to “*remove friction*” through different versions of the method that she created. As the MDs evaluated their method, they simplified the method being designed based on evaluation results (*translation*); re-framed the purpose or outcomes of the method (*iteration*); and added method use cases, context and audiences, and altered the structuredness of the method (*instructions*). Ballard (MD04) described their process of adding a blank review card to the method with existing ethical principle cards, mentioning: “*It seems kind of obvious, but it was really shocking to me the first time I ran it with ‘fill in your blank’ principles, and it totally changed the nature of the reviews in a way that was really striking and really interesting.*”

As the MDs iterated upon and improved their method, a primary stated goal was to increase *ecological resonance* and adoption of method through a process of adopting existing ecological resources to add to the method, mentioning the need for identifying various barriers to adoption in desired ecological contexts. For example, Gray (MD01) described the need for changes in the method if he wanted to improve adoption among practitioners: “*[The published research paper] is open access so people could discover it, but none of it was written with practitioners in mind. The method could have certainly been adopted by practitioners, but it would have been boiled down into like a UMOD [Universal Methods of Design] sort of format to really have people take it up.*” The outcomes of resonance-seeking activities were sometimes left in proposal stage or as speculation and were not implemented due to time or resource constraints.

5. Discussion

In this paper, we have described constraints that MDs select from, work within, and iterate upon as a means of structuring their creation of ethics-focused methods. This account reveals substantial opportunities to more fully theorize, describe, and support the pragmatic creation and use of methods, and the implications we propose may lead to more efficacious support of ethically-focused design practices. We begin by describing how ethical concerns were operationalized into these methods by method designers through the use of decisive constraints.

We then identify potential theoretical bridges from the design of ethics-focused methods to methods' design more broadly.

5.1 Inscription of Ethics into Design Methods

Building on our analysis of method designers' accounts of the design of methods with an ethics focus, we have identified how a range of constraints are considered and employed to structure both the framing and potential use of the method by designers. While some of these constraints directly relate to the ethical framing of design activity intended by the method designer, other constraints appear to point towards the kinds of constraints that may be used by any method designer, regardless of a desire for ethical impact. These more generic considerations that relate constraints to method design are considered in the latter part of the discussion. In this subsection, we seek to synthesize our findings that relate to how ethical concerns were operationalized and inscribed (cf., Verbeek, 2006) into methods by method designers.

First, we have demonstrated how vocabulary of decisive constraints lends more precision to accounts of method creation, with a particular focus on how a method designer's desire for ethical impact is supported by a combination of intrinsic, extrinsic, and self-imposed constraints. The use of *intrinsic constraints* allowed the method designers to consider ethical framings of design work, particularly through the use of pragmatic activation of constraints to identify core assumptions regarding the trajectory of design practice (e.g., “surfacing the conversation” about values; “think through consequences of stuff”; “start with [...] a very wide perspective of humanity and human values”) that was supported by epistemological assumptions about how methods support designers' practice. The use of *extrinsic constraints* illustrated how stakeholder requests also led to an ethical focus or framing of the design method, including instances where a particular value became the explicit mechanism for inscription of ethics or where a known problem with an ethical valence (e.g., “women hate our software, please help.”) set into motion and framed the method designer's work. The widest variety of constraints used to impart and inscribe the potential for ethical impact came through the use of *self-imposed constraints*. In many cases, the identification of a lack of suitable tools and identification of opportunities within the design ecology emerged together—with a synthetic focus on identifying areas for ethical impact and weakness in current practices, alongside building an understanding of which stakeholders and other aspects of the ecology might be better supported to shape downstream

ethical impact (resonant with Shilton, 2013). These two types of self-imposed constraints reflected outward towards known or projected contexts of use, with an eye towards potential resonance and connections to intrinsic and extrinsic constraints that were already present. The method designers' use of design knowledge as a self-imposed constraint included the use of elements of their repertoire (salient design knowledge) alongside a negotiation of their outcomes (desiderata) and framings of the design space (primary generators), which when triangulated, pointed towards potential ethical impact. The desired outcomes and salient design knowledge were the primary entry point for ethical inscription, with desired outcomes frequently pointing towards key values or types of ethical responsibility that they wanted their method to reinforce, and salient design knowledge including the adoption of particular ethical frameworks or existing methods that could be redesigned to include a more explicitly inscribed ethical component.

