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Designing Users: The Social Construction of Users in Product Design

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by

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The Dissertation of David Bradley Kadanoff is approved, and it is acceptable in quality and form for publication on microfilm and electronically:

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ABSTRACT OF THE DISSERTATION

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The technological systems in our society are widespread and structured in complex ways. To comprehend the construction of these systems, it is necessary to understand who has opportunities to influence them and how. Previous scholarship in the sociology of technology has provided some analysis of the roles of designers and users in constructing technology. However, this research tends to oversimplify the nature of design work and portrays designers and users in isolation, having little-to-no interaction with each other. This approach limits the understanding of the design of technology and the role users play in that process. My research investigates what type

of interaction occurs between designers and users and how designers' ideas about the role of users affect the potential for user influence. I use depth interviews with 30 product designers, as well as participant observation of professional association meetings and usability testing. My research findings show that interaction between designers and users is common and takes a variety of forms. However, a cultural divide exists amongst designers. Designers use two main contrasting schemas to make sense of their work and the role of users in design: rationality and creativity. These schemas affect both discourse and practice of designers. Under schemas of creativity, designers tend to gather less direct feedback from users than under schemas of rationality. As a result, users have reduced opportunities to affect the construction of technology. This divide is embedded in design culture, with historical precedence evident in early mass production and current views manifest in the ways designers evaluate the legitimacy and success of Apple, Inc.

I. Introduction

Introduction

Design matters. We live in a society surrounded by objects not of our own design that as users we interact with on a daily basis. These objects represent a complex set of social relationships encompassing a wide array of actors. As users of these technological artifacts, we have a vested interest in the shape they take. However, our relative power to influence this system is unclear and depends in part on our role in the design and development of these goods. Notably, the way in which goods have been designed and produced has changed significantly over time. With this change has come a shifting relationship between designers and end users. The current state of this relationship is one that has received limited close examination.

The rise of industrialization and capitalism brought unique changes to the design and production of material goods. Industrialization ushered in specialization and division of labor and an increase in the relational distance between the makers of goods and the users of goods (Christian 2011). In early 20th century Fordism, the

development of goods tended to adhere to a mass production model, by which maximum efficiency was gained by producing identical products in the greatest number possible. This model meant that users of certain products were generally constructed, intentionally or not, as a mass population, with little variation amongst them. Henry Ford's famous dictum "any customer can have a car painted any colour that he wants so long as it is black" (Ford 1922) exemplifies the approach to conceptualizing users during this time period. As a result, the designers of goods and the users of goods experienced great relational distance.

In mid-twentieth century, a shift could be seen in which corporations attempted to close the gap between producers and consumers. In the 1950s, corporations and private marketing firms, borrowing from sociologists like Robert K. Merton, began using focus groups in order to gain insight into their users (Munday 2006). In these early focus groups, designers and marketers gathered information from and tested ideas with prospective users. These early efforts demonstrated the beginnings of a shift in the conceptualization of relationship between designers and users that would be further transformed by shifts in manufacturing capabilities.

Shifts in the prevailing means of production further narrowed the gap between production and consumption by developing ways in which products could be manufactured on a less massive scale. Authors Piore and Sabel (1984) describe this shift in production as the 'second industrial divide.' They explain that the 1970s brought a transition to a post-Fordist system of production in which flexible specialization allowed for shorter, more specialized manufacturing runs. As a result,

mass production was no longer as massive as it once was. Further, as a result of these shifts towards specialization, consumers and users were no longer necessarily seen as homogenous masses, but rather they were targeted with niche products. This narrower segmentation of markets and targeting of users effectively narrowed the structural divide between designers and users.

The advent of the internet later brought with it a novel model of production for whole new categories of products and services, and with it, a further shifting of the relationship between designers and users. The technology of web development has allowed for the existence of highly targeted websites and software products that can be distributed to ever-narrower slices of the population. The web not only provides a means of more narrowly targeting users, but developers and designers of web-based products and services are able to do so with relatively limited resources on a scale that would have been impossible in earlier eras of capitalistic production. In fact, the relationship between designers and users has perhaps become even closer with the emergence of Web 2.0 technology, in which users have taken on the role of content creators and collaborators[1]. Movements such as Professional-Amateur (Pro-Am) Design, in which highly skilled amateurs take on the role of designers reflects a shifting landscape of production (Leadbeater and Oakley 1999; see also Leadbeater 2000, 2004, 2008). As a result of these changes, the structural relationship between designers and users has shifted to create a situation in which designers have the ability

[1] While the advent of the internet has generally lowered the threshold for the development and distribution of certain products and services, there are clearly still significant barriers to entry. Research on digital literacy attests to the persistent inequality in this arena. However, despite such inequalities, relative to earlier industrial means of production, the internet represents a clear shift.

to target user segments, or even individual users, while users have new tools with which to provide feedback or even create content themselves.

These broad shifts toward greater specialization and more highly targeted products have also been accompanied by a significant transformation in the contemporary work landscape. A growing "creative class" has resulted in designers and other "creative" workers having both greater numbers and more prominent roles in production (Florida 2002).

Overall, these shifts in the relationship between designers and users have produced structural conditions that have changed the environment in which goods are produced. At the very least, these shifts represent a pendulum swing towards more highly targeted design and the potential for greater interaction between designers and users. This greater degree of interaction is significant because it has the potential to change the way products are designed. However, while these changes provide a historical context for the relationship between designers and users, they provide limited information about the nature of this relationship in contemporary practice and the potential of its impact on the way our material world is shaped.

In order to understand this system of relations and its implications, we must understand the process of design more fully and the nature of the relationship between designers and users. The most directly relevant sociological literature dealing with the design of materials objects and the relationship between the user and the design process comes from the sociology of technology subfield. However, scholars in this subfield tend to provide overly simplistic portrayals that paint the picture of designers

as lone individuals. As a result, these scholars provide limited explanation of the context in which designers are embedded and the relationships and processes that influence the imagining and construction of potential users, let alone actual feedback mechanisms between users and designers. Fortunately, scholarly research from the field of organizational culture provides conceptual tools that can be used to complement approaches in the sociology of technology. Ultimately, it is valuable to address the limits of existing research and investigate the complex relationship between designers and users. This manuscript represents my research efforts to address these issues. It provides findings about the ways designers make sense of their work and about the role of users in the construction of technology.

Theory and Literature

Within sociology, Science and Technology Studies (STS) most directly attempts to investigate the relationship between designers and users. In particular, research using the Social Construction of Technology (SCOT) approach examines the role of users in the development of technology. A brief review of this subfield shows the changes in thought regarding the relationship between designers and users. This overview will show that while the sociology of technology makes valuable first steps towards providing insights into this relationship, it is still limited in a several key ways. These limitations can be addressed in part by drawing on key concepts from organizational sociology that provide tools for understanding the relationship between meaning making, organizational culture, and practice.

The Social Construction of Technology Approach

Early research in the sociology of technology focuses on the deterministic nature of technology, an orientation that paints the picture of developers of technology as powerfully influencing the material world and individual consumers and users as passively receiving that technology. However, in the early 1980s, the SCOT approach emerges as a critique of this model of development. This approach is articulated by scholars such as Trevor Pinch and Wiebe Bijker in their article, "The Social Construction of Facts and Artifacts: Or How the Sociology of Science and the Sociology of Technology Might Benefit Each Other" (W. Bijker and T. Pinch 1987). Further works during this time period solidify the SCOT approach toward examining technology (for selected examples see W. Bijker and T. Pinch 1987; Collins 1983; Cowan 1983; MacKenzie and Wajcman 1985; Mackenzie 1990; T. J. Pinch and W. E. Bijker 1984). These scholars critique the linearity of technological determinism and argue that users are not passive dopes but are in fact active participants in the construction of technology. By conceptualizing these consumers and users as potentially active, this research opens an intellectual space for the study of these individuals in understanding technology.

In essence, SCOT Scholars open up the study of users as important players in the construction of technology by providing a more complex understanding of the way technology is created. SCOT research develops four conceptual areas that provide an

increasingly clear picture of the role of users of technology: interpretive flexibility, closure, relevant social groups, and technological frame.

SCOT scholars assert that there is an interpretive flexibility whereby users actively interpret the uses and meaning of technology (W. Bijker and T. Pinch 1987; Wiebe E. Bijker 1995; T. J. Pinch and W. E. Bijker 1984). By examining specific historical technologies, these scholars show how different groups of users interpret and use technology objects differently. For example, Bijker and Pinch trace the various interpretations of the bicycle during its development, showing how early users value the thrills that bicycles provide while later users value more practical virtues related to transportation (T. J. Pinch and W. E. Bijker 1984). Similarly, Pinch and Kline, examine how farmers use the Ford Model T as a stationary power generator rather than a means of transportation, thereby showing how users can, and do, actively change the use and meaning of a seemingly stable technology (Kline and T J Pinch 1996). The authors even describe these farmers as "agents of technological change," emphasizing their active role in shaping technology (764). By emphasizing the ways in which these individuals interpret technology and then exert their agency, SCOT scholars provide a way of understanding the contribution of users on the construction of objects of technology. This move fundamentally changes the scholarly understanding of the relationship between designers and the users of technology.

Bijker and Pinch further articulate their theories of interpretive flexibility by introducing the notion of closure. They argue that interpretive flexibility is greater in earlier phases of a technology followed by diffusion and decreased flexibility. They

assert that this process ultimately leads to a largely stable, or predominant, understanding of a given technology. By adding further understanding to the way users play a role in the development of technology, these scholars further challenge earlier deterministic portrayals.

Feminist scholars and others later add additional depth to the understandings of users by expanding the scope of who counted as relevant social actors. They do so by attending to the diversity of users in terms of gender, race, and class (Cowan 1987; Friedman 1989; Mackay et al. 2000). Such research adds multidimensionality to otherwise flat portrayals of users, and examines the ways in which users cluster around certain interpretive lenses to form social groups. For example, Cowan shows how the development of the cast iron stove in the 19th century relies on the junction of diverse groups of users – rural and urban – with distinct perspectives. Furthermore, typologies such as "end users," "lay end users," "implicated actors" (Oudshoorn and Pinch 2003:6), and non-users (Wyatt 2003) elaborate the varied nature of those who influence the construction of technology but are not part of the formal organizations that develops those technological systems.

Research in this tradition also ventures to provide greater context about users. The domestication approach embeds users in social contexts that more accurately represent the entirety of their social relationships, rather than simply their location relative to the system of technological production (Silverstone and E. Hirsch 1992). This approach most often looks at users within their environment, which is generally, but not exclusively, the home (Lie and Sorensen 1996; Silverstone and Haddon 1996).

By contextualizing users not solely within the relations of production, but in broader social context, domestication research provides a more nuanced understanding of users and their active relationships with technology.

Lastly, Bijker pushes for an approach that not only places users in their social contexts but attempts to examine what he calls their technological frame. He examines the cognitive structures of these users, demonstrating how these schemas influence their thinking on a deeper level (1995:125-6). Bijker's work along with other SCOT scholars helps forge a new path of understanding in the sociology of technology subfield and has indirectly provided valuable insights into potential for users to influence objects of technology and larger technological systems. However, despite the advances made by SCOT scholars, this research is not without its flaws.

Critique of SCOT Approach

The SCOT approach has served as the dominant voice of research on users of technology, and this research attends very well to the previously missing role of users as active agents in technological systems. By shifting the analytical gaze from processes of production to consumption, this research provides complex and nuanced understanding of users. It also complicates our understanding of the power of designers by challenging overly deterministic models and providing a way to understand the behavior of individual consumers and users. However, despite the advances made by SCOT research, this approach fails to examine several key dimensions of the way in which technology is constructed and the way in which users

may play a role in that process. This research provides limited examination of the following central issues in the design and production of goods: user feedback and interaction, the context of design work, power relations, and institutional level culture.

User Feedback and Interaction

In carving out a space for user agency, SCOT research also creates an unfortunate conceptual divide between designers of technology and users of technology. In describing (and perhaps celebrating) the creative agency of users, this research relies on an implicit model by which designers and users exist in separate spheres. This research isolates users from the processes of design by ignoring any interaction and feedback mechanisms between designer and user. Users are understood as actively interpreting and shaping technology but not in interaction with designers. Any direct relationship between designers and users is virtually non-existent and therefore only understood as two isolated sets of relationships, one between designers and the objects of their designs and another between users and those same objects. Actual or potential feedback loops are not part of the model. The limitation of SCOT research is that it establishes an a priori conceptual divide between designers and users that preempts a careful empirical investigation. The existence of feedback and interaction between designers and users is an empirical question that my research aims to investigate.

While the SCOT approach has certain shortcomings with regards to feedback and interaction, there are some sociologists of technology that do provide some

insights in this direction. The semiotic school does take a step toward addressing the problems of separation between design and use by looking at the ways users are imagined, represented, and 'configured' by designers and other producers. For example, Steve Woolgar (1991) argues that while users do actively interpret technology, they themselves are "configured" by designers in the design process. He explains that "configuring the user" is the process of "defining the identity of putative users, and setting constraints upon their likely future actions" (59). For Woolgar, while users may have some individual agency, they are configured in certain ways by producers and therefore limited in their interpretive flexibility.

A similar and influential approach, Actor-Network-Theory, uses the language of 'scripting' rather than 'configuring.' In this approach, scholars argue that the design process is akin to writing a script for potential users in which actions and motivations are anticipated and materialized into the technological object (Akrich 1992). Akrich further elaborates on the mechanism by which this representational relationship is formed. She states that one of the most prevalent methods used by designers to imagine and script users is what she calls "I-methodology" (Akrich 1995). She states that "reliance on personal experience, whereby the designer replaced his professional hat by that of the layman, is a much more common device than might be thought at first sight" (173). She argues that designers configure users by imagining themselves as the user and attempting to anticipate user actions and interpretations.

I-methodology has been noted by scholars is subsequent research as an analytical tool to explain the configuration of users and uses in empirical research

(Oudshoorn, Rommes, and Stienstra 2004; Rommes, Oost, and Oudshoorn 1999). In Oudshoorn et al. (2004), the researchers investigate the social construction of users in the design of digital cities, free community networks, in the Netherlands during the nineties. They claim that the failure of the digital city projects to meet the formal egalitarian goal of 'designing for everybody' was due in large part to designers using their own masculine approaches to design. They explained that "this pattern can be largely ascribed to the use of implicit representation techniques, in particular the use of the "I-methodology" (Oudshoorn et al. 2004:41). Here, Oudshoorn et al. draw on Akrich's concept to explain the configuration of users based on the cognitive construction of those users by the designers.

Both of these approaches effectively shift the focus of user research away from free agency and look to the efforts of designers to construct users and to the constraints that result from such efforts. In these approaches, the gap between the sphere of designers and that of users is bridged. By focusing on the ways in which users are represented within processes of formal production, these scholars provide glimpses into the ways in which users appear within organizations.

However, while research from SCOT and Semiotic traditions begins to address the problem of the conceptual separation of production and consumption, it still provides a severely limited consideration, devoid of interaction between producers and consumers, feedback mechanisms, and a deeper inquiry into the processes of representation. This gap in the research must be filled in order to gain a more thorough understanding of the construction of technology.

The Context of Design Work

A second problem posed by previous research is that it oversimplifies the design process by conceiving of designers as lone individuals. This research tends to conceptualize designers as individual agents, who as the ultimate crafters of technological artifacts, imbue the objects they design with meaning and scripts. The use of "I-methodology" by researchers to explain the way in which users are configured perpetuates the image of the lone designer. By decontextualizing the designer from the organizational and institutional environment in which he/she is embedded, this approach reduces a collective process to an individual one.

For example, in explaining the masculine nature of Amsterdam's digital city designs, Oudshoorn et al. are only able to make their case by ignoring the potential influence of other individuals intimately involved in the design and development process. The researchers argue:

> Except for the first graphic interface, which was designed by the project leader's wife, most of the women involved in the New Topia project team had little impact on the design because they were only involved in user research and marketing activities (Oudshoorn et al. 2004:57) .

Here the researchers claim that the women involved in the project have 'little impact' because they are involved in user research and marketing. The researchers simply dismiss the potential influence of user research and marketing based solely on an a

priori assumption about designers as lone actors[2]. By failing to embed the designers within their organizational context and failing to explain the designer's tasks within a larger development process, the researchers are left to explain their observations with the only theory that will logically fit the scope of their research design: "I-methodology."[3] The deficiencies of this research analysis underscore the problem of the decontextualization of designers in the design process. Thus, a clearer understanding of the contextual factors that affect the designer is needed.

Power Relations

In addition, previous scholars have failed to fully address the issue of power between producers and consumers, or designers and users. The SCOT approach commonly employs a theoretical and methodological notion of 'symmetry,' whereby scholars attempt to examine the contributions of a range of individuals to the construction of a given technology. While this approach has exposed the active role of previously ignored individuals, it can result in relativism that ignores the power differentials amongst various producers, users, and others involved. Russell (1986) argues this point stating the following:

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[2] This dismissal may also be based in part on the assumption that designers are homogenously male actors; however, the addition of gender as a factor does not negate the fact that the researchers assumed that individuals holding organizational positions other than that of 'designer' were not influential on the final design.

[3] It should be noted that Akrich did not see "I-methodology" as a lone explanation for the configuration of users during design; however she does argue for its prevalence (as noted earlier). Akrich in fact calls for a methodological balance to which my research will hope to contribute: "we cannot be satisfied methodologically with the designer's or user's point of view alone. Instead we have to go back and forth continually between the designer and the user, between the designer's projected users and the real users, between the world inscribed in the object and the world described by its displacement" (Akrich 1992).

