What is the Nature and Intended Use of Design Methods?

Colin M. Gray[a*]

[a]Purdue University
*Corresponding author e-mail: gray42@purdue.edu

Abstract: Interest in the codification and application of design methods is rapidly growing as businesses increasingly utilize "design thinking" approaches. However, in this uptake of design methods that encourage designerly action, the ontological status of design methods is often diffuse, with contradictory messages from practitioners and academics about the purpose and desired use of methods within a designer's process. In this paper, I explore the paradoxical nature of design methods, arguing for a nuanced view that includes the (often) conflicting qualities of prescription and performance. A prescriptive view of methods is drawn from the specification of methods and their "proper" use in the academic literature, while a performative view focuses on *in situ* use in practice, describing how practitioners use methods to support their everyday work. The ontological characteristics and practical outcomes of each view of design methods are considered, concluding with productive tensions that juxtapose academia and practice.

Keywords: design methods; design practice; research/practice divide

1. Introduction

In the past decade, many texts have flooded the market that include curated collections of design methods (e.g., Curedale, 2012; Hanington & Martin, 2012), often riding the "design thinking" wave of popularity and the increased interest of businesses in applying design approaches to wicked problems in their everyday work. These collections of design methods follow a relatively standard format, often organized by their intended use in a sequential design process, and including a description of each method, citations of where the method originated, and how it might be applied by a practitioner in a generic, context-free sense. However, the curation and codification of methods in this way begs the question: What about a design method is being represented? What ontological assumptions about methods

do these collections make? And how do these representation- and ontologically-oriented assumptions affect the projected or intended use of design methods?

Curedale (2012), in an introduction to a recent collection of design methods, notes his belief about how such lists of design methods should be utilized, pushing the responsibility surrounding use to the individual designer, explaining in the introduction:

"I have kept the descriptions simple to give readers the essential information to adapt, combine and apply the methods in their own way. We hope that you will gradually build a personal toolkit of favored methods that you have tried and found effective. Different design practitioners can select different methods for their toolkit and apply them in different ways. *There is no best combination*." (emphasis added).

This view of emergent use, where methods are pragmatically applied or appropriated, resonates with contemporary perspectives on design practice (Lawson & Dorst, 2009; Stolterman, 2008). In the context of interaction design in particular, where approaches to design practice have emerged without consistent and pervasive academic influence, the use of methods has been found by Goodman and colleagues to be highly complex, drawing on the material qualities of specific stakeholder interactions (Goodman, 2013; Goodman, Stolterman, and Wakkary, 2011). This pragmatist view has been echoed in design education, with Harrison, Beck, and Tatar (2006) noting that methods have often been taught to students as more predictive than is warranted, with the conclusion that method use in practice is itself designed (see also Woolrych, Hornbæk, Frøkjær, & Cockton, 2011). Underlying this understanding of the emergent use of method is a growing realization that our modeled understanding of design activity often does not represent authentic design practice (Gray, Stolterman, & Siegel, 2014; Rogers, 2004; Stolterman, 2008), and this mismatch stems from research on methods and practices that are only proven to be effective in research settings (Mullaney & Stolterman, 2014). While many authors of methods from academia intend their methods to influence or extend practice, Roedl and Stolterman (2013) demonstrated, through a review of method-oriented papers in the ACM SIGCHI community, that few papers demonstrated resonance with practice, and even fewer appear to be adopted or otherwise used by design practitioners.

On the other hand, methods have been described as blueprints for effective, or potentially more "rigorous," design practice (Hanington, 2003; Pahl, Beitz, Feldhusen, & Grote, 2007). At one extreme, following a prescribed method in a careful way might constitute a high likelihood (i.e., approaching a "guarantee") of an appropriate or valid design outcome. Established design methods such as personas have been explored in the research literature in a prescriptive way that is in alignment with this view, describing designers that did not use personas in the "correct" way, and often resulting in criticism when authentic design activity is held to a certain academically-derived standard of rigor (e.g., Nielsen & Hansen, 2014). Even in curated collections of design methods, this prescriptive view of method can easily dominate, with a description of how to carry out or apply a method taking on an implicit authority or guarantee. Many collections include citations explaining where the method was

derived, lending additional credence to the designer's role as simply *applying* a method that has already been scientifically determined to be valid in producing effective outcomes. Whether the method has been scientifically validated, and under what conditions, is not as important as the reader's *perception* of such validity.