Second, we observed that method designers reported a range of means by which to inscribe ethical concerns into their design methods through the application of decisive constraints. When inscription is addressed naïvely, it can lead to a linear process that begins with identification of ethical concerns—often framed through particular human values or ethical theories—that then result in downstream potential for ethical impact. In our analysis, we found the majority of inscription to emerge more opportunistically through self-imposed concerns that related to ethical theory and values (e.g., through the use of “salient design knowledge”), but frequently in forms that did not naturally trickle down from somewhat stilted language common in moral philosophy. For instance, method designers did not seek to create a method to strengthen deontological or consequentialist reasoning, but rather sought to “think through consequences of stuff”; method designers did not simply set out to create a method inspired by feminist theory, but rather operationalized feminist approaches to ethics as “a way to start thinking about shared responsibility.” Even though many of the MDs we interviewed had knowledge of moral philosophy, ethics, or critical theory-related traditions, in discussing their design process, this more formal knowledge was not explicitly mentioned as being leveraged. In contrast, the moments of inscription that MDs described included both the identification of relevant ethical concerns (but in colloquial language) and the operationalization of these concerns in the method. When viewed retrospectively, these colloquial representations of ethical concerns could form a bridge between formal instantiations of moral philosophy and the potential for describing downstream impacts on design practices. Beyond the identified self-imposed constraints that

relate to ethical inscription, we found the use of normatively framed assumptions about methods use to pervade all three categories of decisive constraints, with important connections in particular across the following types: intrinsic pragmatic activation, extrinsic, self-imposed desired outcomes, and self-imposed salient design knowledge. This incorporation of ethical concerns through a range of decisive constraint types demonstrates that method designers use multiple avenues to create and shape ethical framings of their methods.

5.2 Pragmatic Creation and Use of Methods

The range of constraints that we have identified further reveals the complex and non-deterministic creation and use of methods that has been shown in prior design literature. When envisioning methods as “designerly tools” that support practitioners’ work (Stolterman et al. 2008), we find value in both the act of design that brings new methods into the world and in the projected and actual use of these methods by designers. However, both of these areas are undertheorized and understudied, leading to a lack of knowledge regarding how practitioners select, use, adapt, and create new methods to support their work, and even less knowledge regarding how researchers, educators, or practitioners envision the space for new methods and then bring those methods into existence. There has been increasing interest in characterizing the complexity of methods use from a performative perspective, with notable work on ecosystems of methods by Gericke et al. (2020), the relationship of method content to contextual performance by Daalhuizen and Cash (2021), and the use of methods by users and designers to introduce values in practice contexts by Vermaas et al. (2015). Our contribution in this work adds additional nuance to these performative accounts, describing the normative inscriptions of methods and how they are purposefully introduced by methods designers with a consideration for this potential future performance. We view this study as a first step in a theoretical and empirical trajectory, wherein we propose language to characterize the complexity, subjectivity, and designerly qualities of method creation and use. We outline several areas of future study that could be supported by our work.

First, we propose **research on the method design process** itself as a worthwhile and productive area for future research by design scholars. While many of the constraints we have identified readily align with known vocabulary used to describe typical design processes, the use of this vocabulary in what is in essence a “meta-design” activity perhaps invites more comparison with

the design of probes, co-design activities, or other design outcomes that are designed with the intent of inviting new design work to occur. We have laid the groundwork in this paper to characterize the work of MDs as skilled, contingent, and subjective—yet filled with expertise that is important to unpack and describe. The work of methods designers appears to take on many of the same judgment-laden and normative characteristics proposed for design work more broadly (cf., Nelson & Stolterman 2012), including a subjective stance that relies opportunistically on many forms of knowledge, a design framing which is contingent and grounded in particular research or practice ecologies, and a set of resonance-seeking activities that relies on knowledge of design complexity. While our focus here is on ethics-focused methods, other “generic” design methods could be analyzed and described using the language we have proposed.