> An explanation of technological change must show not only what different social groups think about an artefact, but also what they are able to do about it - their differing abilities to influence the outcome of its development and adoption. Thus we must relate not only their objectives to their social location, but also the resources of knowledge and power with which they can bring about change to suit those objectives (335-6).

Here, Russell highlights the issue of relative differences in knowledge and ability as they relate to the production of goods. He claims that the power to influence the construction of technology is rarely held equally by all involved.

Russell goes on further to explain that the ability to exert power to create technological change is a crucial issue in need of further investigation. He states,

> A crucial variable is access of different social groups to those arenas and to information about the technologies - something Pinch and Bijker assume rather than explore. We should explain, for example, why a workforce is excluded from the design of equipment it must use, or why a population suffering harm from a toxic effluent cannot bring about the adoption of a different chemical process. Not to do so is again to legitimate existing patterns of control and deny the possibility of change . . . Additionally, I want to know how such conceptualization and interaction affect the power different individuals and groups have on material outcomes (ibid).

Russell's critique aligns with the central premise of my research. The issue at stake is not just how products are designed but how approaches to design have the potential to facilitate or constrain the participation and influence of users of those products.

Klein and Kleinman (2002) agree with Russell and argue that SCOT scholars neglect addressing "the relative capacity of actors in shaping artifact construction"' (46). Klein and Kleinman take their argument further to assert that in consumer industries, consumers lack power:

> Industry is generally likely to have greater influence in shaping an artifact than retail consumers because retail consumers are typically atomized and unorganized. The individual consumer's investment is typically lower than the individual firm's, and industries tend to be more concentrated than consumers. In such cases, it is fair to say, as Williams and Edge (1996) do, that 'the final consumer may have little opportunity to engage upon the design and development of such artifacts (e.g., domestic goods) other than the 'veto power' to adopt or not" (p. 878)' (40).

These critiques effectively point out the flaws in previous research. They highlight the fact that due to issues of concentration of resources, producers of technology are in a position of greater potential influence. However, the assertion that consumer influence is limited to a decision whether to adopt a technology may be overly simplistic. A true investigation of the processes of technological development with an eye towards opportunities for users to impact the process is needed.

Institutional Level Culture

Lastly, SCOT research often ignores the important role of professional cultures, structures, and practices in understanding the construction of technology. Scholars such as Oudshoorn et al, Pinch, and Bijker tend to use single case studies to examine one historical product or technology. They put this technology in its social context and aim to provide symmetrical accounts of the technology to understand the flexible and variable interpretations and uses. However, while this focus on a single technology or product (such as a bicycle) allows for depth and symmetry, it makes it difficult for SCOT scholars to make claims about the broader trends in how the culture, structure, and practices of design professionals might shape technology. For

example, Klein and Kleinman (2002) argue that SCOT scholars such as Bijker struggle to connect the technological frames used in one case to broader social trends: "Bijker never considers the ways in which deeply institutionalized social values shape components of a technological frame or actors' interactions or practices more generally. This is a matter that the new institutionalism in organizational studies has consistently addressed" (40). Klein and Kleinman's critique points out both the merits and flaws of the use of 'technological frames' in the SCOT approach. These frames, or interpretive structures, do provide some insight into the way different social actors understand a given technology. Unfortunately, the connection of these frames to broader institutional patterns of meaning is limited. As a result, an understanding of the way broader practices and beliefs affect how designers and others involved in the design process make sense of their work and carry it out is underdeveloped.

Drawing on Organizational Sociology

The contributions of the SCOT approach are clear, but the limitations of work from this perspective are also evident. SCOT scholars tend to provide limited examination of the following issues regarding the social construction of technology: feedback and interaction, the context of design work, power relations, and institutional level culture. Fortunately, these areas can be addressed in part by borrowing conceptual tools from organizational sociology.

The limitations of the SCOT approach with regards to feedback and interaction can be addressed using organizational sociological concepts. SCOT scholars tend to

portray designers and users as separate. As a result, the notion that designers might be in direct or indirect interaction with users and possibly gathering feedback is relatively unexamined. The first step in addressing this gap in the literature is to establish the nature and extent of interaction between designers and users in the product development process. However, it is crucial to look beyond the existence of interaction and assess the meaning of that interaction. The organizational concept of schemas can be useful in this regard. This concept, used by organizational and cultural scholars, helps provide insight into the sense-making practices of individuals and can be used to understand how product designers and others involved in the design process make sense of the role of users and user interaction and feedback.

In their seminal work of organizational sociology, The New Institutionalism in Organizational Analysis, DiMaggio and Powell (1991) explain that schemas or scripts play a fundamental role in shaping institutions and organizations: "not norms and values but taken-for-granted scripts, rules, and classifications are the stuff of which institutions are made" (15). Organizational sociologist Mary Blair-Loy defines schemas as "ordered, socially-constructed and taken-for-granted frameworks for understanding the world" (2003:176). Part of the process of understanding includes the idea that schemas "dictate what are appropriate practices and orientations in a given institution" (Haydu 2011:465). Schemas therefore play a valuable role in structuring both the beliefs and practices of individuals within an organization and would be instructive in understanding individuals involved in product design. Haydu

expands the notion of schemas to explain how schemas are sense-making categories that are used in the normative evaluation of practices:

> Cultural sociologists like Michèle Lamont (2009; Lamont and Molnár 2002; Lamont and Thévenot 2000) emphasize that schemas also include standards of evaluation. Members of particular communities (a social class, an academic discipline) often deploy shared metrics for making distinctions of worth and for drawing boundaries between the more and the less valued (types of people, competing grant proposals) (see also DiMaggio 1992)" (ibid).

For the purpose of examining how designers and users play a role in the construction of technology, schemas are a useful tool. Schemas provide a way of examining how designers, members of a particular community, evaluate their work and make sense of the role of user feedback and interaction in that process. Furthermore, new institutional theory predicts that these schemas will help provide a tool to explore not only cognitive dimensions of design but also the practice of design. These insights will help clarify how designers construct the role of users in the design process.

An investigation of dominant schemas amongst designers will also provide insight into the relationship between those individual level schemas and broader institutional culture. New institutionalists tend to look towards broader institutional environments to determine the origin and reproduction of common schemas. Friedland and Alford (1991) assert that different institutional fields have different logics of action, which are based in different criteria for evaluation and legitimacy. They argue that these logics "shape individual preferences and organizational interests as well as the repertoire of behaviors by which [individuals] may attain them" (232). As Klein and Kleinman suggest, schemas are therefore a tool to help understand the

role of the broader institutional environment in shaping the interpretive frames of those involved in the construction of technology. These broader logics can provide insight into the schemas of design work and help situate design work in a broader institutional context.

Some organizational sociologists would argue that schemas do not just move directly from broad institutions to individuals within organizations. Instead, these inhabited institutionalists argue that the individuals within organizations actively interpret and shape these broader logics, establishing a mutually constitutive process among institutions, organizations, and individuals. Binder (2007) articulates this perspective:

> Organizations are not merely the instantiation of environmental, institutional logics "out there" (including technical rational logics), where workers seamlessly enact preconscious scripts valorized in the institutional environment (Fine 1984; Lounsbury et al. 2003). Instead, they are places where people and groups (agentic actors, not "institutional dopes") make sense of, and interpret, institutional "vocabularies of motive" (Fligstein 1997), and act on those interpretations - the central premise of symbolic interactionism (551).

This inhabited institutions perspective has implications for understanding designers and the way they imagine the role of users in constructing technology. This approach provides a way of looking closely at the individual thoughts and actions within organizations as generative. For product design, it means a way of understanding the role of individual designers in shaping broader logics. Furthermore, it empowers an approach that places designers in a broader context to understand their place within their institutions and organizations.

Finally, organizational sociology provides tools for addressing the limited analysis of power relations in the sociology of technology research. As discussed, the relevant issue with regards to power is the extent to which different individuals have opportunities to affect the design of goods. In examining the role of users, a central question is the extent to which the schemas and practices of design work provide users the opportunity to influence designs through feedback, interaction, and/or direct involvement. Cal Morrill (2008) argues that organizational sociologist have come to be attentive to issues of power within organizations:

> In recent years, cultural-political scholars have extended their analytic foundations by drawing from social movement theory. This inspiration emanates from early work by Mayer Zald, who brought the apparatus of political sociology into organizations to study the dynamics of internal collective action and change (Zald and Berger 1978). Researchers now draw on many of the conceptual tools of contemporary social movement theory, studying the dynamics of political opportunities and processes, framing, and resource mobilization (McAdam, McCarthy, and Zald 1996) (30).

These conceptual tools will serve well in examining the process of design work. By using these notions from organizational sociology, a more careful analysis can reveal the opportunities that arise for user influence in the construction of technology.

Research Design and Methods

Using tools from organizational sociology and the existing foundation of SCOT research, my research attempts to provide a clearer understanding of the construction of technology by examining the relationship between designers and users. My research investigates what type of interaction and feedback occurs between

designers and users and how designers' ideas about the role of users influence design practices. It also attempts to place these ideas and practices within broader institutional context while examining how these dynamics affect the opportunities for users to impact the design of the goods in society.

In order to examine these aspects of the relationship between designers and users, I focused on the role of users within formal and informal processes of design. Many design processes are often shrouded in secrecy as a way for companies to protect their intellectual property. As a result of this secrecy, the design of goods represents a black box. My goal was to demystify some of these processes using ethnographic methods to interview and observe individuals who work in the development and design of goods. I attempted to identify the ways in which users, do or do not play a role, either directly or indirectly, in these processes.

My focus on design processes as opposed to activities of use represented a conscious research design decision. I interviewed and observed people working in product development and design, not the consumers and users purchasing and using products. This approach went against SCOT principles that call for a methodological symmetry that examines all relevant social groups equally; however, such an approach was necessary for theoretical and practical reasons. Theoretically, as Klein and Kleinman argue, production processes represent a greater concentration of activity and power relative to the dispersion of individual users and in the sociology of technology have received limited attention over the past several decades. So in order to provide a potential corrective to SCOT research, a production focus was appropriate. Practically

speaking, such dispersion of users also created logistical challenges. Examining the designer-user relationship from both perspectives would have expanded the scope of the project beyond the feasibility.

I set out to examine these design and development processes as a broad set of practices and understandings. As an outsider, I needed to first gain a working understanding of design work more generally in order to understand the cultural and structural influences that affect this type of work and my specific research interests. My specific goal was to understand how, or whether, designers conceive of and interact with users, either directly or indirectly. Therefore, my research utilized interviews with people close to the development and design process along with participant.

Defining who was "close to the design process" was a difficult task because the design and production of goods involves an extraordinarily complex set of relationships. As sociologist Harvey Molotch (2005) argues, even simple goods, such as toasters, are part of a broad and interconnected 'stuff system,' that includes those mining raw materials to those assembling the finished product, not to mention far flung social and historical factors that shape the very environment in which these individuals work [2005][4]. So in order to examine the relationship between producers and users, I needed to determine the scope of my investigation[5].

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[4] Russell (1986) argues that defining who is included in a 'relevant social group' is further complicated because certain actors or organizations may "secure their interests, or have them secured, without participating directly in conflict" (335).

[5] Difficulty regarding how to determine the scope of research on technology is a common amongst scholars of technology. Langdon Winner (1993) argues that SCOT theorists tend to define relevant groups too narrowly (369), a problem seen in the limited contextualization of designers in such

Ultimately, the scope of my research was defined in part by the ways in which my research question fits into previous literature. My research was designed to interrogate previous depictions of designers as lone individuals. Therefore, it was necessary for my research to conceive of product 'design' as a process that potentially involved various individuals whose titles are not 'designer.' But how broad a net should be cast? Should marketers, managers, accountants, researchers, and others all be included? Rather than attempt to determine this scope at the outset, I allowed my research subjects to use their own categories and understandings to do so. In my initial queries for interviews, I used open-ended terminology and stated that I was looking to interview "product designers and others close to the design process." The scope of my research was therefore guided by my informants and evolved during my research. My research respondents primarily fell into three categories: product managers, researchers, and designers. However, during the course of my research, I also interviewed engineers, sales people, and tech support personnel[6].

The scope of my research in terms of product type and organizational type required important research design decisions as well. My research looked at products of various types in order to gain a broader understanding of the relationship between designers and users. Because it was likely that individual products types might have specific design and development practices due to the nature of their technology, I cast

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research. My research has the advantage of focusing more heavily on design processes, because the various social groups involved are more clearly defined than the atomized masses of users of technology.

[6] The positions of my informants are difficult to divide in practice. Different companies use different conventions for assigning employee titles. Additionally, many of my informants held positions in which their duties involved a blend of roles.

a broad net in terms of product type. For example, while a narrow focus on a product such as Molotch's toaster would allow me to examine the relationships involved in great detail and perhaps use that product as a control to compare different organizations producing the same type of product, such an approach would lack representativeness in terms of the designer-user interactions. For example, one could imagine that the relatively durable and fixed physical nature of a toaster would make the role of user feedback quite different than a software-based product whose interface might be more easily changed. Furthermore, as a more mature product that has been commercially available for more than a century, the toaster likely has a design process that varies considerably from a less mature or new product. So my research included products of various types, from simple durable goods, to complex consumer electronics, to business devices, to software or web-based applications. As a result of this breadth, I did not try to control for the effects of software/hardware or mature/immature products in a strict sense, but my research design did allow for possible insights into these types of variations.

My research scope was also inclusive in terms of organizational type. The development and design of modern products occurs in various organizational forms. Similar to product type, organizational form had the potential to importantly affect the nature of the relationship between designers and users. Issues of available resources, levels of decision making, and role specialization could easily affect the character of designer-user interaction. Therefore, in my research, I sought a deliberately broad selection of organizational types. As with my research design decisions related to

product type, this decision removed the possibility of my making strict comparative claims about the effects of organizational type, but it did allow me to generate insights based on the reflections of my informants and my observations regarding the role of organizational type. As a result, my research included a variety of firm types: small, medium, and large firms as well as satellite offices of larger firms, design studios, small consultancies, and freelance individuals. Most of these firms were for-profit corporate firms while some were government entities doing work directly for the government or for other organizations that received government funding.

In order to gain access to informants and research sites, I employed a snowball sampling method. I initially recruited these individuals by emailing personal and professional contacts of mine in the fall of 2009. While this recruitment method was not a random sample by any means, it was necessary given the nature of my outsider position to my field of study. Though I have a background in advertising, having worked at a mid-sized advertising agency for three years, product design is a relatively small universe, one that can pose a challenge to outside access. My recruitment goal was to simply acquire initial entrée, after which I would utilize snowball sampling to increase my sample size.

In my initial recruitment email to friends and colleagues, I tried to entice a broad range of potential informants while concealing the specific focus of my research. In my recruitment email, I stated:

> The quick overview of my research project is that I will be studying product design from a sociological perspective. What this means is that I'll be looking at how product designers, engineers, managers, marketers, and others involved in the process of designing consumer

> products do their work. In particular, I'll be looking at how these individuals balance their own views about what good design is with the objectives and expectations of others with interests in the final outcome.

In this email, I attempted to frame my research interests in a way that potential informants would find my research understandable, intriguing, but not necessarily threatening (J. Lofland et al. 2005: chapter 3). I intentionally concealed my focus on the relationship between designers and users in order to not bias my recruitment with regards to this central variable and in order to allow informants to bring up, or not, issues of interaction and representation with users on their own terms (see Appendix for full transcript of recruitment email).

Lastly, for feasibility and cost reasons, I encouraged friends and colleagues to provide interview contacts in the greater San Diego area, where I reside, so that I could interview subjects in person more easily. While my initial interviews and the predominance of my subsequent interviews would occur in southern California, several informants worked in other areas of California, in Texas, and in New York. This geographic distribution is not a representative sample and therefore may introduce potential bias due to cultural variations in design work geographically within the United States and across the world. However, this bias was mitigated to a degree because many of my informants had considerable work experience previously in their careers across a range of locations in the U.S. and abroad.

Ultimately, my research took place over the course of 17 months, from October 2009 through March 2011. I conducted a total of 38 semi-structured interviews with 30 individuals. My interviews were relatively informal in structure

but followed an interview guide that I developed to address five areas of inquiry: background and work history, evaluations of design work, interaction with other workers, design process and feedback mechanisms, and user testing (see full interview guide in appendix)[7]. With the main focus of my research on the role of users in the design process, the interview guide built toward the two final categories of inquiry in order to address this central question more directly. However, as discussed previously, I made every attempt to avoid asking direct questions about user representation, feedback, and testing; I wanted instead to provide ample opportunities for respondents to volunteer such information, at which point I would be able to probe further.

Each interview lasted between one and one-and-a-half hours. The interviews took place in a variety of settings: 11 at informants' offices, 13 at local coffee shops, 7 over lunch/dinner, 4 on the phone, 2 at my home, and 1 at an informant's home. During interviews, I recorded audio when permission was granted—permission was given in 24 of 38 interviews. Some individuals asked not to be recorded, citing concerns with privacy, a need for corporate approval, or personal discomfort. I took notes during interviews that were not recorded and after all interviews. When I was able to meet with informants at their offices, I was also usually given a tour of the facilities and took notes on what I observed.

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[7] Questions about subjective evaluation of current/past design projects are intended to bring out the criteria respondents use to make sense of their work and the extent to which they align their evaluations with other individuals, be they other workers in different positions or users themselves. Questions about interaction with other workers are intended to not only clarify design practices and procedures but also elicit responses that elaborate on the set of relationships out of which products are designed.