This paper exists at the intersection between these two apparently contradictory notions of method—as pragmatically applied or as prescriptive—by addressing what a method actually *is*. To begin this discussion, it is important to note what design methods are not. In opposition to implicit or explicit claims in a portion of the extant literature, I claim that design methods in this definitional space do not: make design decisions for you, tell you what to do next in the design process, model design activity in a direct sense, operate in isolation from other methods or techniques (even when self-referencing), or must be applied only to the design project that is foregrounded while being used. For the purpose of this paper, I define design methods simply as *any tool that enables a designer to think about, reflect on, or otherwise pursue design activity*. This paper extends general knowledge on design expertise (e.g., Lawson & Dorst, 2009) and reflective practice (e.g., Schön, 1990) into the domain of design methods, elaborating the complex ways in which designers extend and assimilate methods as a natural part of their design activity.

What is a method then? Some scholars have called them "prescriptions," while others treat them as specifications—more like blueprints or sets of instructions, which may be altered based on the context or emergent issues. What is the relationship of methods to design activity itself, though? Do methods *model* authentic design behaviors? Or provide designers with a generative "creative spark" (e.g., Schön's *generative metaphor*) to engage in additional design activity? Many of the questions raised here I will attempt to resolve in the remainder of this paper.

2. The Proposition

Speaking from this space of potential confusion and conflicting views on what methods *are* and how they should be used, I propose a return to a lower-level conversation: that is, what are design methods in their essence? What is their epistemology and ontology, and how are these characteristics reflected in the ways that methods promote or reify understanding and use in academic and professional settings?

What I will posit in this paper is that while methods themselves may act as reifications of explicit design activities, expressed in an objective or objective-like form, the objective description of a method is not equivalent to the enactment of, use of, or cognitive processing of that method in a performative sense. To support this assertion, I will trace the designer's cognitive use of methods through some examples of design activity, with the goal of showing the limitations of viewing design methods as *only* a model of appropriate design activity. Instead, I will attempt to show how, in design activity, designers use the language of method to describe their work, but only as a form of shorthand—or as a grounding object—not as a complete retelling of their activity. This use of method as shorthand can be

confusing in documenting design activity through research, where multiple instantiations of method with many levels of fidelity to an "original" academic method may be unintentionally conflated—where similar terminology is used, but with often dramatically different intent. This phenomenon likely stems from an application of empiricism to the enactment of practical knowledge (Dunne, 1997; Polanyi, 1966; Stolterman, 2008), where researchers tend to treat methods as prescriptive enactments of known, objectively defined activities—drawing on original understandings of design methods as an exploration of design cognition (Jones, 1970), rather than as emergent activities that manifest through a generative performance (Goodman, 2013; Rittel, 1984; Schön, 1990).

3. The Argument: In Three Parts

I will now explore and argue for this proposition through three perspectives on methods use, attempting to "muddy the waters" and show how the conception and use of method varies depending on our collective understanding of methods as a prescriptive or generative tool. The first two parts provide competing arguments for how design scholars might view the use of methods—as performance or prescription—and how this perspective impacts the agency of designers involved in their use, and implications for communicating using methods. The third part provides a brief summary of how these perspectives may interact through productive tensions, potentially causing a clash of priorities and vocabulary between academic and practice communities.

3.1 Arguing for Performance

This first perspective draws from the vantage point of a designer as she engages in authentic design activity (i.e., research in the ethnographic tradition, such as Goodman, 2013). Notably, this activity varies from research carried out on the use of a particular method (in a speculative sense, e.g., research through design or design-based research; see Mullaney & Stolterman, 2014; Roedl & Stolterman, 2013) or study of method as used in classroom instruction (e.g., Person, Daalhuizen, & Gattol, 2012). To trace the designer's use of methods, I will use a standard analytic method in design—affinity diagramming—to stand in for a variety of methods, both convergent and divergent. At this stage, I am explicitly scoping the exploration to standalone methods that are common across multiple design fields. This scope excludes comprehensive design *methodologies* (e.g., contextual design) or descriptions of process or philosophy (e.g., Agile, Six Sigma), although many of the performative or prescriptive attributes may still be present.