Second, an analysis of method development activities invites attention to the many **gaps in method provision or structure** that point to future work. New methods may represent wholly new additions to design methods vocabulary, extend known methods, or result from the revision of existing methods. All of these activities bring value, but these activities could be better shaped by knowledge of the landscape of methods that already exist, and the gaps that are presented through the lenses of knowledge, conceptual grounding, audience, or resonance. Perhaps a set of “use qualities” similar to the ones proposed by Löwgren (2006) in interaction design could provoke new ways of talking about methods use, provision, and design? What might more “fluent” methods look and feel like? How might we define an “elegant” method or one that produces “surprise”?

Third, our analysis points towards the need for a greater focus on what Stolterman et al. (2008) call a **“rationality resonance” in the creation and dissemination of methods**. While past work by Roedl and colleagues (2013) has revealed the lack of this resonance in their analysis of methods disseminated in the human-computer interaction context, our findings show that many of the developers we interviewed *did* consider issues of resonance and fit, either as explicit and *a priori* constraints, or constraints that caused a shift in their approach after evaluation with stakeholders. The liminal space between method creation, evaluation, use, and adaptation is one that requires new language, practices, and means of validating methods. If methods use is

focused at least in part on “mindset” (Gray 2016a), how might researchers gain access to and better describe that mindset while also respecting the non-determinism of method adaptation and use in practice? What criteria could be used to evaluate this resonance? And what means or length of engagement is necessary to document whether the method is efficacious in a given context? Future work could productively ask and build knowledge in relation to any of these questions, revealing more about how designers pragmatically select and adapt methods that feel resonant with their work context, describe the role of methods use in supporting decision making, and foreground new spaces that would be ideal targets for the creation of new methods.

5.3 Implications for the Support of Ethical Practices

While the previous section has largely focused on the generic provision of support by methods to practitioners, we also highlight the unique ethics-focused role of the methods we investigated and the MDs that we interviewed. What does this knowledge mean for design practice, and what implications can better support ethical and socially responsible design work?

First, our analysis reveals that there is a largely unexplored landscape of methods that have the potential to support design practitioners in building awareness of values, inscribing these values into their work, and evaluating the resulting design outcomes to ensure the success of this inscription. While at some level, this finding is unsurprising, since it reiterates the overall purpose and structure of high-level methodologies such as VSD (Friedman and Hendry 2019) and Values at Play (Flanagan and Nissenbaum 2014), we have found many design methods that do not directly rely upon these methodologies that could be more fully explored. As a baseline, this collection of MD interviews and methods could be used to structure a survey of ethics-focused methods more broadly, aiding the research, education, and practice communities in locating support resources that already exist, alongside opportunities for more method development.

Second, there appeared to be interest among MDs in generating methods to bridge or reshape divides among practitioner communities, knowledge bases, aspects of design process, and aspects of ethics or moral theory. We posit that this *translational resonance* thus represents a repositioning of what Stolterman et al. (2008) proposed as a resonance with practice, perhaps pointing towards the need to evaluate conceptual resonance, disciplinary resonance, or

paradigmatic resonance, among other possible points of focus—potentially linking with previous discourses regarding translational science and the research-practice gap (Colusso et al. 2019; Gray, Stolterman, and Siegel 2014). These additional types of resonance supplement Stolterman et al.’s proposal, while also adding additional clarity regarding the question of resonance with “what” and to what end. Some MDs expressed the desire for certain concepts such as empathy or privacy to cross disciplinary boundaries, which presents the challenge of disciplinary-centric epistemologies, areas of sensitization and purview, and the linguistic complexity of bridging these divides. While as a baseline, these MDs have been able to bridge the often stilted and heightened language of moral and ethical theory, there may be other resonance challenges depending on the stakeholders that a method might serve, or the unique ecological framing of practice in certain industries. In addition, further investigation into the knowledge and skills required of MDs to encourage better chances of successful outcomes may reveal further characteristics that are important to consider. Future work could address this complexity of disciplinary, organizational, and cultural contexts, identifying the impact of methods creation and use in these spaces in bringing about more ethically-centered outcomes.