In addition to conducting interviews, I attended a total of seven professional association meetings. These professional association meetings were for two different groups, one focused on 'user experience' and one on 'human-computer interaction.' The attendees at the meetings were primarily designers, researchers, and engineers. Each group met several times a year. The format for one meeting was a panel of speakers and the format for the other a heuristic review of a new product, in which an outside company would come to have its product evaluated in a group setting by meeting attendees. These meetings were not 'professional' meetings in the sense of being sanctioned by a larger professional organization, but instead, they were gatherings of practitioners with common interests or positions. The meetings were announced online, open to the public, and free of charge. Each meeting was approximately two hours and was attended by anywhere from 10-50 people.

I initially attended these meetings because several informants reported that they attended and recommended that I go. While these were likely not the only local meetings that might have been relevant to my research, they were the two that emerged from my informants' responses. In total, I attended four meetings for the user experience association and three for the human-computer interaction association.

At the meetings I was able to investigate how these practitioners spoke about themselves to themselves and what they considered to be the best practices in their fields. During the meetings, I took on the role of an inquisitive outsider, and I spoke with attendees informally and observed the meeting proceedings. I took notes during the meetings and recorded five of the seven meetings. These meetings also served as

networking events for me, in which I was able to meet potential interview subjects and establish myself to some degree as presence in the local community.

Lastly, in addition to conducting interviews and attending professional association meetings, I observed a usability testing session conducted by one of my informants. The testing occurred over several hours in a user-testing room inside a large corporation. I was able to not only observe the testing, but also speak with my informant and the other designer and researcher involved during the test. While I had initially planned to do more participant observation of this sort, due to strict privacy concerns by most of my informants, my requests for such access were stalled or denied.

Finally, for my data analysis, I approached my data inductively, looking for patterns that emerged from my informants' responses and my observations. I transcribed all of my recordings and notes, and I used qualitative data analysis software to aid in organizing my data, which I then coded. In expanding and then collapsing my categories of analysis, I identified the main patterns within my research. The following chapters represent my findings based on these data and methods.

II. Designer-User Interaction

Introduction

To better understand how technology is constructed, a central theoretical and empirical question is whether designers and users indeed interact, directly or indirectly. Furthermore, if some amount of interaction does exist, to what extent and in what form does it exist? These questions are essential because much of the SCOT literature portrays designers as lone actors, so a clearer understanding of this type of interaction is necessary. Furthermore, an understanding of these issues allows for a deeper understanding of the sense-making practices of designers and others involved in the design process with regards to the role of users. If designers do interact with users and gather user feedback, how do they make sense of that feedback and how does it affect the likelihood of users to affect those designs?

During my research, every designer I interviewed interacted with users in ways not captured in the scholarly literature on "I-methodology"[8]. This literature portrays designers as lone individuals who inform their design work primarily by looking inward to their own predilections. That is not to say that this type of self-reflexive design methodology does not ever occur; however my research shows that the portrayal of this activity as designers designing based on their own preferences is an uncommon activity. Primarily, designers gather feedback from users in two ways: direct user feedback and indirect user feedback. With direct user feedback, designers and others involved in the design process attempt to gather user preferences according to what users say and do. Designers use various methods to gather direct user feedback, with the most common including focus groups, surveys, user testing in controlled lab settings, 'live' user testing, ethnographic observation, and informal interviews. With indirect feedback, a designer imagines and represents users by drawing on the designer's own accumulated expertise, based on past direct feedback gathered by the designer and secondary research conducted by others in the profession. Designers do acknowledge an approach that fits descriptions of I-Methodology, but my research shows what may appear as designers designing for themselves would more accurately be described as designers relying on accumulated experience and gathering user feedback indirectly.

[8] As described in my methodology section, I have purposefully interviewed a variety of individuals who are closely involved in the design process. In my discussion of my findings, for convenience, I at times refer collectively to these individuals as designers. This terminology denotes that they play a meaningful role in the design process though their titles and functions vary.

Direct User Feedback

Designers interact with users in a variety of ways and do not simply engage in self-reflection as some scholars suggest. For designers, when trying to gather direct user feedback, the primary goal tends to be gathering the best information possible within given constraints. Many of my informants explained that they drew on a number of methodologies when trying to gather information or feedback from users. One of these informants, Grey[9], is the organizer of one of the two professional association meetings I attended: The Computer Human Interaction Network (CHInet). Grey explains

> The way I view user experience is that of a methodological toolbox. So that you've got maybe fifty different methods that you can choose from. They're useful in greater or lesser degrees, depending on who your users are, depending on what your product is, depending on the environment you're testing in, depending on what kind of data you're trying to get out of it, depending on how much time you have, depending on how much money you have.

Grey's toolbox metaphor is instructive. He describes that he has various methodological tools available to him, each aimed at the central goal of gathering direct user information or feedback. Some of the tools included focus groups, surveys, user testing in controlled lab settings, 'live' user testing, ethnographic observation, and informal interviews.

Other informants did not speak explicitly of using a "toolkit", but described drawing on various types of methods that put them in interaction with users. For example, Jonas, a researcher at Intelligence, a large software company, described a

[9] Pseudonyms are used for the names of all individuals interviewed and the organizations for which they worked.

multi-faceted approach toward user research. Jonas explained that in developing Intelligence's finance software, he and his colleagues used a dual-pronged approach. When working on newer products, Intelligence generally employs focus groups and ethnographic research that includes observation in their research subjects' homes or workplaces. He explained that this type of research was particularly well suited towards gaining new insights and ideas. When making changes to existing products, Intelligence primarily uses 'live' testing and usability lab testing. He explained that 'live' testing also known as 'A/B' testing, was used for their web-based software. In such testing, two different versions (version A and version B) would be used 'live' by two samples of users online. These users would be located remotely in their natural settings and would be unaware that they were using test versions. Jonas and other researchers at Intelligence would then evaluate the performance of the two groups of users on various tasks using metrics that measured and evaluated the time taken and process used by the users. This live testing was sometimes also coupled with survey data, in which users were prompted to evaluate the quality of their experience. Jonas' descriptions here indicate that like Grey, a varied set of methods are used in order to gather information and feedback directly from users. This approach contrasts starkly with the portrayal of lone designers using 'I-Methodology' found in accounts by Akrich and others sociology of technology research.

Intelligence, like a number of other companies I examined, also uses in-person usability testing. For this type of testing, Intelligence brings-in potential users to its offices to do usability testing onsite. These users are generally solicited on websites,

like Craigslist, that feature classified ads. To solicit test subjects, Intelligence uses a 'screener,' an ad that specifies the profile of its potential users. This usability testing is conducted in dedicated usability 'labs,' in which researchers, project managers, and/or designers monitor potential users as they attempt to complete tasks, gathering observational and interview feedback during and/or after the process. Intelligence does this type of usability testing so frequently, in fact, that they have a full time staff member responsible for soliciting and screening test subjects.

Intelligence is perhaps the company that researches and interacts directly with its customers more than any other I interviewed. This frequency is notable, but its methods are actually quite similar to those used by other individuals in firms large and small. For example, I interviewed Andrea, who developed a reusable food storage container that could be used as an alternative to the common three-section Styrofoam containers used by cafeterias. When she first thought of the product concept, Andrea was an undergraduate student majoring in environmental studies and won a $32,000 grant in order to develop her product idea. In order to develop this idea she surveyed over four hundred potential users. After receiving positive feedback on the product concept and determining potential profitability, she was able to have the product manufactured by a mid-sized manufacturer where she now works as the Sustainable Products Manager. Her gathering of direct user feedback continued after the product was produced and sold, when she sent out an additional two rounds of surveys to existing customers. These subsequent surveys led to revisions to the design and the development of related products. Andrea's survey methodology was a clear form of

interaction between designer and users, and like the methods used by Intelligence, demonstrates that direct designer-user interaction is the norm, not lone product development by isolated designers.

The varied nature of this type of interaction is also a norm, though the types of methods used can be influenced by organizational structure and culture. As Grey points out, the type of method in the toolbox used can depend on a variety of factors. Andrea's user interaction was clearly more limited in its scope than those methods used by Intelligence—Intelligence's size and resources play a large role in its ability to do the kind of research it does, particularly methods that require greater resources such as ethnographic observation and lab-based usability testing. However, what is clear, though, is that Andrea, Jonas, Grey, and indeed all of my informants interact with their users directly during the design and development of their respective products. This interaction may take various forms, but users do play a definite role in the production and design of a variety of products. Subsequent chapters will explore further examples of this type of research and interaction.

Indirect User Feedback

Direct user interaction and feedback was the most common approach described by my informants. However, selected informants also explained that a more indirect form of interaction exists. This indirect approach to gathering feedback at times sounds like the common scholarly descriptions of I-methodology. However, my

research shows that evidence of I-methodology is limited, and practices that might appear to be I-methodology may actually draw on user feedback in indirect ways.

A selection of my informants spoke of an I-methodology-like approach to product design, in which designers base their design decisions on their own preferences. Most commonly, my informants did not describe utilizing this type of methodology themselves, but described (or accused) others of doing so. Engineers, as a category, were sometimes cited as a group more likely to engage in such practices. To explain the use of I-methodology, one informant recommended that I read the book, "The Inmates are Running the Asylum" by Alan Cooper (2004). In the book, Cooper argues that in the world of software development, software engineers all too often engage in this type of self-focused design work. He posits that such an approach often results in software products that are overly arcane and difficult to understand unless the user is an engineer. Coopers', and my informant's, point was that I-methodology does exist, it is a negative influence on product design, and it is perhaps on the decline as companies become more focused on the experience of users. Here, the prevalence of I-methodology is not clear, but appears to exist at the very least as a myth or cautionary tale.

One of my informants, Rick, who is a freelance designer and holds a Master's Degree in Human Computer Interaction, argues that I-methodology does exist, but he argues that it is rare, and in his view, ultimately not effective. He described an expert designer as one who had a lot of experience and perhaps an innate talent, and could indeed do very good design without any interaction with users. He went on further to

explain that these experts had a "rickety patchwork" of complex understanding "held together by duct tape," and that they could simply sketch a design, or look at a drawing, and know whether something was wrong or whether the design was good. Here, Rick's description of the "rickety patchwork" of knowledge and experience that allowed these expert designers to function is revealing. It seems as though the notion that designers work as isolated individuals exists, perhaps both in reality and as a type of myth. At the end of this description, though, Rick invokes the importance of gathering user feedback and doing iterative design: designing successive concepts or prototypes and gathering user feedback at regular intervals along the way. Rick's point is ultimately that even these 'expert' designers would benefit from utilizing testing and iteration. Rick's descriptions demonstrate that the model of the lone designer exists, but that it is perhaps not the norm, with direct user interaction being not only more prevalent, but from Rick's perspective preferable.

The role of I-methodology, however, is not as simple as it might seem. While my research indicates that some designers or engineers may indeed develop products without direct interaction with users, the process is often not as isolated from users as it might seem. For example, Gerard, a User Experience Specialist for a prominent user experience consulting firm, Murphy and Hayes Associates explains

> At [Murphy and Hayes Associates], my title is "User Experience Specialist". So at this company, what I essentially do is represent the users for my clients. That can happen in a variety of ways. That can happen through usability testing, where I'm sitting down with who they've identified as the target user and I am either usability testing those series of target users, I'm doing in depth interviews with them. I'm trying to glean some information about them, in how they think and what they do so that I can ultimately bring it back to the company

> and say, "This is what you should do," or, "These are your usability problems." I also do what are called "Expert Reviews" where I take a look at their website or their software and analyze it based on my experience about what problems are with it or what problems I would guess the users would encounter. I also do a fair amount of lecturing on these topics about how to create usable applications or how to usability test. Also what methods you can use – a variety of different methods -- 20 different methods -- on how to gather user research from target user groups.

What is interesting in Gerard's case is that he tends to take two distinct approaches in his consulting work. At times he employs up to twenty different research methods for gathering data about user experience and at others he acts as a representative of the user. The first approach matches the description given by many other informants who view themselves as gathering direct user feedback using a varied methodological toolkit. However his second approach indicates a different understanding of the relationship between designers and users in the design process. In describing himself as a representative of the user, even in cases in which he has done no direct user testing for a specific product, Gerard is employing a type of I-methodology. But unlike the model of I-methodology described by Akrich, in which designers design for themselves, as though they were the users, Gerard describes that he is not basing his decisions on his own predilections, but on his estimation of those of the target users. In essence, Gerard's accumulated experience and expertise stands in for actual target users. This representational role of users indicates that users indeed play a role in design work, though their role exists through the proxy of designer experience and expertise and is therefore indirect.

The distinction between I-methodology and this type of representation through expertise is a subtle, but important one. At the User Experience Association (UXA) meetings I attended, the meetings took on the form of expert heuristic reviews. Instead of a having a panel of speakers at each meeting, UXA organizer Wes arranged for a different company to present a product it was developing. The attendees, mostly designers, researchers, and project managers, would then provide feedback on the product in an open discussion moderated by Wes. Similar to Gerard's use of expertise as a means of representing the target users, attendees of the UXA meeting would often be asked to do the same. Wes would generally begin each meeting by having the company outline its business objective, its target customer, and its customer's objective. Then, Wes would turn to the audience and urge them to imagine themselves as the users: at one meeting he stated, "put your hat on . . . you're an IT professional' and at another he stated "everyone put on your hat, you're an [educational] training professional." The meeting attendees would then ask questions of the presenters and often provide a spirited critique of the company's product. At times, the attendees would begin their comments by saying something like, 'If I'm an IT professional, I would . . . ." while at others times it was less clear the degree to which the attendees were 'wearing the hat' of the intended user. Ultimately, it seemed the attendees presented their questions and critique from one of a few perspectives: a UX expert, a target customer, or some hybrid of the two.

This complex use of expertise or accumulated knowledge as indirect user feedback can be seen outside of these professional meetings as well. For example,

Lanie, is a User Experience Architect for an online insurance company and is responsible for developing the company's website interface. She explains that she draws on her four to five years of undergraduate training in Human-Computer Interaction and Cognitive Science to make design decisions. She told me that her education gave her knowledge of color theory, layout, and human cognitive loads. She explains that she would prefer to do more direct user testing, in which she could take a "test early and test often" approach, but she feels limited by her available resources. Aware of the usability testing procedures at nearby Intelligence, she explains that the Intelligence not only has a strong culture of usability testing, but they also have the resources that allow them to have full-time user recruiting personnel and state of the art facilities. She argues that such regular usability testing is a luxury and is too resource intensive, so she relies on her training and expertise.

Lanie's perspective shows that for many designers, the use of I-methodology is a complex one. Designers may not simply be reflecting on their own preferences but may be imagining their users by using previously accumulated knowledge/expertise or by internalizing their users based on various bits of research, both formal and informal. These practices reveal some of the complexity of I-methodology and indicate that even though these design practices may be seemingly individualistic, similar to Akrich's description of I-methodology, users often play an indirect role.

Overall, it is clear that users commonly play a role in formal product design processes. And while there may be instances of designers or engineers acting in isolation, such approaches do not seem to be common or even as isolated as they

might appear at first glance. However, while the prevalence of such designer-user interaction has been established, the character of this interaction and the ways in which designers make sense of this interaction requires further investigation.

Making Sense of Designer-User Interaction

The existence, prevalence, and types of designer-user interaction provide an important corrective for previous SCOT research. However, how designers make sense of the role of users in design has important implication for the ways they evaluate their work and structure their practices. As the literature on organizational sociology suggests, the schemas used by designers structure various elements of their world. These schemas are important because they may also have significant implications for the likelihood of users to have opportunities to influence those practices.

The ways in which designers make sense of users discursively and in practice varies considerably and reveals an important divide with regards to the role of users in design processes. My research indicates a clear pattern among informants in terms of how they made sense of their interaction with users. Informants tended to use one of two competing schemas: rational schemas or creative schemas. When using rational schemas, informants described their work using language that indicated a clear purpose and specific means to achieve that purpose. Often times, informants would use the language of science, describing their procedures as 'hypothesis testing' and 'validation techniques'. In describing their relationship with users, informants would

explain that users were their test 'subjects', allowing them to develop and refine their design concepts using user feedback. In contrast, when using creative schemas, informants described their work using language that focused on creative sensibilities. Frequently, informants would use the language of art, describing their work as employing 'intuition' and 'talent'. In explaining their relationship with users, informants using a creative schema explained that users 'inspired' them and acted as their muses[10].

These schemas are important because they show the culturally informed ways designers understand and talk about the world. These schemas, therefore, express more than simply *what* designers do but *how they make sense* of their actions. This sense-making is important because while many designers have similar processes and even interact with their users in ways that appear quite similar on the surface, different designers do not understand those activities in the same ways.

The schemas are also important because as I will show, they are not simply the mental categories through which individuals understand design work and the relationship between designers and users, but they are the also reinforced within organizational contexts. These schemas of rationality and creativity are embedded within the larger cultures and structures of the firms in which my informants work.

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[10] While two distinct schemas emerge, there is some variation in the usage of these competing schemas. This variation is to be expected, as scholars such as Swidler (1986) and others influenced by the cultural turn in sociology have demonstrated, schema usage is not fixed. These scholars argue that in fact, individuals often switch schemas to fit the situation, using different explanations from their 'tool kits' to provide post hoc descriptions of actions and events. This switching of narrative schemas was evident to an extent by my informants, so I make every effort to describe and interpret cases in which an informant who predominantly uses one script switches temporarily to another. However, the divide between designers who described their work and the role of users using a rational schema and a creative schema was fairly clear and consistent.