GENERIC SEQUENCE OF METHOD USE

If we were to imagine the use of any standalone method as it emerges in the process of a specific designer, the following stages may provide a framework for us to think through how and when a method is applied, how it is used, and what happens after the explicit use of the method has concluded. Consider the following stages, which are intentionally broad and decontextualized:

1. *In situ* design activity
2. A next step is needed (e.g., a way to think differently, communicate, extend, collaborate)
3. A method is selected, created, or adapted based on its perceived salience to the design context (i.e., from a pastiche of lived experience and available or known tools)
4. A method, set of methods, or appropriation of method(s) is enacted or performed until its utility has been achieved or exhausted
5. The enactment or performance of a method (ideally) has some perceptible impact on the design situation (e.g., a new insight, validation of a previous hunch, raising consciousness of previously tacit ideas, realization a concept in a new form)
6. *In situ* design activity continues

PERFORMANCE AS CONTROLLED BY THE DESIGNER

This general process description presents methods as tools—fully in the control of the designer, ideally employed in ways that are perceived by the designer to be beneficial to the design process at large (e.g., "designerly tools"; Stolterman, McAtee, Royer, & Thandapani, 2008). It is notable that methods in this framing do not drive the process, constraining the decisions of designers in a larger sense, and are not employed in a purely mechanical manner. Methods are being used by the designer to promote new ways of thinking about a design problem; the level of fidelity of the specific method performance as related to the originating method specification is irrelevant when considering the utility the designer may derive from the use of a method in a situated way. There are many junctures (i.e., Steps 2-5, above) where judgments *must* be made by the designer: a) to determine which method to select from a group of methods the designer is familiar with, and when to commence use of the method; b) knowing how to begin using the method in the specific design context (i.e., what inputs to use); c) deciding when use of the method should conclude (i.e., what outputs were desirable and when those outputs are present); and d) choosing which outputs from the method to employ in guiding the design process forward. Interestingly, none of these judgments are included explicitly in the method, but rather are left up to the individual designer to make a judgment (e.g., instrumental judgments, Nelson and Stolterman, 2012) based on the specific design situation. A generative method such as affinity diagramming only provides a rough approximation of behavior and output—sorting and clustering—that doesn't tell the designer *how* to cluster, or how to *know* when they are done. How are elements to be produced or processed in order to sort/cluster? How are elements unitized and then sorted in physical or digital space? What insights does the designer or design team draw from such an activity? These are just some of the questions that method representations leave underspecified in favor of flexible judgments made by the individual designer.

While all of these judgments are continuously occurring in the context of design activity, the individual designer may not be explicitly aware of them in the moment they are made. Schön (1990) describes this process of explicit and implicit awareness of design decisions that weaves through the design cognition as a "reflective conversation" between the designer and the design process or artifact. The judgments being made regarding when the designer commences or concludes the use of a method are discursive and emergent in

nature, although increasingly tacit as design expertise increases (Lawson & Dorst, 2009). Method use which may be easily labeled as such after the fact may not appear to be explicitly selected in design activity, and these stages may be much more interleaved or chaotic than they are presented here. The sense of performance is unique and non-repeatable, bound to the individual designer, the unique design context, and the temporal dimension of emergence in a larger sociocultural space.

PERFORMANCE AS DISTRIBUTED AMONG MULTIPLE STAKEHOLDERS

An alternate view of methods use might be imagined, however. If the focus is placed on the design organization level rather than the level of an individual designer, a different set of conclusions might emerge regarding the use of method. While the same general activities described above may still take place, the instrumental judgments able to be applied by an individual designer may be substantially more constrained. The organization may rely on several branded "house methods" (e.g., IDEO's standardized consulting model; experience maps from one participant in Gray, 2016) that designers select from at any given stage of the design process; or specific constraints may be applied around the amount of iteration allowable for a given method—measured in time, resources, or involved stakeholders. In these cases, the function of method has not changed in a holistic sense, but the freedom around the application of that method has been distributed among multiple stakeholders in the organization.