Third, while not addressed explicitly by the MDs, there is a stated interest by ethics researchers more broadly in better addressing the complexity of design practice—recognizing the sociotechnical system itself as a form of wicked problem that involves numerous stakeholders and countless potential points of focus that all point towards current and future social and ethical responsibility. How might this language of constraints point towards differing levels of methods that frame this wickedness at varying scales and levels of detail? Based on our work, we propose the need for methods to work at varying levels of scale and complexity, with more nimble means of languaging design complexity across methods without a firm reliance on one or more existing methodologies or frameworks as an a priori assumption. Future research may address what types of toolkits—containing a multiplicity of methods and method types—might be needed to address

complexity in different contexts, on different scales, or based on certain levels of disciplinary knowledge or expertise.

6. Conclusion

In this paper, we describe the constraints that developers considered as they created ethics-focused methods, building on an interview study with twelve method designers. Our goal was to characterize the complex and undertheorized processes that lead to the creation of methods as a design outcome, revealing the intrinsic, extrinsic, and self-imposed constraints that shaped these methods, alongside iterative and evaluative activities to improve potential resonance. Building upon a framework of decisive constraints by Biskjaer and Halskov (2014), we described a range of ecological factors, use of existing knowledge, identification of framing metaphors, and response to evaluation of methods as important mechanisms that formed these methods. We highlight how these stories of method creation point towards the need for greater consideration of the pragmatic creation and use of methods to support designers, and the value of building more substantial theoretical accounts of methods building on the conceptual language we have introduced.

7. References

- Alshehri, Taghreed, Reuben Kirkham, and Patrick Olivier. 2020. "Scenario Co-Creation Cards: A Culturally Sensitive Tool for Eliciting Values." In *Proceedings of the 2020 CHI Conference on Human Factors in Computing Systems*, 1–14. CHI '20. New York, NY, USA: Association for Computing Machinery. <https://doi.org/10.1145/3313831.3376608>.
- Akrich, Madeleine. 1992. The de-scription of technical objects. In W. E. Bijker & J. Law (Eds.), *Shaping technology/Building Society: Studies in Sociotechnical Change* (pp. 205–224). MIT Press.
- Ballard, Stephanie, Karen M Chappell, and Kristen Kennedy. 2019. "Judgment Call the Game: Using Value Sensitive Design and Design Fiction to Surface Ethical Concerns Related to Technology." In *Proceedings of the 2019 on Designing Interactive Systems Conference*, 421–33. DIS '19. New York, NY, USA: ACM. <https://doi.org/10.1145/3322276.3323697>.
- Biskjaer, Michael Mose, Peter Dalsgaard, and Kim Halskov. 2010. "Creativity Methods in Interaction Design." In *Proceedings of the 1st DESIRE Network Conference on Creativity and Innovation in Design*, 12–21. DESIRE '10. Lancaster, GBR: Desire Network.
- Biskjaer, Michael Mose, and Kim Halskov. 2014. "Decisive Constraints as a Creative Resource in Interaction Design." *Digital Creativity* 25 (1): 27–61. <https://doi.org/10.1080/14626268.2013.855239>.
- Braun, Virginia, and Victoria Clarke. 2006. "Using thematic analysis in psychology." *Qualitative Research in Psychology* 3 (2): 77–101. <https://doi.org/10.1191/1478088706qp063oa>.
- Braun, Virginia, and Victoria Clarke. 2019. "Reflecting on Reflexive Thematic Analysis." *Qualitative Research in Sport, Exercise and Health* 11 (4): 589–97. <https://doi.org/10.1080/2159676X.2019.1628806>.
- Brown, Tim. 2009. *Change by Design: How Design Thinking Transforms Organizations and Inspires Innovation*. Harper Collins.
- Burnett, Margaret, Simone Stumpf, Jamie Macbeth, Stephann Makri, Laura Beckwith, Irwin Kwan, Anicia Peters, and William Jernigan. 2016. "GenderMag: A Method for Evaluating Software's Gender Inclusiveness." *Interact. Comput.* 28 (6): 760–87. <https://doi.org/10.1093/iwc/iwv046>.
- "Center for Humane Technology." n.d. <http://humanetech.com/>. <http://humanetech.com/>.