These schemas can therefore be seen as both being constituted by these larger structures and constituting them. My research shows that this mutually constitutive relationship has an enmeshing effect that links broader practices with individual schemas. These competing schemas therefore represent an important means to understanding the nature of the relationship between designers and users. Furthermore, the information designers gather in those interactions is used quite differently and has disparate impact on the likelihood of users to be able to influence the design process. I will therefore present my data by providing evidence of the use of both rational and creative schemas. For each schema, I will describe the ways in which that schema is employed discursively and in practice.

III. Rationality in Design

Introduction

To understand how technology is constructed, it is important to examine the relationship between designers and users. SCOT scholars acknowledge that users play an active role interpreting and constructing technology. However, these scholars tend to either look at the isolated activities of users or those of designers. The lack of attention to interaction between these groups limits the ability of SCOT scholars to understand design in its broader organizational, professional, and institutional contexts. The SCOT approach also limits the potential for an evaluation of the relative access and power of different groups and individuals. Therefore, a closer examination of the types of interaction that occur between designers and users is needed as is an analysis of how different designers make sense of that interaction. Such analysis will provide a sharper understanding of how goods are designed and the role of users in the design process. The sense making practices of designers fall into two categories: rationality and creativity.

Rational Schemas – Discourse

A schema adhering to principles of rationality was common amongst my informants and manifested itself in the way designers, researchers, and project managers spoke about their work. One of my informants, Rick, explained this rational perspective. In speaking about his work, he repeatedly stressed the importance of making prototypes and doing what he called 'iterative design,' in which user testing and revision drive the design process. He explained that iterative design is a process of continual prototyping and testing. According to Rick, each new prototype is seen as a hypothesis of sorts, filled with assumptions by the designer to be tested using user feedback or testing. Throughout this process, the goal is a product that is not only profitable for the company but creates a good user experience. This clear goal-orientation and process of careful testing demonstrates what Rick calls a 'scientific' approach to design.

Jonas, the researcher described earlier who works at Intelligence, a large software firm, also relies heavily on rational testing procedures. Jonas expressed his understanding of design work stating, "what can be measured can be managed." This emphasis on measurement, validation, and careful management to achieve goals is emblematic of an instrumentally rational approach to product design and development. In fact, when I asked Jonas what his least successful design project was, he replied stating that it was one in which "there was no clear objective." His example was that the marketing department had launched a television ad that featured a woman driving

her car and reveling in the simple route guidance given by her GPS navigation. The message in the advertisement was that Intelligence's software would provide this same kind of easy navigation and guidance through one's finances. When a higher-up at Intelligence tasked Jonas and his team with incorporating "a GPS feel" to the software, Jonas was dismayed. He said that while his team could incorporate the "GPS feel" from a graphic perspective, his team was ill-equipped to measure the effectiveness of the "GPS metaphor" in user testing. In Jonas' words, such testing and validation was "not a tool in our toolkit." Jonas' frustration with the difficulties in measuring and validating the goals of the project were clear and indicate his instrumentally rational understanding of gathering user feedback.

Like Jonas, many of my informants expressed their views most clearly when they expressed their dissatisfaction, by drawing boundaries between what design work was good and what was not. One of my informants, Jason, a principal designer at a large company that makes mobile technology accessories, relayed his views about designers who do not focus on testing. He said, "I know a lot of designers that kind of pooh-pooh the whole idea of user testing because their vision is the vision and a lot of times it's not. It's not going to work for the general population because [these designers are] specific people and they have specific ideas about the way the world should work, and so they don't want to compromise." Jason argues for the value of systematic testing by explaining the drawback of designers who think of themselves as 'visionary people."

Jason provides evidence for his argument by sharing a story about a designer he used to work with at a large European consumer goods firm, Norson. He explains:

> I had one guy at [Norson] who was designing a knife-sharpening thing, this was in the kitchen appliances group, and it was like a rounded beach rock. It was this beautiful little shape. It would sit on a table and it was like a piece of sculpture. He's very much that aesthetic designer's designer, and there was slots in it for the knife. So the way that you would sharpen your knife is that you would hold this rock in your hand and you would go like this across your fingers. So we kept saying to him, "You've got to put a handle on that thing," and he said, "No, you'll ruin the beauty. Look at the product, it's beautiful. How could you put a handle on it? I said, "people are not going to use it in the way that you're using it, which is very carefully. They're going to use it like this, and you've got to work with the way that people will really do things. Eventually he had to put a handle on it."

In Jason's description of his old coworker, he describes the coworker as being focused on aesthetics rather than user experience. It is important to note, that further discussions with Jason revealed that he did not discount the value of aesthetics in design: he was not making an argument about form versus function but rather about the importance of being focused on the goal of user experience and testing concepts and prototypes to achieve that goal.

Jason further argues for the importance of a rational approach by explaining the differences between designers who test rigorously and those that do not. He states,

> A lot of designers are kind of like, "No, I don't need to test. My vision is the right vision," but it's a funny thing. There's two groups of designers in my mind; the people that have tested and have had that moment where the person on the other side of the glass said, "Well, this is the stupidest design ever. Why would you ever do it like that?" And [they designer thought] that was a good thing. And then you have the designers that had that experience and didn't like it or just don't believe in it, and so you kind of have these two different camps: the designers who are super enthusiastic about talking to users and listening to them, and having those users challenge their assumptions -- like, I totally get

> excited about having my assumptions trashed -- and then the other designers who are just like…it's too scary for them or something like that."

Jason's perspective that user testing reveals valuable surprises is emblematic of those who approach product design from a rational perspective. In essence, the value of these surprises represent the belief that user testing acts not as a perfunctory set of processes, but as a genuine *test* of hypotheses surrounding a product design.

This belief in the value of hypothesis testing can be seen in other examples. Grey, who organizes one of the professional association meetings I attended, Computer-Human Interaction Network (CHIN), shared a story at one of the meetings about a colleague's approach to developing a new product. He explained that his colleague wanted to develop a new product but didn't know whether there was a market for the product. Essentially, he had a hypothesis to test. So he setup a website that consisted of only one webpage, which had a photo and description of the product. On the page, this entrepreneur put a 'next' button for website visitors interested in potentially ordering the product. However, the button lead to nowhere, as the rest of the site, and the product for that matter, had not been developed. This entrepreneur simply wanted to test his hypothesis about the level of interest in the market for his product.

Grey explains to the meeting attendees that this example shows a "fascination with hypothesis testing . . . and seems like a very scientific way" to develop products. Another panelist at the meeting advised the audience, "we're talking about science and hypotheses . . . try to setup tests so that they are relatively objective." Grey goes on

further to explain that once a test for the market exists and it is time to develop a product, one should similarly take a hypothesis-testing approach and develop a 'minimum viable product." He explains, "The minimum viable product is what are the minimum number of features you need to build into your product to get a customer to give you money." This concept of minimum viability was common amongst informants, particularly those working with start-up ventures. A minimum viable product was thought of as a key step in a rational and iterative design process. What is instructive about approaches that embrace minimum viability is that they demonstrate a clear focus on hypothesis testing and scientific rigor in product development. At times these tests are to achieve a goal of sales and profit and at others the quality of the user experience is primary, but regardless of the goal, the instrumental goal orientation is a hallmark of this approach.

This belief in the value of testing and this focus on 'user experience' is an important organizing principle amongst designers who adhere to these rational schemas. Often abbreviated as UX, user experience is a movement of sorts within product design. In fact, more than one-third of my informants have some variation of the phrase 'user experience' in their job titles and many others talk about doing 'user experience' work. Generally, a commitment to user experience indicates that the experience of the users with the final product is of central importance. This approach is often used to contrast with the work of designers who design for aesthetics alone or perhaps design merely with abstract technical functionality in mind.

For designers, researchers, and product managers who use schemas of rationality, their belief in the value of rationality is at times complex. These individuals do not think that creativity and innate expertise cease to exist in design work, but they affirm the value of a more rational approach.

Rational Schemas – Practices

The rational schemas that designers use do not simply organize their thoughts about design work but shape their practices and structure the design work within their organizations. I will demonstrate the ways in which organizational practices reflect rational schemas first by describing some of the usability testing facilities common at a number of firms and then providing evidence of various testing methodologies used by product developers. Throughout these descriptions, the instrumentally rational goal orientation and the emphasis on systematic user testing in order to achieve those goals will be evident.

The usability testing facilities in a number of my informants' firms demonstrate the commitment to rational testing procedures by a significant portion of firms. For example, Jonas, gave me a tour of one of the several user testing labs on site at his company's headquarters. No user testing was occurring at the time, but the setup of the lab and Jonas' description of the testing procedures were instructive. The user testing lab had two rooms: a smaller testing room and a much larger observation room. The two rooms shared a wall in which a large one-way mirror allowed covert observation. The smaller room was about five feet by ten feet, and in it was a table at

which a user would sit. On the table was a large computer monitor that would display the company's software to be tested. Two chairs were stationed at the table, one for the user and a second beside it for a researcher who could sit in the room with the user in order to observe the user's actions and obtain verbal feedback. The room also featured a video camera mounted on the side wall. The one-way mirror sat behind the user. On the other side of the mirrored wall existed a much larger second room of about 25 feet by 25 feet. The room featured stadium style seating for approximately 20 people, who could monitor both the behavior of the user and the contents of the user's screen via computer monitors placed around the room. At the front of the room was a control station equipped with a microphone for an intercom system, computers to simulate and control what appeared on the user's screen, and various monitors for tracking related information. The user testing labs at Intelligence are illustrative. They clearly represent sophisticated tools for testing products with a goal of scientific rigor (hence the term 'lab'). Intelligence was only one of several firms that I researched that had these sorts of usability labs.

Jason's company, Brightway Tech, also has elaborate onsite usability testing facilities. Brightway is a large producer of consumer electronics peripheral devices, such as surge protectors, internet routers, mobile device accessories, etc. At Brightway's offices in Southern California, the company also has a usability lab with a one-way mirror, but its lab is setup to create a more natural setting. The lab is designed to look as much like a one bedroom apartment as possible. The goal with this design is of course to mimic the home setting in which the company's users

actually use its products. Similar to Jonas, Jason explained that this usability lab is used throughout the week at regular intervals and is an integral tool in the development of new products.

At another firm, I actually had the opportunity to observe several hours of usability testing and was able to see the ways in which the designers, researchers, and engineers in attendance attempted to maintain a controlled experimental design in the usability lab. I accompanied one of my informants, Kelly, on a usability testing job she did at a large consumer electronics firm, Specter Electronics. Kelly, who consults as usability researcher and designer, was hired by Specter to conduct a series of usability tests at Specter's onsite usability lab. The lab blended characteristics from both Intelligence's and Brightway's labs; it was small, with a one-way mirror setup, and was decorated like a small living room, if somewhat unconvincingly. The product being tested was a prototype of Specter's new internet connected television. The testing procedures provided a number of revealing ways in which Kelly, like other designers and researchers employing rational schemas, attempted to control variables in an attempt to maintain careful testing procedures.

During the usability test, Kelly sat on a stool in the faux living room with one user at a time. The user, who had been recruited with an internet classified ad and had been screened to fit basic demographic parameters, was seated on a sofa several feet away from two televisions, one an existing model and the other a new prototype. Kelly had prepared a set of discrete tasks for the user to attempt with each television, and instructed the user stating, "proceed as if you were at home." These tasks

included navigating menu systems and accessing and manipulating several of the internet-connected features of the televisions. During the tests, Kelly asked the users to narrate their experience as they attempted to perform the tasks. With clipboard in hand, Kelly stuck closely to a script, seemingly attempting to maintain experimental rigor. In the event that a user asked clarifying questions or expressed confusion, Kelly did not answer, responding with a stoicism that indicated her refusal to intervene with the test.

In one instance, after an hour-long test, Kelly asked the user "which version do you prefer?"—the new prototype or the older version. This question seemed both fundamental and straightforward. However, over the course of the hour, the user had been quite clear and enthusiastic about his preference for the new prototype, making the question seem odd and procedural. The question was met with a few beats of dead air, until the user affirmed his preference, this time with markedly less enthusiasm. While it might be argued that Kelly's approach could have achieved the same objectives with a bit more flexibility, the smoothness of the usability test is not the key issue. This description of her formal testing procedures highlights the strictness with which Kelly followed her experimental design and demonstrates the priority she places on objectivity in testing.

Other designers and engineers involved in the test seemed to comply with the overall testing design, though their level of investment in the highly rationalized process was not uniform. While Kelly conducted the test, I sat in the adjoining room with Jasmine, Specter's lead human factors engineer on the project. We watched and

listened to the test through the one-way mirror and on a monitor that displayed a video feed from the four cameras that recorded the test. Jasmine explained that the tests would go on for a few days with various users. At the end of all the testing, Kelly would collect the data and put together a detailed report. This report would be coupled with edited portions of video and would be distributed to Jasmine's team as well as higher-ups who would weigh-in on a plan of action to revise the prototype. Jasmine seemed to lament the slowness of the process; however, she did affirm its value. She argued that the data would be valuable for her and her team when it was time to make the next iterations to the prototype. Ultimately, these usability tests demonstrated a common practice that aims to assess product designs using rationalized procedures and practices.

Based on my research, it seems that usability testing often takes this form in which a rigid set of tasks are performed by the user, and this approach shows the rational focus on isolation of variables. Gerard, a veteran user experience consultant explains:

> A lot of usability has evolved into not so much the sterile environments but more of the face-to-face, informal office-like environments. But it all depends on what you're trying to gather. Those interrogation rooms are good for controlling variables, making sure no other extraneous stimuli get in there so you're just testing what you want versus a more natural, relaxed environment where you're getting more real world application.

For Gerard, different styles of usability testing do exist, and the type used can be tailored to the kind of information pursued. His description does make clear that a

means-end rationality is used in order to make decisions about how to setup the testing procedures and what type of testing to do.

Gerard later specifies what kind testing environment is best suited for gathering different types of user feedback and information:

> There's different ways we can orient our usability testing—one is like the sterile environment where we control for variables and we give tasks. 'You want to accomplish 'X' please do so on the website.' And that is very task driven and task oriented where the user themselves—within the task—have some freedom to do things that they want, but it is very much end-point and goal-driven. And so with that kind of thing what we see is, are users able to navigate from screens A to B to C and accomplish a goal. Versus other types of testing where we want to see—we want to be more free-form and more real-world, and we'll say—let's take Amazon as an example—the task oriented usability test might say go find John Grisham's novel titled "The Client" and purchase it. Very little leeway for them to decide anything except how they're going to do it. Whereas, more free-form would be 'go find a book you are interested in on the Amazon site and ultimately purchase it.' So then we can see whether they navigate through search or do they browse, how much time do they give themselves, what are they looking for to make a book jump off the page . . . Is it covers, table of contents . . . We are not just saying, 'no purchase this book,' but we're saying 'shop.' So those are different ways we can carry out the testing.

In Gerard's description, it is clear he is pointing out differences in the types of usability testing that are meaningful from his perspective. However, what is also clear even from his description of a more 'free form and more real-world' approach is that his practices as a researcher and designer are rational constructed. His goal is to design a software interface that is effective towards certain ends, and he sees usability testing of various kinds as a means towards achieving that design goal.

However, while Gerard, and a number of other individuals I interviewed stressed the value of usability testing, it became clear from my interviews and from

Gerard's responses that a number of organizations do not engage in the practice of usability testing. Interestingly, some companies seem to extoll the virtues of iterative design and careful testing discursively, but ultimately do not do such testing or wait until very late in the design process to do such testing, at which point the feedback can be difficult to implement. I asked Gerard to share his experience and perspective on how these companies think about user testing:

> [Usability research] is seen by most companies as a luxury—a non-essential, if you will. Part of the problem is the usability research field has fallen down on quantifying its impact. Because we are more of a qualitative, research assessment tool, what we do is a soft science. If we could tie in usability better 1-1 to dollars, just like product marketing and product management—just like they do, we would have a much bigger place at the table.

Gerard explains that some companies might see some value in the feedback gained through systematic research and testing, they oftentimes do not do user experience testing because of constraints on internal resources:

> It's just one of those things where its, "We can build this thing and make it pretty good. With usability we can make it better and differentiate, but this is the core where we have to do these things. These things we can think about later." It's also driven by corporate culture of every cent is looked at, every schedule is looked at, time frames for developing project lifecycles are getting shorter and shorter for competitive advantage, so everything that is non-essential kind of falls off. Everybody's held to these ideals where they have to work 50 hours a week just to get done what's essential, and no time is left for these enhancements. I think that's the biggest thing in my experience.

Gerard explains further that that ultimately there is a tension in usability research. UX researchers are often committed to taking a rational approach to evaluating product designs, but these designers and researchers must also provide rational justifications for the value of their work.

Gerard shares his experience of this tension from time working at Intelligence and another large firm, Acme Engineering:

> When I was talking about [Intelligence] and [Acme Engineering] coming in—I used to work with [Acme Engineering] too—they have a culture of everything is bottom line and money, Six Sigma processes to make sure everything works well. When that happened at [Intelligence], we couldn't quantify usability into Six Sigma practices because we weren't able to show, "If you do this usability practice, you'll save 30 man hours of effort or you'll make $800,000 worth of savings." Some of what people are doing in my field now, and what I did also at [Intelligence], was a lot of return on investment on all of our research. So we would try to solve a top problem that was coming into the call center and say, "Oh we solved this problem." -- the Call Center does have Six Sigma levels of analysis -- we could say, "Things were costing them $80,000 a month in service calls. We solved that so we just saved the company $80,000 a month." That worked much, much more effectively.