As with the view of the individual designer in the previous section, the lines between the design judgments of the individual and that of the organization—or even professionalized design discipline—become very blurry indeed (Gray, Toombs, & Gross, 2015). Individual designers may feel as if they are acting freely, while they are being constrained by dominant approaches in their organization that are tacitly rewarded. Conversely, recognized methods on the organizational level may be co-opted and augmented by individual designers, while still being referred to in a more uniform way when discussed with management. Gray, Toombs, and Gross (2015) trace the ways in which competence around UX processes and method use can flow between the organization and individual (or *vice versa*), demonstrating the fluidity of performance that is shared between an individual and the company within which they work. While this is an area of nascent research activity, the work of Goodman (2013) and Lallemand (2015) provide some initial guidance on how organizational culture shapes—and is shaped by—the actions of individual design practitioners.

COMMUNICATING ABOUT METHOD PERFORMANCE

A view of design activity as performance represents an organic space, where design activity "just happens" and is difficult to objectively document, even via multiple means of data collection. While design activity may begin more organically, with a designer or design team in "flow," eventually the gestalt of the specific situation can be read in some way (often after the activity has taken place) by the designer or third party as a "method" (see descriptions of a hybrid method by "Phil" in Gray, Stolterman, & Siegel, 2014). If a designer would be asked

to reenact the situation from an objective, third-person position, they would likely be able to chunk activities together into a language that is accessible to another designer—often employing known methods as a way of talking about what they had done, even if these labels may have not been explicitly accessible to the designer in the moment of performance. This *post hoc* form of negotiation between design activity and the labeling of design cognition or phenomenon in an illocutionary manner is also the foundation of design research, such as the protocol studies used in early instantiations of the *Design Thinking Research Symposium*. However, in this latter case, it is a third-party that is determining the meaning or labeling of emergent activity, and rarely the designer engaged in that activity herself.

Scholars often see this ontological clash between one's espoused theory and theory-in-use (Argyris & Schön, 1974) in design activity. I don't believe this is dishonesty, but rather representative of the difficulty of articulating complex human activity, appropriately bringing tacit design knowledge into explicit language. Much of what professional designers do, including the embedded rationality of their actions, lies in the tacit dimension (Lawson & Dorst, 2009; Polanyi, 1966), and thus the particulars of how design cognition occurs is obscured, even to the designers who have made the relevant decisions. Thus, fifteen minutes of panicked sketching before a client meeting is languaged as "wireframing"; research to develop empathy with potential users is later called "contextual inquiry" or the development of "personas"; clustering of ideas scribbled on paper, Post-It notes, or by using digital tools becomes "affinity diagramming." These *post hoc* descriptions reference the goal of the design activity as seen from the present looking into the past, focused on the designer's *intention* (often tacit in nature), rather than their actual cognitive state.

3.2 Arguing for Prescription

This second perspective begins from a larger question in design scholarship: if there isn't rigor in the method used to inform design action, how do we know the outcomes are valid? How can we compare the work of multiple designers or design communities? This question has been answered in substantially different ways by the engineering and design communities, respectively, and is echoed in Cross' (2001) differentiation between a science of design (i.e., studying design activity using scientific methods) and design science (i.e., a "rational and wholly systematic approach to design"). In a dominant strand of the design literature, design ethics are drawn from the designer herself. In this case, the guarantor-of-design (Nelson & Stolterman, 2012) is located in the ethics of the designer, her reflective awareness of design decisions, and the impact of these decisions on future use. In the engineering literature, ethics are more often described as a form of failure prevention, with methods, processes, and structures serving as guardrails to ensure that the resulting solution is sound (e.g., Pahl, Beitz, Feldhusen, & Grote, 2007). In the latter case, the guarantee of a successful design is bound up in the systematic nature of the approach— including the methods, processes, and structures that ensure a positive outcome. This view draws on a prescriptive understanding of design process and method use, with the system or

approach functioning as the guarantor-of-design, as contrasted with the designer-(as-human)-centric view. While Cross (2001) notes that few design scholars would argue for a "wholly systematic" rendering of design activity, a continuing preoccupation with the rigor and scientific validity of certain design methods (e.g., Lallemand, 2015; Pahl et al., 2007), particularly in disciplines more closely aligned with the hard sciences prompts me to position this description of design methods guaranteeing a positive design outcome as one interesting, and potentially provocative edge case.