- Chivukula, Shruthi Sai, Chris Rhys Watkins, Rhea Manocha, Jingle Chen, and Colin M Gray. 2020. "Dimensions of UX Practice That Shape Ethical Awareness." In *Proceedings of the 2020 CHI Conference on Human Factors in Computing Systems*, 1–13. CHI '20. New York, NY, USA: Association for Computing Machinery.
<https://doi.org/10.1145/3313831.3376459>.
- Colusso, Lucas, Ridley Jones, Sean Munson, and Gary Hsieh. 2019. "A Translational Science Model for HCI." In *Proceedings of the 2019 CHI Conference on Human Factors in Computing Systems*. CHI '19. New York, NY: ACM Press.
<https://doi.org/10.1145/3290605.3300231>.
- Cross, Nigel. 1980. "An Introduction to Design Methods." *Information Design Journal* 1 (4): 242–53. <https://doi.org/10.1075/idj.1.4.04cro>.
- Daalhuizen, Jaap. 2014. "Method Usage in Design: How Methods Function as Mental Tools for Designers." PhD thesis, TU Delft.
- Daalhuizen, J., & Cash, P. (2021). Method content theory: Towards a new understanding of methods in design. *Design Studies*, 75(3), 101018.
<https://doi.org/10.1016/j.destud.2021.101018>
- Darke, Jane. 1979. "The Primary Generator and the Design Process." *Design Studies* 1 (1): 36–44. [https://doi.org/10.1016/0142-694X\(79\)90027-9](https://doi.org/10.1016/0142-694X(79)90027-9).
- "Design Heuristics Cards: Strategies to Inspire Ideas." n.d. <https://www.designheuristics.com/>.
- Dieter, Michael, and David Gauthier. 2019. "On the Politics of Chrono-Design: Capture, Time and the Interface." *Theory, Culture & Society* 36 (2): 61–87.
<https://doi.org/10.1177/0263276418819053>.
- Dorst, Kees. 2015. *Frame Innovation: Create New Thinking by Design*. Cambridge, MA: MIT Press. <http://www.worldcat.org/title/frame-innovation-create-new-thinking-by-design/oclc/912378209>.
- . 2019. "Co-Evolution and Emergence in Design." *Design Studies*, November.
<https://doi.org/10.1016/j.destud.2019.10.005>.
- Dorst, Kees, and Nigel Cross. 2001. "Creativity in the Design Process: Co-Evolution of Problem–Solution." *Design Studies* 22 (5): 425–37. [https://doi.org/10.1016/S0142-694X\(01\)00009-6](https://doi.org/10.1016/S0142-694X(01)00009-6).