Gerard highlights the tension in usability testing. Even though usability testing is a seemingly rational approach to test the effectiveness of products or prototypes, effectiveness or quality of user experience is not necessarily an end goal. Gerard explains that the final step of quantifying the impact of usability testing in dollars and cents is often a challenge. In particular, in organizations that use Six Sigma processes, a business management strategy popularized by General Electric's Jack Welch, usability testing is a contentious practice whose rationality is questioned. However, despite the challenges usability testing faces within certain organizational contexts, designers, engineers, and others who employ rational schemas, view this practice as a rational one.

Though usability testing in a lab setting is common, my informants used other 'tools' in their methodological toolkit to accomplish similar objectives. For example, many informants reported using live A/B testing. Rick explains,

> So a lot of the start-up world is really focused on "AB Testing", which is just like you put up two versions on your site and you randomly give one out and then you measure how many people actually buy this thing. And people get down to super small details, like should this button be green or red? They try it out and if more people buy more product with the green button than the red button, then green button it is. So it's very different from the Intelligence style, like, "Let's do a research project," and iterate in the lab? It's more like, put stuff out there in the real world and measure these very practical metrics like revenue and basically take this evolutionary, natural selection approach to design.

Rick, who is working on his own startup, provides a description of A/B testing that emphasizes the value of developing metrics to measure real-world results. For Rick and others using these methods, their work is driven by a clearly rational orientation.

Jonas, who works at Intelligence and does do quite a bit of lab research, also employs usability testing. He describes A/B testing as more "scientific" because there is a real-world control group used. He confirms Rick's focus on metrics and states that the most common metrics used are revenue and Netpromoter scores. Netpromoter, a third party measurement software, describes its software as follows: "Net Promoter is both a loyalty metric and a discipline for using customer feedback to fuel profitable growth in your business" (netpromoter.com). According to the company, the system tracks customer responses to a central question that it determines to have "the strongest statistical correlation with repeat purchases and referrals": "How likely is it that you would recommend [Company X] to a friend or colleague?" (netpromoter.com). Jonas argues that this system "is not statistically significant but it

works surprisingly well." Jonas' assessment of tools like Netpromoter indicate that though he thinks this particular tool has limitations, his criteria for assessment are rational in nature. Ultimately, for Rick and Jonas, A/B testing is an integral practice in their product development process because it allows them to evaluate their design using rationalized methods.

In addition to A/B testing, a number of informants reported using survey methodologies as well. Jason at Brightway Tech explains the value of surveys citing quantitative advantages as opposed to the qualitative methods of lab testing. He states,

> We've done online surveys and that's an interesting trade-off . . . sometimes we'll do concept testing in our lab one-on-one and we'll do it online. Online you take the sketches and you make them into a jpeg and you make an online survey and you ask people to fill out a likert scale of, "What do you like? What do you not like?" So online you're getting quantity. We can get 1500 respondents a day. We can only get 5 to 10 in our lab.

Jason's discussion of the advantages of using quantitative data in addition to regular lab testing shows his belief not only in the value of mixed methodologies, but also in the need for hypothesis testing tools.

Perhaps the most common means for assessing product concepts and designs is focus groups. Leonard, who works as a project manager at StartTech, a medium sized design consulting firm, explains the value of focus groups for determining the path to a specific product development goal:

> If you do market research, you'll often hire some third party market research company. They'll be given very clear goals or a framework for like, "Okay, we're going to bring in some people, we want you to ask them about these things about user interface or features, blah blah blah, or what do you think about these new set of features?" This is sort of general, really standard, consumer research kind of stuff . . . generally

> they'll have a facility, something like this, with only mirrors where the research team sits over there and everyone else will sit over here with a moderator asking people what they think about this, blah blah blah. There might be a laptop where you can communicate with them where you say, "Hey, ask the third guy at the end a question about when he said the machine didn't work for him. Ask him to elaborate." "Okay, can you tell me more?" And you just try to get data that way. I've done that pretty extensively when I was in the auto business. We spent a lot of money on customer research. Sometimes it was functional, sometimes it was just brand related stuff.

Leonard's description of focus groups captures a setup that cuts across industries. His description shows that he sees focus groups as a method for gathering targeted data. The tone of his description might indicate that he has a mild disdain for focus groups or simply that they are so commonplace as to be unremarkable. Regardless of his interpretation of their quality, Leonard is clear that focus groups are a common tool used for gathering targeted information.

A variation of focus group testing common amongst product designers whose products or services involve users completing a series of tasks is card sorting, or 'carding.' Eileen, who works as the director of user experience and engineering for Defense Systems, a quasi-governmental firm that consults for the military and other federally funded projects, describes how her division uses card sorting. In one example, she explained that she was in charge of redesigning the interface for a missile launch system. She explained that the goals of the project were clear: to increase the efficiency and accuracy of the system by improving the human-computer interaction. The system needed to show the status of several missiles at once, so that the operator could assess whether they had been armed, whether they had been programmed with targets, whether they had been launched, and several other key

checkpoints in the launch process. According to Eileen, the previous system had confusingly used pop-up windows to convey information, taking on the look of early Microsoft Windows interfaces. In order to redesign the interface, Eileen had brought in military personnel who used the system, and had them spread out index cards on a large table. These individual users explained their day-to-day tasks, with each getting its own card. Then they grouped tasks according to category and identified which tasks were most common and which were most crucial, in terms of consequences. Eileen would help them talk through their daily workflow, helping them identify and prioritize tasks. After having a number of individuals do a card sort independently, Eileen was able to identify a clearer sequence which was used to develop a revised interface. Eileen described that such as approach, like focus group testing, represented a targeted way in which to systematically develop and test concepts with a sample of users. As in other methods, the focus on targeted testing of key variables demonstrates the kind of rational practices common amongst a significant portion of designers and firms.

Finally, some informants also reported using ethnographic methods of participant observation and/or interviewing. For example, Leonard described that for many of the companies his firm consults for, he or other team members will do ethnographic research. He explained that in working with his medical products clients, he often asks the client, "Look can we go see your top customers and spend some time with them in the labs and see whatever the environment is for the product?" Leonard relayed a story in which he used such an approach. He explained that his

firm was tasked with developing a machine that could automate a common lab process that was used to test biological samples. At the time, this process was carried out by a lab technician. In order to understand the task involved and the environment in which the product would be used, his team spent considerable time observing the technicians and asking questions about their activities. Leonard's team found that the human processes involved three distinct steps. Leonard's team used the data they gathered to develop a product that would automate these three steps, saving time and money for the labs. Leonard's example illustrates the way in which ethnographic methods are used to gather information from users in order to develop a product that achieves measurable goals – time and money in this case. Though this ethnographic approach does not have the experimental control of a usability testing lab, it is a method chosen to achieve specific, rational aims.

Conclusion

In all, these descriptions of the facilities and practices demonstrate that a defined portion of designers understand their work and the role of user feedback using schemas of rationality. These individuals engage in a variety of practices that allow them to pursue objectives through particular means. These means include various methodological approaches that all focus on direct designer-user interaction: usability testing in labs, live A/B testing, surveys, focus groups, card sorting, and ethnography. These methodologies make up a toolkit that designers, researchers, and project managers use in order to pursue goals such as increased revenue, greater customer

loyalty, and other metrics. This instrumentally rational approach with a focus on clear objectives and scientific methodology demonstrates that these product developers do not only employ rational schemas cognitively but structure their practices to match these rational schemas. Furthermore, the dedication to direct designer-user interaction indicates that users have significant opportunities to influence the construction of technology. While it can be difficult to assess the exact impact of user feedback on actual designs, it is clear that under schemas of rationality, designers not only seek direct user feedback but do so with the aim of using it to evaluate the success of designs. My research will show that while prominent, this rational approach to testing and development is not universal; a distinct portion of designers use schemas of creativity to make sense of their work and guide their practices. Ultimately, these differences in schemas will reveal disparate opportunities for users to affect influence the design process.

IV. Creativity in Design

Introduction

The role of users in the construction of technology is influenced in part through their relationship with designers and others closely involved in the development of goods. During the design process, the type of interaction designers and users engage in, whether direct or indirect, has the potential to shape the designs of goods and services available in society. Furthermore, how designers make sense of their work and the role of users in design influences how any feedback gathered in that interaction will be used. Sociology of technology scholars have provided a limited investigation of the relationship between designers and users. As a result, they have not provided a detailed exploration of the scripts and practices that shape the designer-user relationship. My research shows that two competing schemas, rationality and creativity, play a significant role in construction of technology and the role of users in that endeavor.

A schema using notions of creativity was common amongst my informants and could be seen in the way designers, researchers, and project managers spoke about their work. When using creative schemas, informants described their work using language that focused on 'intuition' and 'talent' and explained that user feedback served to 'inspire' them, rather than provide instrumental feedback. At times, design work was even sublimated to the realm of magic. As with the rationality schema, evidence of the role of this schema can be seen not only in discourse used by individuals but also in embedded organizational practices.

Creative Schemas – Discourse

When I asked one of my informants, Simeon, to describe his typical product development process he replied, "process is bullshit." It seemed that my inquiry about organizational practices at his design firm, SimeonDesign, insulted his sensibilities. I probed further, inquiring about his apparent disdain for 'process'—or at the very least for discussing his 'process.' Simeon explained that 'experience and intuition' were the keys to great design. He reviewed his own experience, describing himself as a 30-year veteran of the product design business, having built and sold a 45-person design firm before selling it and starting SimeonDesign, which according to him was one of the top design firms in the country. He likened good designers to top athletes and gave the example of famous golfer, Tiger Woods. Simeon argued that even good golfers, professional or otherwise, lack the special kind of talent that Woods has. He said "there's a magic in what Tiger Woods does." He finished his analogy arguing

that product development was about “finding the magic” or “finding the essence” in product design. For Simeon, it is clear that talent, and even an indescribable ‘magic’ are what matters in product design, and not particular processes.

I pushed further, questioning Simeon about whether SimeonDesign truly had no customary way of doing design work. Simeon responded saying “there is a fundamental process . . . but good design is about what you do inside that process: your intuition.” He illustrated his point about the value of expertise and intuition by explaining a recent project he worked on. The project was a flight simulator. According to Simeon, the previously designed simulator worked well, but his clients wanted to reduce the costs of construction from $15 million to $13 million without affecting the quality or functionality of the design. Simeon proposed to his clients that they construct the simulator from composite materials instead of aluminum. He argued that although the composites were two to three times more expensive and required that molds be developed, the design would use the materials more efficiently and would therefore be less costly overall. In the end, Simeon explained that his design was able to reduce the total cost below his initial target, down to $11 million. He told me that his clients’ company had many engineers, but they would not have been able to come up with the solution he came up with. Not lacking in modesty, Simeon was direct in his assessment of his own talent and experience and the role those qualities play in his success. Whether Simeon’s claims about the relative strength of his capabilities versus those of other designers or engineers have validity is not of central importance, and is beyond the methodological scope of this research.

What is clear, though, is that when describing his work as a product designer, Simeon employs schemas rooted in notions or creativity, talent, experience, and intuition. These schemas contrast sharply with the schemas of rationality discussed in the previous chapter and indicate a clear divide in the sense-making practices of individuals working in product design.

I was initially introduced to Simeon by an informant named Spencer whose company hired Simeon's. Spencer works as the Executive Vice President for Global Innovation at CleanWorks, a midsized company specializing in cleaning and lubricating products for industrial and home use. CleanWorks hired Simeon to redesign the canister for its most popular product. The canister had prompted customer complaints for years due to difficulties associated with the spraying mechanism. Spencer explained that the redesign by SimeonDesign was wildly successful in terms of user feedback and profits, but he alluded to some conflicts of organizational culture between CleanWorks and SimeonDesign. His description of the working relationship gets at the tension between CleanWorks' rational approach to product development and SimeonDesign's more creative orientation:

> I would say that creative people, which [Simeon] would be one, have the ability to see things that others can't, combined with a technical discipline of design. Part of this imbues them with a sense of confidence and ability to see the future that is absolute; it's what makes them great.

Spencer's description of Simeon's approach to design reflects the Simeon's own description of his creativity-driven process. However, Spencer sees potential conflict between his organization and Simeon's. Spencer argues that protecting the

shareholders of his company is an important goal. Part of what this means for Spencer is that he must be highly vigilant of costs in pursuing design solutions. However, he fears that such priorities will cause friction between the organizations:

> So I think [SimeonDesign] sees us, the client, as an impediment to the clear path to success. I know [Simeon] has the ability to bring us an idea that is transformative. There is no question in my mind that he can do it. The question is, which of the 10 ideas or 20 ideas on the table is that one? He will say all of them, and he wants us to have the courage to try them all. Protecting the shareholders, we can't afford to try them all. And that's probably the conflict there. We would like to see ourselves as open-minded, bold, and supportive of creativity; he would probably say that we are close-minded, conservative, and the enemy of that. I would hope that as a client we tend to be more on the good side because we at least, certainly in our case, recognize he is a talented person.

Spencer's assessment of the friction points between the culture of his company and that of SimeonDesign highlight some of the differences in schemas between rationality and creativity. However, as Spencer notes, the distinction between these schemas is not always so simple. CleanWorks does not perceive itself as creative, as evidenced in the boundaries Spencer draws between his company and Simeon's. However, Spencer claims that CleanWorks does have an appreciation for the value of creativity.

This subtle distinction is complex and can cause conflict. Spencer continues, putting the creativity of SimeonDesign in context:

> In [Simeon's] case, he exists not to design products to go into museums but make money. They may one day wind up in a museum because of their design, but he's a designer for a commercial enterprise. He is a commercially incentivized, creative guy. I do think that as a new product discipline, we need to recognize that the sanctity of the idea is really what's there. There are a lot of people that can build products that are the same, that can build products that are quality free, that comply with all regulatory requirements. Not many people can have ideas that are commercially successful. That's where creativity is that

> rare spark that sees the white space and says, "This should be there." That's a cool thing.

For Spencer, Simeon's creative talents are rare attributes that have distinct value. However, Spencer's descriptions indicate that he views that creativity as a commodity able to be used within a rational structure, whereas Simeon's descriptions of his own work focus on the 'magic' of creativity and reject notions of process.

This conflict in schemas can also be seen in Spencer's description of the role of research in designing products.

> [Simeon] thinks often the research we do is designed to have the product fail, not to have the product succeed. So we try to find an arena to present research that is accurate so that the ideas have the biggest chance for success. I think our job is how can we make this idea successful, not how many things can we put in its path to make it fail. The view of that might be different [for some], but that is truly how I see our role. How do we transform this idea into a success, not how many things can we do to it to make it fail. He might have a different perspective because he's pushing and I'm pushing but it's not at each other, but it's not quite in the same direction. We just hold that tension and voila, we have the big idea.

For Spencer, the way to approach the kind of friction that he sees between the two firms is to use rational means.

Spencer argues that the best rational means involve providing a clear design brief. A design brief is a rationalized tool that outlines the goals of a particular project and provides relevant information and requirements. Spencer explains,

> I would say that to the degree that we give a clear brief and then allow freedom is more successful. A fuzzy brief and constriction is a guarantee for failure. So we're trying to wrestle between the two. And again, I think there's friction there. When friction does its best, that crucible of friction produces magic. When it becomes conflict it's negative. If there's nothing there, then I think there's bland. So I enjoy Simeon, a powerful, strong, driven person and I think by nature that is

> designed to cause friction with us because I think the rubbing creates the heat, heat creates the fire, and fire creates change. We need that.

Spencer's descriptions of the working relationship between CleanWorks and SimeonDesign highlight some key differences between rational approaches and creative approaches. In Spencer's description of the cultural difference between CleanWorks and Simeon design, he highlights a distinct contrast between the two firms' views on creativity. CleanWorks' emphasis is generally on the role of research to achieve success, as measured by profitability and the approval of its shareholders. This view is indicative of an instrumentally rational approach, not necessarily because the end goals are monetary but because Spencer sees a clear structure towards achieving those goals. Even Spencer's description of creativity takes on a rational perspective, with creativity as a means to achieve an end. In contrast, Spencer's description of Simeon's world view closely matches Simeon's own description. Spencer focuses on Simeon's innate talents and even uses the same language of 'magic' that Simeon uses to describe the design process. That said, Spencer's description of the working relationship between his company and Simeon's is not a cut and dry duality. As Spencer acknowledges the divide between rational and creative approaches, he himself seems torn between the relative merits of each approach and the way to reconcile the two organizationally. However, even though some internal tension may be evident in Spencer's description, what is clear is that his remarks and those of Simeon are indicative of the clear existence of schemas about design work as a creative endeavor.

Simeon is not alone in his view that talent, experience, and creativity are the central ingredients of successful design. This perspective is shared by others such as Peter, who works as a project manager and a designer at Intelligence's New York offices. Peter explains,

> There's an expectation that designers bring in the innovation, solve the problems and are the creative thinkers . . . I've been in meetings where they didn't like any of the [designs we presented], and they're all quiet and looking at me saying, "Okay, maybe you can come up with something." Sometimes they just look at you and they're like, "Do you need more time?" and I'm like "Yeah," and they say, "Get back to us," like they're waiting for magic [chuckling].

Peter describes the creative process using the same notion of 'magic.' This mystification of the design work by likening it to magic is a common discursive move amongst individuals who employ creative schemas. By describing creativity as magic, these individuals create a black box, in which the processes that transform inputs into outputs are not examinable. This resistance to describing process is similar to that shown by Simeon.

Peter does not challenge the notion that designers produce a kind of magic, though he seems to describe the fact that others expect that 'magic' on-demand with some exasperation. He explains that producing creative and innovative solutions on-demand is difficult because others within his organization typically place constraints on his work:

> Basically, everything is constraints. Design gets all these constraints from the other two [engineering and research]. I think that's why they look at us like we're in la la land. [Project managers] bring in the business constraints, like time to market, the cost of our time to take a product to market, what we cost the company to let us produce it, and engineering brings constraints about feasibility. Experienced designers

> advocate the best possible experience, and then we try to figure out if we can negotiate that within the constraints.