REPRESENTATION OF PRESCRIPTION

In beginning to parse questions such as the location of the guarantor-of-design, it is first important to note the formal representation of methods, and the way in which the verbalization of methods circumscribes their potential use. While there is great variety in this representation, for this discussion, I claim that most methods include four distinct segments: 1) the "method" or blueprint name, 2) inputs from previous design or research, 3) the prescribed activity, and 4) the output or outcome. A few common methods aligned in this way perhaps makes these segments clearer:

- **Affinity diagramming** (1) will filter your data (2) through clustering and sorting (3), elucidating important themes and generating insights (4)
- **Personas** (1) will allow for the creation of user profiles (3) from existing research (2) that helps you design for and empathize with users that are economically desirable (4)
- **Wireframing** (1) will provide a low-fidelity mockup of a final project (3) based on known specifications (2) to encourage early changes without the need for investment in a high-fidelity or fully functioning prototype (4)

While these four segments do not necessarily result in a prescription, this format often lends itself easily to excluding or including certain kinds of activity. Leveraging the structure of these method descriptions, one is easily able to say, like Nielsen and Hansen (2014), that a company is using personas in an incorrect or inappropriate way; similarly, Stone and Wood (2004) declare a functional decomposition only valid if the function is defined in a particular, precise way. So there is a sense in which even if a specific prescription is not given, the formal representation of a method projects what an appropriate pattern of use might look like, or at the very least provides a set of unique characteristics or attributes that may be located in design activity. This issue is of particular concern in design education, where students often assume that documented methods have a scientific validity and holism that requires prescriptive use (Harrison, Back, & Tatar, 2006), even when students are directly taught that such a scientific base is not present, or should not constrain the use of methods within the context of situated design activity.

PRESCRIPTION AS GUARANTOR

The guarantee of success in many fields is bound up in the methods or overarching methodologies that are used. The Six Sigma approach, for instance, prescribes a number of

steps that employees at varying levels of management must take in a variety of contexts, with the promise of lower defect and error rates. In engineering, the process of materials testing is undertaken with scientific precision, with the goal of determining the physical properties of a material, such as its reaction to temperature fluctuations, bending, shear forces. The goal of such testing is to produce an objective result that can be trusted by the larger engineering community—and thus must be replicable if enacted in the exact same sequence of steps. In interaction design, Lallemand (2015) references the scientific rigor of *Attrakdiff 2* scale, identifying areas where misapplication (e.g., non-native status, translation, subset of questions) of this instrument that measures usability and design of interactive products may lead to results or design insights that are not valid.

This goal of objectivity applies to some methods—particularly in areas where safety or compliance are paramount—but does not neatly account for the diversity of convergent and divergent methods that currently exist. There are some in the design community that see a method as a blueprint of what *should* be in a more general sense; for instance, in an extended conversation on this topic led by Dr. Terence Love on the *PhD-Design* Listserv, Love claimed that "[m]ethod is a prescription for a way of doing something" (January 5, 2014). This claim drew on instantiations of design research in an engineering and/or artificial intelligence tradition, where methods often represent a distillation of human judgment into a quantitative tool. This understanding of "method as blueprint" is a largely normative statement that circumscribes so-called "proper" use of a method, which often presumes that a designer is unconstrained by time or contextual factors (Roedl & Stolterman, 2013). Method as prescription provides an aspirational state, often coinciding with a guarantee about what the method will accomplish for the designer if enacted as it was intentionally designed.

PRESCRIPTION AS IDEALIZED MODEL OF DESIGN ACTIVITY

This picture of an objective, rational human activity matches well with the notion of a design science—the promise of something that is replicable and knowable, which has defined inputs, activities, and outputs. While not every proponent of method as prescription would also identify with design science, this stance results in a focus on describing and talking about the method, which, in its most blatant form, treats methods as a way to model and describe design activity.