- Elster, J. (2000). *Ulysses Unbound: Studies in Rationality, Precommitment, and Constraints*. Cambridge Univ. Press.
- Flanagan, Mary, and Helen Nissenbaum. 2014. *Values at Play in Digital Games*. MIT Press.
<https://doi.org/10.1177/1461444816631742>.
- Friedman, Batya, and David Hendry. 2012. “The Envisioning Cards: A Toolkit for Catalyzing Humanistic and Technical Imaginations.” In *Proceedings of the SIGCHI Conference on Human Factors in Computing Systems*, 1145–8. CHI '12. New York, NY, USA: ACM.
<https://doi.org/10.1145/2207676.2208562>.
- Friedman, Batya, and David G Hendry. 2019. *Value Sensitive Design: Shaping Technology with Moral Imagination*. MIT Press.
- Gericke, K., Eckert, C., Campean, F., John Clarkson, P., Flening, E., Isaksson, O., Kipourou, T., Kokkolaras, M., Köhler, C., Panarotto, M., & Wilmsen, M. (2020). Supporting designers: moving from method menagerie to method ecosystem. *Design Science*, 6.
<https://doi.org/10.1017/dsj.2020.21>
- Gericke, K., Roschuni, C., & Kramer, J. (2015). Discovery and Evaluation of Design Methods in Practice: An Empirical Study. *ASME 2015 International Design Engineering Technical Conferences and Computers and Information in Engineering Conference*, V007T06A037–V007T06A037. <https://doi.org/10.1115/DETC2015-47387>
- Gestoso, Patricia. 2019. “The Ethics and Inclusion Framework.”
<https://patriciagestoso.com/ethics-and-inclusion-framework/>.
- Goodman, Elizabeth, Erik Stolterman, and Ron Wakkary. 2011. “Understanding Interaction Design Practices.” In *Proceedings of the SIGCHI Conference on Human Factors in Computing Systems*, 1061–70. CHI '11. New York, NY, USA: Association for Computing Machinery. <https://doi.org/10.1145/1978942.1979100>.
- Gray, Colin M. 2016a. “‘It’s More of a Mindset Than a Method’: UX Practitioners’ Conception of Design Methods.” In *Proceedings of the 2016 CHI Conference on Human Factors in Computing Systems*, 4044–55. CHI '16. New York, NY, USA: ACM.
<https://doi.org/10.1145/2858036.2858410>.
- . 2016b. “What Is the Content of “Design Thinking”? Design Heuristics as Conceptual Repertoire.” *International Journal of Engineering Education* 32 (3B): 1349–55.
http://www.ijee.ie/latestissues/Vol32-3B/05_ijee3220ns.pdf.

- . 2016c. “What Is the Nature and Intended Use of Design Methods?” In *Proceedings of the Design Research Society*, 14 pp. Brighton, United Kingdom: Design Research Society.
- . 2020. “Markers of Quality in Design Precedent.” *International Journal of Designs for Learning* 11 (3): 1–12. <https://doi.org/10.14434/ijdl.v11i3.31193>.
- . (2022). Language design methods. *Design Studies*, 78, 101076. <https://doi.org/10.1016/j.destud.2021.101076>
- Gray, Colin M, Erik Stolterman, and Martin A Siegel. 2014. “Reprioritizing the Relationship Between HCI Research and Practice: Bubble-up and Trickle-down Effects.” In *Proceedings of the 2014 Conference on Designing Interactive Systems*, 725–34. DIS ’14. New York, New York, USA: ACM. <https://doi.org/10.1145/2598510.2598595>.
- Gray, Colin, Seda Yilmaz, Shanna Daly, Colleen Seifert, and Richard Gonzalez. 2015. “Idea Generation Through Empathy: Reimagining the ‘Cognitive Walkthrough’.” In *2015 ASEE Annual Conference and Exposition Proceedings*, 122nd ASEE:26.871.1–26.871.29. Seattle, Washington: ASEE Conferences. <https://doi.org/10.18260/p.24208>.
- Hanington, Bruce. 2003. “Methods in the Making: A Perspective on the State of Human Research in Design.” *Design Issues* 19 (4): 9–18. <https://doi.org/10.1162/074793603322545019>.
- Harrison, Steven, Maribeth Back, and Deborah Tatar. 2006. “‘It’s Just a Method!’ A Pedagogical Experiment in Interdisciplinary Design.” In *Proceedings of the 6th Conference on Designing Interactive Systems*, 261–70. <https://doi.org/10.1145/1142405.1142445>.
- Harrison, Steve, Phoebe Sengers, and Deborah Tatar. 2011. “Making Epistemological Trouble: Third-Paradigm HCI as Successor Science.” *Interact. Comput.* 23 (5): 385–92. <https://doi.org/10.1016/j.intcom.2011.03.005>.
- Hendry, D. G., Friedman, B., & Ballard, S. (2021). Value sensitive design as a formative framework. *Ethics and Information Technology*. <https://doi.org/10.1007/s10676-021-09579-x>
- Jones, J. Christopher. 1970. *Design Methods*. London, UK: Wiley-Interscience.
- Kheirandish, Shadi, Mathias Funk, Stephan Wensveen, Maarten Verkerk, and Matthias Rauterberg. 2019. “HuValue: A Tool to Support Design Students in Considering Human