For Peter, this negotiation within constraints is the structure within which creativity occurs, where research and planning are transformed into new ideas. Peter's conviction that design work occurs as a negotiation within constraints portrays design work as operating on principles somewhat different from the means-end concerns of engineers, project managers, and others. Though Peter shoulders this duty a bit uneasily, his view that he is responsible for innovation, creative thinking, and perhaps 'magic' is emblematic of design as a creative endeavor.

This view that design relies on an indescribable quality or magic is further echoed by other informants. Quentin, who works as a research manager for leading mobile phone producer Swan Communications explained that design work is an 'artful' discipline. He described that when hiring industrial designers or interaction designers, he looks for "designers who have a good sixth sense." Quentin's description of design as involving 'sixth sense' aligns with previous accounts of design as otherworldly, or magic. He further believes that this sixth sense is necessary for a pure vision in design, stating "clear vision has a beauty of its own." He explains that that one can tell when there's been only one voice guiding a design. In contrast, he claims that 'a collective voice is softer." Here, Quentin argues not simply that designers have certain mystical properties, but he introduced the notion of singular talent by arguing that a singular vision of a design is always better than one developed by committee. These views are common amongst designers who employ creative

schemas, and contrast sharply with those based in rational schemas in which research, iteration, and tight links between means and ends are central.

Andrew, a lead user experience engineer at a company that specializes in developing the kind of predictive analytics that drive suggestion engines for websites like Netflix, also likens user experience design to an innate talent.

> I feel like user experience, that field, is very much…well, to give you an example, you could have singing lessons all of your life, but you may never sing better than someone who was born with natural ability—you know, with natural musical talents, who is actually gifted. I feel like user experience has somewhat that same element, where you're either one with it or not, and I think while it's not as extreme as singing I truly believe that you could be untrained in this field and be much better than somebody who has had years and years of training.
>
> There's always exceptions, but on a more realistic scenario, I would say that if you have someone who has not as much training but a lot more experience, versus someone who has studied it all their lives, the first person may end up being better at what they do than the guy who has a lot more training. I think there is an element where you just get it. You can sit down, and I guess that's true of every field, where some people are just naturally better at some things than others.

For Andrew, good design is less about the rational methods employed and more about the natural abilities of the designer. His analogy to singing highlights his belief that design requires innate talent that is more powerful than even years of experience. Andrew's singing analogy closely mirrors Simeon's golfing analogy, in which pro-golfer Tiger Woods is held up as having incomparable talent.

When I asked Andrew about the role of research and usability testing that many designers employ, Andrew asserted, "typically the designs [that talented designers] make without any validation end up being very similar to the ones with validation." For Andrew, the implication is that the elaborate methodological toolkits

employed to test and validate product designs, along with the significant resources of time and money they require, are essentially useless in the face of real talent. In many ways, Andrew is making the case for the value of I-Methodology, or at the least indirect designer-user interaction.

In trying to define what talent was, Andrew explained that part of the talent of a designer was about "noticing things." He argued that noticing different trends amongst design work, even outside one's competitive product set, is very valuable. For example, during a User Experience Network meeting, a guest company was having its website evaluated by the UX Network attendees. During the meeting, Andrew pointed out that when the website prompted the user to input a date, no calendar popped up to help the user select a date. Andrew's point was that a pop-up calendar was now a common trend amongst leading websites, and that the company should copy that design element. However, he clarified that copying is not as straightforward as it might seem. He states, "you could just go around copying things, but then you're just taking a chance that someday you're going to copy something that sucks and you don't know it." Andrew goes on to argue that the role of talent is not only in "noticing" but also in evaluating with good taste, a skill that he believes cannot be taught: "how do you take a course in recognizing if something is good or not, right? I think it's similar to…I would compare it to fashion. Some people have an eye for fashion." For Andrew, innate talent and taste play a central role in producing good design work, and education and training are insufficient substitutes.

Andrew explains further that at times, recognizing trends in design best practices can be complicated. He provides an example from the consumer electronics industry to illustrate his point:

> A lot of times you'll have competing trends. If Apple does something one-way and Google does it another, which do you follow? A lot of times they'll come out with competing products where eventually one is going to win out and the other one is going to change. It may be some feature that is going to be widely used. I think we see some of that with the mobile platform. Apple came out with the iPhone first and they had these feature sets. Then Google came out with Android and now you're starting to see, "Oh, well Apple just redid this feature and now it looks more like Android," and vice versa. I think there's definitely…it's definitely possible for you to just have a knack for looking at the two phones and saying, "Okay, this is good about this, this, and this. This is good about this phone and this is what's bad about this one."

It is clear from Andrew's responses that he views the role of talent as primary in design work. In contrast to designers who tend to employ rational schemas, Andrew argues that the process of designing an experience that will be good for the user lies not in systematic user research but instead in the designer's innate talent.

Creative Schemas – Practices

Creativity-oriented designers tend to be more resistant to describing the processes and practices of their work. For designers who tend to employ schemas of creativity, their way of making sense of design is intertwined with seeing design as innate and at times mystical. Because of these factors, eliciting descriptions of research and design practices was challenging. This resistance is in many ways evidence of their differences in practice relative to more rationally-oriented designers.

However, some designers shared their experiences and interpretations of those practices.

These designers employed some of the same research practices as those who used rational schemas. However, the range of methodological tools was more limited. When these direct interaction methods were used, they were often modified to involve less direct interaction with users. They also engaged in experiential research practices in which users were often not present at all. The interpretations of these methods also contrasted with those given by more rationally-oriented designers. Creatively-oriented designers did not tend to describe their work in terms of testing, validating, and iterating. In contrast, they talked about the research 'inspiring' designers. Overall, the role of research seemed to be to confirm or refute previous research or their own intuitions.

Barbara, who was a Designer and Researcher for the California design studio of Nami, a major Japanese auto manufacturer, describes good design as an "authentic experience" for both the designers and the users. When I asked her to elaborate, she provided an anecdote about a project on which she worked. She and the rest of her design team were tasked with redesigning the company's compact car. As part of the redesign process, she and the other designers wanted to "completely rethink social space." She explained that a car is an important social space in our culture, and she and the design team wanted to take a fresh perspective. With a background in anthropology and cognitive science, Barbara gave a presentation to her team on

research she had done concerning social space among baboons. However, she said the designers, while open to the presentation, had difficulty connecting with the material.

So Barbara arranged for them to go on several research outings in order to immerse themselves in different social spaces and to observe users. She explained that she and her team had a picnic on the grass overlooking a cove on the shores of the Pacific. They went bar hopping at trendy nightlife spots in Los Angeles. And they had breakfast at a homey San Diego restaurant called Big Kitchen, which is paradoxically extremely small. Barbara also took video footage at a local arcade, thinking that it would provide the design team with an opportunity to see teenagers interacting in a built environment. And while the teens to be observed were mostly too young to drive a car, she explained that given that the product development would take a few years, she targeted the younger audience. The video showed teens struggling to hold their drinks while playing the games and captured the way multiple teens would interact when playing the games or watching each other play. Barbara's research is largely ethnographic in nature, focusing on participant and non-participant observation. These methods are also used by designers who tend to employ rationality schemas. However, Barbara's research outings would seem to have somewhat more broadly designed goals: e.g. rethinking social space.

Beyond ethnographic research, Barbara employs less conventional research methods in contrast to more rationally oriented designers. While at a coffee shop, Barbara spotted what she called three "cool kids." After observing them for a while, she approached them to talk. She explained that she was later struck by the fact that

these three friends, who were visual arts students at the local university, had very different relationships with cars. One of them did not drive a car, one was unsure of what car he drove (he thought it was a Toyota Camry), and one was a car enthusiast who coveted the latest high performance luxury cars. Intrigued by this hodgepodge trio, she recruited them to come in and talk with the design team at Nami. Ultimately, Nami paid them $1,500 dollars to make a video about cars. The result was a movie about a relationship break-up in a Volvo and a presentation to the designers by the three students. Here, Barbara begins with ethnographic methods that then lead to a sort of participatory feedback process. This approach is in some ways similar to that of other designers, in which diverse users are queried for feedback and insight. However, the more abstract content of the insights gathered are less common and indicate a level of indirectness in feedback.

Lastly, Barbara brought in a group of young children to participate in the rethinking of social space for the compact car. She provided them with a slightly raised platform about the size of a car's footprint, gave them kid-sized furniture, and asked them to arrange the furniture and other objects on the platform how they would want them if the platform were their room. Barbara's excitement about this array of research methods was clearly evident in her retelling. Again, the research methods used bare resemblance to those of more rationally minded designers, but there tends to be less clearly defined goals and less direct product feedback.

Without my asking, Barbara offered her take on the relationship between her research and the resulting product designs. She stated, "the link between the research

and the design was not visible." She explained that the goal of these research endeavors was "finding a way to get them [the designers] excited and inspired." This focus on excitement and inspiration connects with common discursive patterns among designers using creative schemas. The aim of inspiration fits an understanding of design as a creative endeavor. Users are described more as muses than data points. In addition, Barbara's description of the design process obfuscates or mystifies the process in much the same way that other creatively oriented designers do. By describing the invisible link between research and design, Barbara reinforces design as a mystical process that is not scrutable to analysis. Notably, she does not offer this analysis with regret, but her tone almost seemed celebratory. This tendency to bracket-off the process of design work is similar to Simeon's more colorful description of the value of process.

One of Barbara's coworkers and successors, Peggy, provides a similar creativity-based interpretation of the role of user research. However, Peggy's descriptions add complexity. She explains that research outings like those described by Barbara are often attempts by the designers to confirm their intuitions by enlivening and internalizing what they perceive as stale PowerPoint data. For example, when I asked Peggy to tell me about any recent project she worked on, she described the process behind the redesign of the Nami's mid-sized sport utility vehicle (SUV), the Adventura. Like Barbara, Peggy describes the use of various research methods and places the focus of the research on inspiring the designers.

> There's research that was conducted by Market Intelligence [a Nami research group] and the designers went to the research meeting . . . and

> they took what they thought the customers were saying and they turned it into these collages, their interpretation of how they feel the customer feels about how the Adventura should look, how it should work, and how it should feel.

Here, Peggy describes a process in which designers act as interpreters of existing user research. The designers move from the specifics of the user feedback to more impressionistic understandings.

Peggy then explains that this first idea-generating step in the process lead to what she called the 'Adventura Experience.' The 'Adventura Experience' involved the designers going on a wine tasting road trip to simulate the experience of actual users. She explained, "we wanted to follow-up on these ideas and see how does it actually manifest and how can we get inspired by some of these things that they were talking about." Like Barbara, Peggy, argues that survey data and focus group information was insufficient, so a more experiential approach was taken.

Peggy walked me through her thinking about the 'Adventura Experience' while showing me slides on a PowerPoint documenting the research. Her description reveals two key points. First, her explanation of the 'Adventura Experience' aligns closely with the creativity schema, focusing on inspiring designers. Second, the nature of the outing contrasts starkly with the research practices of rationally-oriented designers because users are not present or directly involved in the process.

> This [Adventura] experience is something that we organized to give the designers . . . just like, get them away from the studio and then also just give them some perspective on the setting of what the customer would go through. And so it was also a "ride and drive." We had two vehicles: the [Adventura] and then I kind of stole budget for [a competing model].

> So a lot of people [in focus groups] talked about this ideal road trip where they go wine tasting and it's all about the experience; it should feel optimistic. But then there are these very technical things like, "its push button features, its spaciousness." So there's this element of like, okay, there's the car but how does it work in the big picture? So there are these themes we wanted to explore. People talked about dress-up and dress-down, like that's what the [Adventura] gives them the ability to do. Some vehicles can do this and some can't; some are dress-up all the time and you don't feel comfortable taking it to the dirt roads or you don't feel comfortable taking it to a nice dinner and having the valet bring it around, and also these other things.
>
> So we [the design team] talk about the purpose of the activity and there's a balance of, "We just wanted a boondoggle and we just wanted to get out and have fun." But then how do we justify what we did and how does it relate back to the customer or the product? And there's always a story that we can tell.

Peggy's account provides a complex juxtaposition. She explains that the 'Adventura Adventure' is meant to inspire the designers by giving them the opportunity to experience first-hand what they think is otherwise dry user research. However, she also explains that part of the motivation for the trip is the desire for a 'boondoggle.' She also states that there is always a story that can 'justify' these practices. Peggy's interpretation of her team's research activities contrasts with those given by more rationally-focused researchers and designers. More rationally-focused designers tended to organize and interpret their research to test hypotheses in order to make direct revisions to design iterations. Peggy on the other hand describes a process where fun and inspiration are the motivations.

Peggy's subsequent description of the 'Adventura Experience' reveals another telling aspect of her team's research: the users were not directly present.

> So we did the road trip, so we drove more than 120 miles in the [Adventura] and the [competitor's vehicle] to experience the ideal

> driving scene and the events for the customer. I mean we went wine tasting, but at the same time we got a lot of seat time and we got to experience the cars in the setting our customers talked about. It allowed us to also think about how are each of these vehicles different, how did one do the job better than the other, which one did you prefer riding in? And these are things you come out having a perspective.

Peggy's paints a picture of designers using the outing to confirm or challenge the user research for themselves. However, in her description, it is also clear that designers are evaluating which vehicles they 'prefer' themselves. This evaluation process is similar to I-Methodology because designers are exerting their own preference. However, it is different because designers are not just imagining themselves as users but attempting to recreate the experiences of those users.

Peggy describes a complex relationship whereby designers are not only attempting to internalize user feedback through creating approximations of user experiences but also making their own evaluations and exerting their own preferences. She explains further:

> Where we went, is kind of in line with where we feel the target customer is. And I feel like these research outings, they help the designers internalize…"Okay, who is the target customer and who isn't?" I feel like when we went to lunch, that feeling kind of outdoor lunch was nice, casual; that's kind of the [Adventura] customer. Whereas we did the dress-up version and we went to this [high-end country inn], and they had a dress code and you had to be really, you know…it was just a whole different setting and we felt like, "Okay, this is not [Adventura] because it feels more like [a luxury automotive brand]," and for those guys to point those things out to me, it's really cool because they totally understand the customer, more so than I do even sometimes. These opportunities are really good for us to get in that space. Because sometimes there are designers that don't think about the customer; they're like, "Whatever, I'm just going to draw something cool," which is fine. But if you bring those guys out and have this shared experience, I think the biggest value that comes out of this thing is that everyone is on the same page.

Peggy's explanation of the outing draws interesting contrasts. She describes Nami designers as customer focused. She even draws a distinction between that customer-focus and the kind of inwardly focused design that other designers do. However, the customers are notably absent in any direct fashion in the outing. This feature of Nami's research process is a marked contrast to rationally-focused designers and demonstrates indirect designer-user interaction. In addition, by focusing on inspiring designers, these research practices remove the elements of iteration and continual testing that marked the efforts of more rationally minded designers.

Rationality and Creativity – Combining Schemas

While it is clear that both discourse and practice of design work is structured by the two schemas of rationality and creativity, the usage of these schemas is at times not mutually exclusive. At times, designers will combine schemas in their descriptions of their work and that of other individuals and organizations. Explanations of design work that combine both schemas tend to demonstrate two features. They demonstrate that the use of these schemas is at times complex, but they also reify the existence of these schemas.

For example, Gregory, who collaborates on research with Wes, the organizer of the User Experience Network group, employs discourse that blends rationality and creativity. Gregory is the principle of a firm, Rubric Research and Consulting, and he argues that leading consumer companies are successful because of their use of both

rational and creative principles and practices. He argues that sometimes products emerge 'organically,' without means-ends rationality, but are then sustained and improved through more rational approaches. To illustrate his point, he provides an example of Reed Hastings, the CEO and co-founder of movie rental giant, Netflix:

> Reed Hastings had such a bad experience with Blockbuster [the leading movie rental retailer at the time] . . . he had misplaced a movie, one cassette tape, and he realized it was going to be a $40.00 charge. And you know what his first thought was, 'my wife is going to kill me.' And so . . . he said 'there has to be a better way, why am I even thinking that renting a video should have an impact on my marriage. And then I feel like I'm being penalized with late fee.' And so, he worked out at a gym, and he played a flat fee, and whether he used the gym or not you never got a late fee. And so it was kind of like the Reese's chocolate and peanut butter—it was his 'ah-ha' moment. He said it shouldn't be like that, renting a movie should be less of a pain, it should be less stressful, less costly . . . And I've been married for a long time and I can tell you that I would feel really stupid if I had to go to my wife and say . . . 'I know it should've been three dollars but it's forty.' So Reed was under that pressure, according to his people, and even after he paid the fee and everything, he thought there's gotta be a better way. That's part of how Netflix got born. So that was very organic. See the point is, I was very organic. It's not that he did market research or the scientific method.

Gregory's description describes the initial development of Netflix's product and service as an 'organic' process. He contrasts this 'organic' process of inspiration with 'market research or the scientific method.' This description of individual inspiration and not systematic means-end practices aligns with accounts of creativity. However, Gregory's description of Netflix's success is not limited to a creative interpretation.

While Gregory argues that some success is 'organic' or creative, he goes on further to contend that rational or scientific means are also necessary for success.