The prescriptive element occasionally takes over the management of the design process itself, as in a purportedly holistic method or methodology such as contextual inquiry (Beyer & Holtzblatt, 1998) or mental models (Young, 2008). These methods not only seek to direct design activity or process through a specific instantiation of a design method, but also in engineering the flow of the design process itself. A method "swallowing up" the process—perhaps what could be called a "meta-method"—is perhaps the best example of arguing for prescription, even while these method authors also claim that the method can be applied in a flexible and designer-directed way. In most "meta-method" cases, the documentation of the method is focused on aspects of prescription, not on flexibility; and focus is often shifted

from generative, in-the-moment use of design methods to the management of entire design processes. As in the case of the organization constraining the judgments of individual designers, so too do these methods *qua* design processes begin to remove the potential for diversity of use in the enactment of methods.

COMMUNICATING ABOUT METHOD PRESCRIPTION

Some confusion lies in when and where objective or objective-like descriptions, like those represented as prescriptions here, are seen to be appropriate. In design research, there is a desire to label and systematize things. Scholars like to define phenomena, attach a name to that phenomena, and then apply inclusion and exclusion criteria so other scholars are able to "know it when we see it." These names are important—both for development of scholarship around methods, and for their dissemination in practice communities. However, a method blueprint is frequently adapted for a variety of uses, with sometimes only the core of a method remaining (Gray, 2016; Gray et al., 2014; Rogers, 2004), stripped of its original prescriptive detail.

Unlike the discussion of method as performance, above, communication about prescription raises the issue of context and community. While performance lies primarily in the realm of practice, method creation and prescription is a task historically taken on by the academic community (e.g., Jones, 1970; Rittel, 1984). This indicates that many academic creators of methods may actually imagine, project, and communicate a different use than is tenable in a performative sense (Roedl & Stolterman, 2013); and this very penchant for labeling and systemization in a scientific or scientized manner privileges the scholarly discourse over the practice discourse (Gray et al., 2014; Rogers, 2003), moving a discussion of method to be dominated by prescription.

3.3 Prescription in Academia and Legitimation of Practice

The tensions between these two perspectives on method, and the professional and academic communities these perspectives represent, have the potential to be productive— drawing together the need for humans to communicate their often complex activities with each other, and the desire for scholars to name, categorize, and taxonomize. When these perspectives conflict, the potential for ontological uncertainty ensues. The ontological entity named or referred to by a designer in service of communication during design activity can easily be confused by a scholar as a designer using an ontologically-bounded and taxonomized method as a blueprint or prescription. This results in an objective or scientific reification of practical knowledge, which is better understood and represented on its own terms (Dunne, 1997; Stolterman, 2008).

The realities of the cycle of method creation and use inevitably brings these two different perspectives into discussion and conflict, often unknowingly. Each perspective and associated community brings with it a unique set of imperatives relating to activity, knowledge production, and rigor. Participants in each of these communities value certain forms of communication over others. But when these communities interact—and this

interaction is desirable in many ways (Gray et al., 2014)—many of these imperatives clash. In relation to methods, the issue of over-specification (as in the prescriptionist perspective) and under-specification (as in the performative perspective) becomes potentially divisive, limiting the quality of communication that can occur in a bridging way between communities around the purpose and substance of methods.

If the design research community seeks to bridge academia and practice, we must be committed to finding ways to understand and communicate intentions regarding methods and method use in productive ways. The bridges already exist: in academic institutions, professors train designers to join the ranks of professionals; and in professional settings, methods that often originate in academic institutions serve as a basis for design practice. Yet these bridges are occluded by differences in vocabulary, standpoint, and ontology—particularly around the nature and purpose of design methods.

4. Conclusion

I began this paper with the assertion that methods themselves may be seen as a form of objective or objective-like knowledge, but that the objective description of a method cannot be viewed as equivalent to the enactment of that method as performance. I have presented each view separately, with some of the limitations and strengths of each, and will provide some additional synthesis in these closing paragraphs.