- Values in Their Design.” *Int. J. Technol. Des. Educ.*, May.
<https://doi.org/10.1007/s10798-019-09527-3>.
- Kolarić, S, J Beck, and E Stolterman. 2020. “On the Hierarchical Levels of Design Knowledge.” *Proceedings of the Design Society: DESIGN Conference 1* (May): 51–60.
<https://doi.org/10.1017/dsd.2020.330>.
- Lockton, Dan. 2010. *Design with Intent: 101 Patterns for Influencing Behaviour Through Design*. Equifine.
- Löwgren, J. 2006. “Articulating the use qualities of digital designs.” In *Aesthetic Computing*, edited by Paul A Fishwick, 383–403. MIT Press.
- Löwgren, Jonas. 2013. “Annotated Portfolios and Other Forms of Intermediate-Level Knowledge.” *Interactions* 20 (1): 30–34. <https://doi.org/10.1145/2405716.2405725>.
- Martin, Bella, and Bruce Hanington. 2012. *Universal Methods of Design: 100 Ways to Research Complex Problems, Develop Innovative Ideas, and Design Effective Solutions*. Beverly, MA: Rockport Publishers.
- Maxwell, Joseph A. 2004. *Qualitative Research Design: An Interactive Approach*. 2nd ed. SAGE Publications.
- Merrill, Nick, and Joanne Ma. n.d. “Adversary Personas.”
<https://daylight.berkeley.edu/adversary-personas/>.
- Muratovski, Gjoko. 2015. *Research for Designers: A Guide to Methods and Practice*. SAGE.
<https://play.google.com/store/books/details?id=pv2ICwAAQBAJ>.
- Nelson, Harold G, and Erik Stolterman. 2012. *The Design Way : Intentional Change in an Unpredictable World*. 2nd ed. Cambridge, MA: MIT Press.
- Rittel, H. 1984. “Second-Generation Design Methods.” *Developments in Design Methodology*, 317–27.
- Roedl, David J, and Erik Stolterman. 2013. “Design Research at CHI and Its Applicability to Design Practice.” In *Proceedings of the SIGCHI Conference on Human Factors in Computing Systems*, 1951–4. CHI ’13. New York, NY, USA: ACM.
<https://doi.org/10.1145/2470654.2466257>.
- Sanders, Elizabeth, and Pieter Jan Stappers. 2012. *Convivial Toolbox: Generative Research for the Front End of Design*. BIS.