> The stellar thing about this whole thing is that the product stayed the same. The movie, even if it changed format, it stayed the same. So here you have a company that changed the whole experience except for the product. . . . So it's many years later now, and if you look at how they have stayed competitive, that's been systematic. That's been scientific methodology. That's been the intel about my preferences, my buying habits, so they can suggest to me, 'oh [Gregory], you like that movie about auto racing in the fifties, here are three others about auto racing in the sixties.' And I'm on it like glue. It's stunning. It's a stunning thing.
>
> But the most sustainable [aspect of Netflix's success] is very systematic. The website and the accumulation of people's analytics on the website keep them differentiated –'better and different' as I always like to say—than their competitors . . . and here's the point I want to make. It's organic and it's systematic. And it's usually a hybrid—done right it's a hybrid, done wrong and it's a mongrel.

Here, Gregory argues that the development of Netflix's website and its ability to gather and use user data are competitive advantages only possible through systematic efforts. Gregory asserts that while Netflix's origins are due to an organic process, its continued success is due to its systematic and scientific approach. This 'hybrid' approach combines the rational and creative, or at the very least indicates Gregory's position on when in the product development process one schema is needed more than another.

However, while Gregory outlines a system that draws on both schemas, he seems to indicate there are variations in how well this hybrid approach is carried out. I pressed him on what he meant by 'done right' and 'done wrong':

> David: So you said that the combining of the organic and a systematic, if done right is a hybrid, but if done wrong is a mongrel. What determines whether it's done right or done wrong?
>
> Gregory: That's a really, really good question. I love that question . . . the first thing is this, no matter where it ends up on a continuum, it's a

> matter of whether it's effective. Effective is the word . . . when I was at [my former company, a large telecommunications firm], I noticed this. There were a lot of people doing a lot of good work and a lot of people taking in a lot of information: secondary research reports, observations, etc. And then they were just giving it out: 'here's what I found, here's what it looks like.' And they handed it to me, and I handed it back to them. And they said 'what do you mean?' And I said 'those are your findings . . . what are the implications? What does that mean for us? . . . Tell me what it means for my company, my unit, my products, and my world.'
>
> So the second level is they're willing to take in information, and the third level is turning that information into meaningful decision making information, currency, whatever you want to call it. What do those figures mean? What does that statistic mean? What does that trend mean for the car maker? What does it mean for me making telecommunications data systems? The company that can do that is way ahead of the company that doesn't really know what to do with all that information.

In describing the differences between companies that integrate the creative and the rational, Gregory claims that whether a company is gathering information is only part of the puzzle. Success hinges on the ability of an organization to interpret that data and make decisions based on that data. His responses suggest a belief that systematic processes for gathering information are insufficient as rituals alone, but rather must be done 'right' or 'effectively.' Gregory's descriptions provide valuable insights into the way that designers, researchers, and others make sense of product design work by demonstrating the ways that rational schemas and creative schemas are at times intermingled.

Gregory is not alone in his perspective on the blended role of rationality and creativity in product design. Wes, who is normally more likely to use schemas of rationality, asserts that there is a role for intuition and creativity in product design. He

argues that good product design is sometimes a blend of art and science. However, Wes is somewhat uneasy when I probe further. He seems to see his own point of view as unpopular, professionally.

> David: I'm interested in this 'art and science', the 'intuition versus the analytics.'
>
> Wes: Oh, you're a fringe guy.
>
> David: (brief laughter) Oh . . . I don't know what that means.
>
> Wes: Well, you'd be a lot safer staying, especially in the western culture, talking about observational science, empirical science, where it's very obvious what it is you're measuring and how you're gonna measure it, and predicting your outcomes. You know, the whole scientific process. When you start throwing intuition into the equation, you're gonna lose a lot of mainstream western thinkers, because I don't think they really think about intuition as a valid form of reasoning. But if you talk to a police officer, an investigator, who trusts his gut a lot, you know these guys live and breathe by their intuition. And I think in user experience design, there is a role too.

Wes' reaction demonstrates three key points. One, that he sees a role for both creativity and rationality. Two, in making this argument, he reaffirms the existence of these two schemas. Three, he indicates that there is contention between those who draw on schemas of creativity and those who draw on rationality. He even seems to be warning me about how I talk about product design and user experience.

Despite his warnings, Wes continues on to argue that he thinks intuition can play an important role alongside more traditionally rational perspectives. Wes explains:

> So going back to the example of the analytics, what I'm seeing a lot of companies do now is that they have, what is sometimes called, their optimization group or their SEO [search engine optimization] group, or whatever. Where all their analytics scientists are, and they gather all

> that data and based on that data they make predictions. They might use predictive analytics or decision management tool to do that, but I'm seeing more partnering with user experience folks, who will then be able to look at that data and use their intuition to say, well if I look at their [a population of users about whom preference or decision data has been gathered] pattern or views or what they're doing, the reason that they're doing this is this. I don't know, but I can go run a study and we can go figure that out.

In this description, Wes uses the familiar term 'intuition' to describe the blending of non-scientific insights into an otherwise rational process. And while Wes' example varies from Gregory's, Wes' understanding of the role of intuition is perhaps not so different from Gregory's. Gregory describes Netflix's Reed Hastings using intuition at an early conceptual stage. Wes describes intuition being used at a later stage to interpret data collected. However, these descriptions have some similarities. In both examples, intuition is being used to interpret data that then motivates future research. In Hastings' case, the data being interpreted is his personal experience with Blockbuster while in Wes' example the data being interpreted is a large mass of analytics data from the research department. In both cases, this data motivates subsequent action to evaluate hunches through further research.

These perspectives on the interplay between rationality and creativity add complexity to an otherwise dichotomous relationship. However, despite this complexity, their responses also serve to reify the categories they combine. Both Wes' and Gregory's descriptions of the way in which rationality and creativity can play a role in product design follow fairly conventional interpretations of the nature of these two schemas.

Conclusion

Ultimately, the evidence of the use of rationality and creativity both in discourse and practice demonstrates that these schemas structure the way in which product designers make sense of their work. Designers who employ schemas of rationality tend to view product design work and the act of gathering user feedback as an instrumental process. The goals are clearly established and research, testing, and feedback, and iteration are the transparent steps in the process towards achieving those goals. In contrast, designers who employ schemas of creativity tend to describe intuition and talent as the qualities necessary for good design. In describing the process of design work, these designers tend to obscure or mystify processes. Sometimes they describe their work as coming up with 'magic.' Some of the practices they engage in are similar to those described by designers using rational schemas. They conduct qualitative research and gather user feedback using focus groups and other methods. However, they tend not to make sense of these practices as instrumental in the way more rationally focused designers do. They describe these practices as a search for authentic experience that might inspire their work. These practices are less likely to have users present or directly involved, giving users decidedly less opportunity to influence the construction of technology.

V. Design Schemas in Context

Designers and others involved in the process of design understand their work and the role of users through competing schemas of rationality and creativity. These schemas are infused in various aspects of the product design process. They influence designers' practices. They shape the way designers make sense of their work. And they affect the type of designer-user interaction that occurs. As a result, they create disparate opportunities for users to have a direct role in the social construction of technology. However, as organizational theory suggests, schemas are not found in isolation. Where do these schemas come from and how are they legitimated? To understand these schemas more fully, it is useful to place them in broader historical and contemporary contexts.

From a historical perspective, product design of mass-produced goods emerged as a profession in the early twentieth century when product designers played a pivotal role in the changes in the way automobiles were designed (Gartman 1994). A brief examination of the case of the automobile demonstrates a precedence for the existence

of schemas of rationality and creativity in product design work. From a broader contemporary perspective, it is informative to look at how today's designers attempt to legitimate these inherited schemas. My interview data reveal that a number of designers make frequent connections between their work and broader trends in their field through referencing one company in particular: Apple. Through an analysis of the way in which designers speak about rationality and creativity at this large consumer products firm, we can better understand how designers understand and negotiate the legitimacy of their perspectives. Ultimately, through a consideration of these broader contexts, we can better comprehend the role of these schemas in the social construction of technology and the role of users in that process.

Design Schemas in Historical Context

To investigate the relationship between schemas of rationality and creativity, it is helpful to consider these concepts in historical context. However, before examining the character of these schemas in early product design work, it is advantageous to borrow some conceptual tools from sociological theory.

Conceptual Tools for Rationality and Creativity

The notion of rationality has deep intellectual roots in sociological inquiry. Most notably, Max Weber's analyses of the rationalizing forces that accompany modernity are foundational in sociological theory and relevant to contemporary product design. Weber argues that pre-modern modes of economic, cultural, and

social life are replaced with the calculability of rationality. However, while Weber is primarily concerned with rationality, some evidence of his views on the relationship between rationality and creativity can be found in his less prominent work about rationality in music: "The Rational and Social Foundations of Music" (Weber 1958), originally written in 1911 (Feher 1987:147) [11]. Weber argues that music, like other areas of society, has been rationalized:

> The drive toward rationality, that is, the submission of an area of experience to calculable rules, is present here (in Western culture) . . . This drive to reduce artistic creativity to the form of a calculable procedure based on comprehensible principles appears above all in music (Weber 1958:xxii quoted in Feher 1987:3).

Weber argues that in music, more than any other area, the result of rationalization is that creativity is transformed to a set of calculable rules.

In analyzing Weber's work on music, Frenec Feher argues that this rationalization process becomes totalizing:

> Modern music, as it is portrayed in Weber's analysis, bears an acute resemblance to all the dominant features that otherwise characterize Western modernity in his later narrative. It is a fully rationalized system, the cumulation of purposively rational acts. Although it draws upon the raw materials of inconsistent rationalizations of pre-modern worlds, it resolutely sweeps them away to erect its own proud edifice on their ruins (Feher 1987: 152).

Feher argues that the processes of rationalization affect all aspects of modern music. However, he argues that while rationalization sweeps away the creativity and inconsistencies of pre-modernity, rationalization indeed draws upon these raw

[11] The explanation here of the broader theoretical context of rationality and creativity is not intended to be exhaustive. Instead, the purpose of drawing connections to Weber's work is to establish conceptual tools that can be useful for interpreting the historical emergence of product design in mass production. Weber's analysis of the rationalization of music is well-suited to this task because it provides explicit juxtaposition of the relationship between rationality and creativity.

materials. Here Weber, as well as Feher, argues that rationality and creativity exist in a state of tension.

This tension is complex. Interpreting Weber, Feher argues that this tension creates a dialectical relationship that motivates change and development within the field of modern music:

> Western music has been completely rationalized, and yet it reaches the limits of rationality very quickly. The non-rationalizeable, the residual "irrational" elements within the rationalized system are "revolutionaries" or "rebels." On the one hand, they challenge the legitimacy of Occidental music; on the other, they generate a dialectical tension without which dynamic development within the system would be inconceivable. Despite its role of a dialectical stimulant, the romantic rebellion cannot pretend to transcend, let alone supersede, the rationality of the system. Insofar as the rebels find the courage or boldness, to stray beyond the limits of rationality, they can destroy the system; but they will negate it without creating anything of lasting value and significance in its stead. (Feher 1987: 152-3).

Feher argues that though creativity and other irrational elements cannot truly challenge the advancement of modernity and rationality, these elements play an important role. The non-rational serves to fuel the 'revolutionaries' or 'rebels' within modern music and leads to dynamism and change. Ultimately, the march of rationality is inevitable, but notions of creativity persist and provide sources of change.

Automobile Design at General Motors - Introduction

This tension between rationality and creativity, with creativity serving as a source of change, can be seen in early 20th century mass production and product design. Product design emerged as a field concurrently with the development of the mass produced automobile. The case of General Motors demonstrates the tension

between the march of rationality and the role of creativity as a source of change. The early articulations of these schemas provide some insight into their contemporary usage.

Rationality at General Motors

Sally Clarke provides a historical analysis of General Motors' success in surpassing Ford as the dominant force in the early automobile industry in "Managing Design: The Art and Colour Section at General Motors, 1927-1941" (Clarke 1999). Clarke argues that General Motors (GM) challenged Ford by attempting to match Ford's production efficiency and by providing more creative designs that would contrast with Ford's staid Model T.

For GM, its challenge to Ford's dominance relied on first matching, then exceeding Ford's efficient system of production. GM's efficiency was the result of following Ford's model of rationalized production; however, GM developed a system of flexible specialization that provided calculable efficiency while allowing for more frequent model changes. Clarke describes GM's move toward rationalization: "General Motors acquired lasting fame for its performance in the inter-war years. Compared to 1920 when it came close to bankruptcy, by 1941 GM had been transformed into an enormously powerful and efficient organization" (Clarke 1999:67). GM's success relied on modeling Ford's efficient processes and surpassing them. Clarke explains, "GM managers introduced new bureaucratic procedures and a decentralized organization—methods that were imitated widely. GM created a system

of flexible mass production that, unlike Henry Ford's assembly line, accommodated a car's annual model change" (ibid). These accounts of GM's approach show some of the organizational structure that supported a rational bureaucratic approach.

It was not simply GM's structure that was rationalized; GM adopted a culture of rationality that was similar to rational approaches by contemporary designers. Alfred Sloan, the head of GM from the 1920s through the 1950s employed rational schemas and practices. In Sloan's reorganization of GM in the 1920's he used what he referred to as a 'scientific' approach. Clarke explains, "The new management team introduced a set of policies between 1921 and 1925 to put, as Sloan liked to say, management on a "scientific basis." (Clarke 2007:126-7). She explains further, "Sloan displayed his genuine belief in the "objectivity" of statistics" (129).

This scientific approach extended to the way that GM understood the role of its users. In his practices, Sloan was at the forefront of using consumer research to influence product design and development decisions.

> Aside from a few remarks, Sloan offered no sustained analysis of GM's consumer research division in [his autobiography] My Years. This was not due to the insignificance of market research. In a 1938 article, Time reported that GM's research staff was perhaps the largest corporate research organization in the United States. At that date, its budget was estimated to be $300,000 to $500,000. Like many other companies, by the 1920s GM began tabulating statistical portraits of consumers and expanded its data gathering during the 1930s (130).

Sloan's use of market research to understand GMs customers was not only extensive but also took on a typically rational form. Under Sloan's leadership, GM gathered direct user feedback that it used to make design decisions.

Buck Weaver, GM's Director of Marketing Research, developed a number of research methods to directly test design concepts and prototypes:

> Just as Sloan repeatedly recounted his efforts to put the firm's finances and its operations on a "scientific basis," Weaver's surveys tried to translate complex social and cultural questions about consumers into "objective" terms. Data about consumers' attitudes and behavior were tabulated and presented through different statistical measures. As such, the data illustrated ideas or assumptions about consumers that had underpinned many of their core business activities in the distribution, marketing, and production of vehicles (131).

Weaver's efforts at developing a systematic and objective profile of GMs customers demonstrate his rational approach.

Weaver used this methodology to test a number of specific design innovations. For example, "Weaver's 1934 study of independent front suspension, for example, was meant to determine whether consumers expressed enough enthusiasm as to justify its production" (133). Weaver similarly took this approach to testing GM's prototypes for its first automatic transmission.

> By 1940, engineers had developed and tested a prototype version of automatic transmission, or what they called "Hydra-Matic drive." At that point, Weaver surveyed 10,000 car drivers. More excited than he had been in some time, Weaver reported that an estimated ninety-one percent of respondents were said to be favorably impressed (133-34).

Weaver's rational approach to gathering user feedback and data was emblematic of GM's broader culture under Sloan's management. However, while the role of rationalization at GM was widespread, one of GM's divisions was characterized by creativity. The Art and Colour Section was more creative in approach and existed in a state of tension with the broader culture of rationality at GM. However, in much the

way Weber would have anticipated, this division was an important source of change at GM.

Creativity at General Motors

The role of creativity in automobile design can be seen in its complex relationship with the dominant ethos of efficiency and rationality at General Motors. When Sloan became head of the GM, the stage was set for GM to replace Ford as the dominant manufacturer if it could match Ford's efficiency in production and then differentiate its product. Using a rational and "scientific" approach, Sloan helped GM match Ford's efficiency. A new subset of professionals, referred to at the time as industrial designers, helped GM differentiate its products.

David Gartman, sociologist and scholar of automotive history, explains that Fordist-style mass production had reached a dilemma in which production was beginning to outstrip consumption, and amidst heated competition, mass produced but stylish goods were in high demand. Gartman explains that product design, or industrial design as it was then known, emerged as a profession to play an integral role in addressing this dilemma.

> The solution to Fordism's dilemma was found by the new profession of industrial design. In the mid-twenties, when saturated markets began to elevate the priority of sales over production, industrial designers or stylists emerged to show mass-producers how to give their products the superficial appearance of individuality, unity, progress, and class without changing the production process of Fordism. The automobile industry was at the forefront of this new wave of industrial design (Gartman 1994:5).

Gartman's analysis positions product designers as important figures in the automobile industry.

GM employed these industrial designers to engage in a new form of creative work, which would become an important part of the design process. Clarke explains that "by portraying the Model T as the unchanging auto, Henry Ford made it easy for Chevrolet [GM's main automotive brand] to demonstrate the value of styling for sales" (Clarke 1999:65). "Styling" was GM's term for differentiating the appearance of automobiles to make them more visually appealing[12].

To develop GM's styling capabilities, Sloan created a new division and hired a charismatic leader to serve at its helm: "in 1927 General Motors hired Harley Earl to direct a new design department, the Art and Colour Section" (Clarke 1999:65). Before the introduction of this department, automobiles had primarily been developed by engineers with a greater emphasis on cost and efficiency (Sloan 1990:264-278). Gartman argues that when Earl was hired to head up this creative division, others in the industry and within GM were initially skeptical: "This was the corporate "beauty parlor," as some of Detroit's hard-boiled, no-nonsense automotive men referred to it, where the "pretty-picture boys" dressed up the automobiles that came off the engineers' drawing boards" (Gartman 1994:3). However, this division, under Earl's

[12] GM developed a system of flexible specialization that allowed for efficient, frequent model changes that would provide the capacity for it to explore more highly differentiated "styling". While these changes in manufacturing are relevant to the historical context of product design and development, my analysis focuses here on the cultural context of product design work (see Clarke 1999 and others for further explanation of the role of flexible specialization in allowing manufactureres to target specific users).

leadership would push forward a new approach to product design and development that drew on notions of creativity.