Methods can be viewed in a prescriptive stance as a rationalist view of reality, where a method is intentionally and systematically reified to represent underlying scientific rigor. Viewing a method as a blueprint or prescription for doing something is a natural outcome of this perspective, moving the role of the individual enacting the method from that of a designer to something more akin to a technician (Nelson & Stolterman, 2012)—and thus changing the locus of design activity from the designer and her professional ability to make judgments to an abstract representation via method, process, and structure. While some might choose to take on this prescriptive view for the small areas of design practice where objectivity is moderately attainable (e.g., high stakes design contexts such as safety systems), I suggest that this is not a view that is tenable for the vast majority of design production, which is much more nuanced, and brings with it substantially less cause for prescription.

I therefore contrast this view with a more practice-centric assertion. That methods have inside them a generative "script" (*a la* Madeline Akrich, 1992) which can be interpreted in a simultaneously subjective and intersubjective way. This perspective allows scholars and practitioners alike to view a method as an unqualified "designerly tool" (Stolterman et al., 2008) for getting work done—as a way of approaching design activity, and potentially as a means for labeling such activity in the sense of a shared professional language or grounding object. In this view, methods contain within their very structure a "script" of defined or potential use, which is subject to the interpretation (and often appropriation) of the individual designer or design organization. This script could be as potentially reductionist as

a defined "core" of a method (e.g., clustering and sorting in affinity diagramming), but could be much more complex as well, taking into account aspects of the individual designer's lived experience, the culture of the organization or stakeholders, or other salient factors relating to the unique design situation. Importantly, this script is read by the person choosing to perform it, with an interpretive, intersubjective quality that is temporally and contextually bound.

And this brings us back to where I began our discussion of the ontological constitution of design methods. I have argued that methods are only approximated in reality, and cannot be directly located or "found" in a traditional scientific sense. Even robust and highly structured methods meet practical challenges when they are applied in practice, distancing the performance of the method from any objective blueprint from which the performance is derived. The translational process encountered by designers and design researchers when they use methods as a "cookbook" makes it appear that they can be found, but this is an interpretative move, with human actors required (Woolrych et al., 2011; Harrison et al., 2006). If a method is inscribed into a machine-based process (and is this still design?), is it any longer a method? Then a designer would have to make decisions about the limits of the method in situations that are explicitly coded for. A shift from method as prescription to method as tool and performance changes the conversation. It moves the object of conversation from an objective set of activities and outcomes, and moves it to a place where the designer and design activity are front and center, and methods are "merely players."

5. References

Akrich, M. (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). Cambridge, MA: MIT Press.

Argyris, C., & Schön, D. A. (1974) *Theory in practice: Increasing professional effectiveness.* San Francisco, CA: Jossey-Bass Publishers.

Beyer, H., & Holtzblatt, K. (1998) *Contextual design: Defining customer-centered systems.* San Francisco, CA: Morgan Kaufmann.

Curedale, R. (2012) *Design methods 1: 200 ways to apply design thinking.* Topanga, CA: Design Community College.

Dunne, J. (1997) Back to the rough ground: Practical judgment and the lure of technique. Notre Dame, IN: University of Notre Dame Press.

Goodman, E. S. (2013) *Delivering design: Performance and materiality in professional interaction design.* (Unpublished doctoral dissertation). University of California, Berkeley, CA.

Goodman, E., Stolterman, E., & Wakkary, R. (2011) Understanding interaction design practices. In *CHI'11: Proceedings of the SIGCHI conference on human factors in computing systems* (pp. 1061-1070). New York, NY: ACM Press.

Gray, C. M. (2016) "It's more of a mindset than a method": UX practitioners' conception of design methods. In *CHI'16: Proceedings of the 2015 CHI Conference on Human Factors in Computing Systems.* New York, NY: ACM Press.