- Schon, Donald A. 1984. *The Reflective Practitioner: How Professionals Think in Action*. Basic Books.
- Shapiro, Ben Rydal, Amanda Meng, Cody O'Donnell, Charlotte Lou, Edwin Zhao, Bianca Dankwa, and Andrew Hostetler. 2020a. "Re-Shape: A Method to Teach Data Ethics for Data Science Education." In *Proceedings of the 2020 CHI Conference on Human Factors in Computing Systems*, 1–13. CHI '20. New York, NY, USA: Association for Computing Machinery. <https://doi.org/10.1145/3313831.3376251>.
- . 2020b. "Re-Shape: A Method to Teach Data Ethics for Data Science Education." In *Proceedings of the 2020 CHI Conference on Human Factors in Computing Systems*, 1–13. CHI '20. New York, NY, USA: Association for Computing Machinery. <https://doi.org/10.1145/3313831.3376251>.
- Shilton, Katie. 2018. "Values and Ethics in Human-Computer Interaction." *Foundations and Trends Human-Computer Interaction* 12 (2): 107–71. <https://doi.org/10.1561/11000000073>.
- . 2013. "Values Levers: Building Ethics into Design." *Sci. Technol. Human Values* 38 (3): 374–97. <https://doi.org/10.1177/0162243912436985>.
- Shilton, Katie, and Sara Anderson. 2017. "Blended, Not Bossy: Ethics Roles, Responsibilities and Expertise in Design." *Interacting with Computers* 29 (1): 71–79. <https://doi.org/10.1093/iwc/iww002>.
- Steen, Marc. 2015. "Upon Opening the Black Box and Finding It Full: Exploring the Ethics in Design Practices." *Science, Technology & Human Values* 40 (3): 389–420. <https://doi.org/10.1177/0162243914547645>.
- Stolterman, E. (2008). The nature of design practice and implications for interaction design research. *International Journal of Design*, 2(1), 55–65. <https://doi.org/10.1016/j.phymed.2007.09.005>
- Stolterman, E, J McAtee, D Royer, and S Thandapani. 2008. "Designerly tools." In *Undisciplined! Design Research Society Conference 2008*, 116:1–14. Sheffield, UK: Sheffield Hallam University.
- Stolterman, Erik, and James Pierce. 2012. "Design Tools in Practice: Studying the Designer-Tool Relationship in Interaction Design." In *Proceedings of the Designing Interactive Systems*

- Conference, 25–28. DIS '12. New York, NY, USA: ACM.
<https://doi.org/10.1145/2317956.2317961>
- “The Data Ethics Canvas.” n.d. <https://theodi.org/article/data-ethics-canvas/>
- Van Boeijen, Annemiek, Jaap Daalhuizen, Roos van der Schoor, and Jelle Zijlstra. 2014. *Delft Design Guide: Design Strategies and Methods*. orbit.dtu.dk.
- Verbeek, Peter-Paul. 2006. “Materializing Morality: Design Ethics and Technological Mediation.” In *Science, Technology & Human Values*, 31:361–80.
<https://doi.org/10.1177/0162243905285847>.
- Vermaas, P. E., Hekkert, P., Manders-Huits, N., & Tromp, N. (2015). Design methods in design for values. *Handbook of Ethics, Values and Technological Design*, 179–202.
- Vermeeren, Arnold POS, Effie Lai-Chong Law, Virpi Roto, Marianna Obrist, Jettie Hoonhout, and Kaisa Väänänen-Vainio-Mattila. 2010. “User Experience Evaluation Methods: Current State and Development Needs.” In *Proceedings of the 6th Nordic Conference on Human-Computer Interaction: Extending Boundaries*, 521–30.
- Wolf, Tracee Vetting, Jennifer A Rode, Jeremy Sussman, and Wendy A Kellogg. 2006. “Dispelling Design as the Black Art of CHI.” In *Proceedings of the SIGCHI Conference on Human Factors in Computing Systems*, 521–30. ACM.
<https://doi.org/10.1145/1124772.1124853>
- Wong, Richmond Y, Karen Boyd, Jake Metcalf, and Katie Shilton. 2020. “Beyond Checklist Approaches to Ethics in Design.” In *Conference Companion Publication of the 2020 on Computer Supported Cooperative Work and Social Computing*, 511–17. CSCW '20 Companion. New York, NY, USA: Association for Computing Machinery.
<https://doi.org/10.1145/3406865.3418590>
- Wong, Richmond Y, Deirdre K Mulligan, Ellen Van Wyk, James Pierce, and John Chuang. 2017. “Eliciting Values Reflections by Engaging Privacy Futures Using Design Workbooks.” *Proc. ACM Hum. -Comput. Interact.* 1 (CSCW): 111:1–111:26.
<https://doi.org/10.1145/3134746>.
- Woolrych, Alan, Kasper Hornbæk, Erik Frøkjær, and Gilbert Cockton. 2011. “Ingredients and Meals rather than Recipes: A Proposal for Research That Does Not Treat Usability Evaluation Methods as Indivisible Wholes.” *International Journal of Human-Computer Interaction* 27 (10): 940–70. <https://doi.org/10.1080/10447318.2011.555314>.