Gray, C. M., Stolterman, E., & Siegel, M. A. (2014) Reprioritizing the relationship between HCI research and practice: Bubble-up and trickle-down effects. In *DIS'14: Proceedings of the 2014 CHI Conference on Designing Interactive Systems* (pp. 1645-1654). New York, NY: ACM Press. doi:10.1145/2556288.2557264

Gray, C. M., Toombs, A., & Gross, S. (2015) Flow of competence in UX design practice. In *CHI'15: Proceedings of the 2015 CHI Conference on Human Factors in Computing Systems* (pp. 3285-3294). New York, NY: ACM Press. doi:10.1145/2702123.2702579

Hanington, B. (2003) Methods in the making: A perspective on the state of human research in design. *Design Issues*, *19*(4), 9-18.

Hanington, B., & Martin, B. (2012) Universal methods of design: 100 ways to research complex problems, develop innovative ideas, and design effective solutions. Beverly, MA: Rockport Publishers.

Harrison, S., Back, M., & Tatar, D. (2006) It's just a method!": A pedagogical experiment in interdisciplinary design. In *DIS'06: Proceedings of the 6th conference on designing interactive systems* (pp. 261-270). New York, NY: ACM Press. doi:10.1145/1142405.1142445

Jones, J. C. (1970) *Design methods.* London, UK: Wiley-Interscience.

Lallemand, C. E. (2015) Towards consolidated methods for the design and evaluation of user experience. Doctoral dissertation, University of Luxembourg.

Lawson, B., & Dorst, K. (2009) *Design expertise.* Oxford, UK: Architectural Press.

Mullaney, T., & Stolterman, E. (2014) Why 'design research practice' is not design as we know it. In *Proceedings of the design research society.* Umeå, Sweden: Design Research Society.

Nelson, H. G., & Stolterman, E. (2012) *The design way: Intentional change in an unpredictable world* (2nd ed.). Cambridge, MA: MIT Press.

Nielsen, L., & Storgaard Hansen, K. (2014) Personas is applicable: A study on the use of personas in Denmark. In *Proceedings of the 32nd annual ACM conference on human factors in computing systems* (pp. 1665-1674). New York, NY: ACM Press.

Pahl, G., Beitz, W., Feldhusen, J., & Grote, K. -H. (2007) *Engineering design: A systematic approach* (3rd ed.). London, UK: Springer Verlag.

Person, O., Daalhuizen, J., & Gattol, V. (2012) Forming a mindset: Design students' preconceptions about the usefulness of systematic methods. In *E&PDE 2012: 14th international conference on engineering and product design education: Design education for future wellbeing,* Antwerp, Belgium.

Polanyi, M. (1966) *The tacit dimension.* Garden City, NY: Anchor Books.

Rittel, H. (1984) Second-generation design methods. In N. Cross (Ed.) *Developments in Design Methodology* (pp. 317-327). Chichester: John Wiley & Sons.

Roedl, D. J., & Stolterman, E. (2013) Design research at CHI and its applicability to design practice. In *Proceedings of the 2013 ACM annual conference on human factors in computing systems* (pp. 1951-1954). New York, NY: ACM Press.

Rogers, Y. (2004) New theoretical approaches for HCI. *Annual Review of Information Science and Technology*, *38*(1), 87-143.

Schön, D. A. (1990) The design process. In V. A. Howard (Ed.), *Varieties of thinking: Essays from harvard's philosophy of education research center* (pp. 111-141). New York, NY: Routledge.

Stolterman, E. (2008) The nature of design practice and implications for interaction design research. *International Journal of Design*, *2*(1), 55-65.

Stolterman, E., McAtee, J., Royer, D., & Thandapani, S. (2008) Designerly tools. In *Undisciplined! Design research society conference 2008* (pp. 116:1-14). Sheffield, UK: Sheffield Hallam University. Retrieved from Google Scholar: http://shura.shu.ac.uk/491/

Stone, R. B., & Wood, K. L. (2000) Development of a functional basis for design. *Journal of Mechanical Design*, *122*(4), 359-370.

Woolrych, A., Hornbæk, K., Frøkjær, E., & Cockton, G. (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), 940-970.

Young, I. (2008) Mental models: Aligning design strategy with human behavior. Brooklyn, NY: Rosenfeld Media.

About the Author:

Colin M. Gray is an Assistant Professor at Purdue University in the Department of Computer Graphics Technology and a Faculty Fellow in the Educational Research and Development Incubator. His research focuses on the development of design ability in education and practice contexts.