General Motors' designers were a new group of individuals, who under Earl's direction were guided by new schemas with little precedent in mass production of automobiles or other goods. In these early days of industrial design, the institutional logics used to hire, train, and evaluate these workers contrasted sharply with those used to evaluate other employees at companies like GM:

> Much depended on designers, yet they proved to be an odd lot . . . the design of auto bodies was a creative activity. For one thing, there were no clear-cut educational standards for industrial designers . . . In hiring engineers and scientists, GM screened applicants based on their work at major universities. No art school, by contrast, taught automotive design in the 1920s and 1930s. Earl recruited some stylists from custom body companies; he also resorted to hiring graphic designers and sculptors (valued for knowing how to work with clay). In looking for ideas, these individuals did not turn to a 'scientific' body of knowledge, but rather frequented race tracks, read magazines, and studied other fast-moving vehicles like airplanes and boats. And for managers, it was hard to assess their results . . . Aesthetic design defied quantification' (Clarke 1999:72).

This account of the role of industrial designers in a broader set of product development practices highlights early differences between schemas of rationality and creativity that still exist today. Most notably, the individuals within GM's Art and Colour section engaged in much the same kind of indirect user research outings that characterize contemporary designers who are creatively-oriented.

Though direct discursive evidence from Earl and other designers regarding how they made sense of their work is limited, the responses of others within GM demonstrate the contrast between the creative culture of this design division and the

rational culture of rest of the organization. As Clarke indicates, GM's managers struggled to assess the work of these new designers. The attempts by GM to rationalize what managers considered to be creative work show the conflict and tension between these schemas within GM. Clarke explains that "GM managers wrestled with . . . the task of judging designers who as creative individuals defied 'rational' management"(Clarke 1999:65). These creative individuals represented a new way of thinking in the design of mass produced goods. Similarly, Gartman characterizes this tension by asking: "could style, excitement, and change be routinized and rationalized, turned into an predictable cog in Sloan's corporate bureaucracy?" (Gartman 1994:4).

GM's management attempted to deal with the tension between rationality and creativity in two notable ways. First, Alfred Sloan attempted to implement within GM's rationalized chain of command an alternate organizational ethos. Gartman explains this ethos with reference to Weber:

> The pioneering sociologist of organization, Max Weber, recognized that the only alternative to bureaucratic control through impersonal rules is personalistic control through ties of kin and loyalty. If subordinates cannot be controlled by detailed instructions, they can often be made to act in the interest of superiors through personal loyalty to them. Sloan cultivated such a personal friendship with Harley Earl, which allowed him to personally influence the highly variant tasks of automobile styling (Gartman 1994:14).

At GM, Sloan created an alternate means of rational control in his relationship with Earl. Earl then organized his team using similar tactics of personal loyalty.

The conflicting relationship between rationality and creativity at GM can also be seen in the Earl's attempt to organize his division's work. Earl attempted to

manage design at GM by creating a system of anonymity amongst his designers. Clarke explains, "As one step to manage design, GM created an in-house staff of designers. The art historian, C. Edson Armi, labeled GM's design process as a form of 'anonymous' creativity" (Clarke 1999:68). This approach made it so that workers' outputs were less personalized, thus subsuming them as parts of a rational process. In addition, this organizational system limited the impact of turnover amongst designers (72). Earl was in fact the only individual to have access to the designs of individuals within the organization, a move that created uniformity in its anonymity. These efforts to obscure the individual creative discretion of designers who tended to find their inspiration outside of "a 'scientific' body of knowledge" aligns closely with patterns in contemporary design. Earl's efforts to rationalize the output of his division shows that at GM, rationality and creativity existed in tension. However, as Weber anticipated, that creativity was perhaps a source of change for the automaker.

Earl's methods also suggest an important insight about the place of creativity within a larger organizational context. In order for creatively-oriented work to exist within a rationally-oriented context, a somewhat dictatorial leadership may be necessary. According to Clarke, Earl's design leadership created "A secretive and harsh organization. By 1936 each division [of GM]—Cadillac, Chevrolet, Buick, Pontiac, LaSalle—had its own closed studio, and 'Mister Earl' was the only person with keys to each compartment. Earl thus kept full knowledge of the designs while inhibiting stylists' own comparison" (Clarke 1999:72). Ultimately, these efforts by Earl and others by Sloan highlight GM's struggle to manage creativity in a

rationalized manner. These struggles reveal an important historical precedence for the role of creativity as a competitive advantage and the tensions between rationality and creativity.

Historical Context - Conclusion

The case of the design and development of mass-produced automobiles in the first half of the twentieth century at General Motors provides important insights about the historical underpinnings of schemas of rationality and creativity. General Motors' organizational culture was comprised of both rational and creative schemas. Sloan's management and Weaver's research were emblematic of the type of 'scientific' approach characteristic of contemporary designers who are more rationally-oriented. However, as Weber argues, that dominant rationality existed in relation to pockets of creativity. Harley Earl's Art and Colour Section housed a group of designers who were more creatively-oriented. These designers eschewed the 'scientific' approach and sought inspiration other experiences. Though these creatively-oriented designers were only some of the many individuals who worked on the product development and design process, the tension between their division and the rest of the organization highlights the existence of separate design schemas. GM's efforts to rationalize this creative work further highlight the salience of these schemas and the tension between them. Interestingly, to manage these creative workers, GM employed a particular set of organizational strategies that created a secretive and harsh organization with Earl holding great power and discretion at its helm. While this case study alone does not

provide a systematic assessment of the origins of the schemas of rationality and creativity in design work, it provides a useful historical precedence of early product design work in mass produced goods. A repetition of these contrasting ways of organizing discourse and action can be seen in contemporary product design.

Design Schemas in Contemporary Context

It is clear that a divide exists among product designers in terms of how they understand design work and the role of users. The case of product design at General Motors demonstrates that historically, these schemas existed in a state of tension. This tension between contrasting schemas can be seen in my informants' descriptions of their work and the role of users in design. However, while my informants employ this inherited language, they use contemporary references to articulate and legitimate their schemas.

The ways in which designers connect their individual schemas to broader understandings provides further understanding of the nature of their views and points to similarities between product design culture now and in the past. New Institutional scholars Friedland and Alford address the role of what they call institutional logics on the culture and structure of organizations (Friedland and Alford 1991). They argue that these logics are tied to notions of legitimacy for institutional players. In my research, connections between individual schemas and broader logics were largely not made explicit. In many ways, this implicitness is not surprising. The very nature of schemas suggests that they are generally taken-for-granted. However, a pattern did

emerge in my interviews, in which research subjects would articulate ideas about product design by referencing one prominent company: Apple. Designers largely agreed that Apple's success was transformative for the field of product design and in many cases their own work. They explain that Apple's use of design as a competitive advantage has increased the stature of design in their organizations. Apple's success and prominence therefore confer legitimacy to design work. Individual designers in turn used references to Apple to support their views about best practices in design. However, my informants disagreed in expected ways about whether Apple's success was attributable to its rationality or creativity. Ultimately, Apple's success serves as disputed terrain in designers' struggles for the legitimacy of their own schemas. Designers' descriptions of Apple also reveal some historical parallels that reveal similarities between contemporary and historical design schemas.

The Impact of Apple's Success on the Field of Design

Apple's influence is salient for designers. During my research, Apple was the most common example invoked by my respondents. Apple or its products were references in 26 of my 38 interviews for a total of 223 mentions. The frequency of these mentions is in many ways not surprising. At the time of my data collection, Apple was a powerful force both in the business world and popular culture. Data collected by mainstream business magazines, Fortune and Forbes, provide a snapshot of Apple's place in corporate America as well as that of its Chief Executive Officer, the late Steve Jobs:

Apple Inc.

- #1 on Fortune's "World's Most Admired Companies – 2011" (Fortune 2011c)
- #1 on Forbes' "Most Valuable Companies – 2011" (DeCarlo 2011)
- #8 on Fortune's "Most Profitable Companies – 2011" (Fortune 2011b)
- #35 on Fortune's "The Fortune 500: Annual Ranking of America's Largest Corporations – 2011" (Fortune 2011a)

Steve Jobs

- #17 on Forbes' "The World's Most Powerful People – 2010" (Forbes 2010)
- #39 on Forbes' "The Forbes 400: America's Richest People – 2011" (Forbes 2011)
- Steve Jobs' biography, Steve Jobs (Isaacson 2011), was the #1 selling book on Amazon.com in 2011 despite being on sale for only two months (Anon 2011)

These rankings confirm that Apple is a large, powerful, and profitable company, in much the same way General Motors was during its time. Also of interest is that Apple is highly admired and its CEO a figure of intense public interest. For my informants, Apple was a frequent touchstone in our discussions.

Many designers credited Apple with a demonstrable shift in the field of product design. Eleanor, who works for Swan Communications, described Apple's impact in part by focusing on the outcomes of its efforts with two of its products, the iPhone and iPod:

> Well I think 'user experience' and 'user friendly' are key words that everybody's throwing around, but Apple had a big thing to do with it probably because the iPhone is so simple. And the iPod and just that simple design I think companies are now--they are no longer competing on features as much as the ease of use, because at the feature level everything is pretty much the same.

Eleanor points to the intuitive nature of one of Apple's core products. She emphasizes that Apple has had a significant influence on the field of product design.

Rick agrees, stating that there were other portable music players that took advantage of the digital mp3 music format, but he argues that "Apple just made it better through design." For Rick, Apple's focus on user design is a competitive advantage. He claims that companies only recently have come to understand that design can make money, that it adds value. He explains that Apple has definitely influenced this trend with their success over the last decade. He argues that part of what these companies realized is that design can make users want a product, and tell their friends all about it. Furthermore, he states that from a functional standpoint, Apple's intuitive products mean that a feature that is included can be accessed and used more easily or readily, adding value because that feature is fully delivered on, as opposed to if the feature were simply present but not well designed. For Rick, the products Apple has developed have changed how users and other designers evaluate the success of a product's design.

Lewis agrees that Apple has shifted user expectations and therefore design practices. Lewis is a lead engineer at Megacomm, a company that traditionally builds components for mobile phones and other devices. However, Megacomm also develops the user interface for some devices, though this has not been a core of their business. Lewis argues that Apple's success significantly shifted the work he does on user interface design.

> Since I've been here, the whole time I've been designing user mobile user interfaces . . . three or four generations of mobile UI designs. So we've done it for various projects. Some of them I had small ambitions. Some of them I had big ambitions. But it's not actually a new activity. What is new is that the iPhone, when it came out in 2007, it really started to move off in the marketplace and then people realized

> that user experience is really important. That did have an effect on [Megacomm].

Lewis goes on to describe that this effect took the form of a greater emphasis on developing intuitive user interfaces that could compete with those designed by Apple.

Apple's impact on the way designers evaluate successful design is not limited to mobile electronics. Spencer, the Executive Vice President for Global Innovation at CleanWorks, describes how Apple served as an inspiration for the way that intuitive design can not only solve customer problems, generating sales and revenue, but can also be gratifying. He states that Apple shifted his company's thinking when CleanWorks redesigned the canister for their bestselling household lubricant spray, CleanSpray:

> New product development is certainly…it's somewhere between important and glamorous, right? It's high-visibility, high-importance, because it's future revenue for the company, so it's very important. For many people, creativity is fun and creation is very fun. It's as simple as putting the [patented spray device] on top of the [CleanSpray] to fix something that bugged people for 40 years. That's exciting! Or putting [CleanSpray] in a [patented portable applicator], I was thinking that would be cool. People have this, in some ways perhaps, exaggerated opinion when they see something like the iPod that it literally has a cultural transformation from 15 year olds to 75 year olds, sitting on airplanes, using iPods; it becomes such a part of our culture and how that we now say, "Wow, I want to do stuff like that. I want to make an iPhone or a Blackberry." To create new stuff that people want is very, very gratifying.

Spencer follows-up this description by explaining the process of the CleanSpray canister redesign. He explains that the desire to design more user-friendly products led his company to hire Simeon's design firm to conduct the redesign and even to create a new internal group focused solely on innovation, which he now heads.

Jasmine also referenced Apple as having a significant influence on the design field both in her own company and more broadly. Jasmine is the human factors engineer I sat with when observing Specter Electronics' usability testing of their new television.

> I think user interface is becoming more of a differentiating feature. And I mean definitely the strength of Apple has helped everybody in the user interface field probably, even regardless of whether you like Apple or dislike Apple . . . There's a big difference in how Apple markets their stuff. You know, the stuff is on, and you can play with it, and everything -- so it's about the interface, and it's about what it enables you to do. Whereas the TV, pretty much, you're lucky if you can find a remote in the store -- and they're all tuned to the same channel -- And [using a TV is] a different experience, although that's probably changing too, because people are using it as more than just a TV now. So, because of that, we are getting more things that we requested to happen. So things that we're asking for in remotes are starting to be considered, where before it was dismissed at the very first discussion.

Jasmine's description demonstrates that Apple's success has influenced the way that Specter Electronics does its design work and even the resources available to engineers and designers like Jasmine.

In a separate conversation, Jasmine's colleague, Kelly, who conducted Specter's usability tests as a freelance consultant, made reference to Apple's role in shaping the field of product design.

> Well, everybody sees Apple. Apple has even written statements that the user experience is one of their core value offerings. They start to equate ROI to the user experience. Now that that's working for Apple, everybody else is starting to say, 'whoa.' I mean, I think people are getting it to some extent, but it really is. I think there's like this tipping point.

Kelly echoes the sentiments of other designers by making the case that Apple's approach to user experience is shifting the field of product design in various industries. According to Kelly, the focus on user experience is reaching a tipping point, and product design at other firms is changing as a result.

Samuel is a Senior Human Factors Engineer at a large mobile phone company called Teku. He states that Teku is "very engineering-focused—there's nothing that's not engineering at the core of the company." He believes that Apple's success has shifted Teku's engineering focus on features and capabilities to a more holistic view of user experience.

> There is also a lot more recognition of my field now as being critical to marketing success because of companies like Apple, which make the pleasure, and ease of use, and the joyful experience of a product core to their identity . . . When they introduced the iPhone, for five years in the future [Teku and other competitors] have to play catch-up. But that really is a beneficial thing for my field to say, "Well, this is what we need to be focusing on, not just going through this menu system to finally get to this function, but make it so the user knows that when they pick it up and play with it without reading a manual how to do it."

Samuel argues that Apple has had a significant impact on design field and his company. Even more telling is that Apple plays a role in shaping his schemas about his own work and that of product design more broadly.

Samuel and many other designers agree that Apple has had an important impact on the field of design. However, while this assessment is widely held, at least one of my informants argues that Apple's impact is not totalizing. Lewis, a Human Factors Engineer at mobile communications company Megacomm, argues that Apple has had a significant effect on the field of design, but that his work remains relatively

unaffected. He argues that at his firm, an engineering culture leads projects to be evaluated primarily by time and cost demands, not the quality of user experience:

> At a place like Apple, you know, user experience is the number one thing, right? It's kind of like if the user experience isn't good, then don't even bother—products don't go out the door. They'll be cancelled if they don't have a great user experience. It's not the same here [at Megacomm]. So we don't have that same dedication or, you know, absolute obsession with quality, so the groups that I've been working with have always been very accepting of user experience, and I don't have to spend time trying to convince them—but it's a relationship, you know. It's not one where I'm the dominant player.

Lewis explains that his company's focus tends to be more on the timing of projects. In this way, he reveals that the power to dictate the shape of a product hinges on issues of speed and efficiency.

However, in contrast to the sentiment of others working in product design, Lewis defends the ways in which his company's approach vary from Apple's:

> We're actually very date driven, at least in the group that I'm working in so, you know, like there's one who's like as long as it works, if it's not super awesome, that's generally considered to be okay. And that's something that, you know, potentially the iPhone has raised the awareness of the importance of user experience, but I wouldn't say it's had an appreciable effect on me . . . I mean this is an engineering company, so it's products are engineering, so I don't necessarily think that's a wrong thing or a bad thing. But it is certainly true that there are people working here who have jobs working in an environment where I would imagine it would be somewhat frustrating to have to deal with that.
>
> I mean it's how this business works. I don't know why exactly, you know. I think the answer again is because it's an engineering company. I mean it's -- we don't conceive of things in terms of the end product being a kick-ass user interface. I mean there's just so many other things that we're thinking about. User interface is just one of those things. So a company like Apple or Netflix, whatever that they're thinking about, they're eye is always on the end game, but the end game is the user interface. So it's just different business goals essentially.

For Lewis, Apple is a salient force in terms of its impact on the field of design and his own work. However, Apple's impact is complex. Lewis grants that Apple has shaped the field of design. However, he defends Megacomm's engineering approach. The complexity of Apple's influence can be seen most acutely in his acknowledgment that Megacomm might be a frustrating place for some to work because of its culture. While his descriptions challenge the reach of Apple's influence, they also reaffirm Apple's prominence. Ultimately, he feels compelled to define his work and that of others in reference to Apple.

In many ways, Apple's success can be seen as a driving force in shaping the ways that designers understand their work. This notion is perhaps best captured by one of Wes' comments while leading the User Experience Network meeting. During a group evaluation of a software interface, there was a disagreement about a design issue: how to present a necessary legal disclaimer. Wes guided the group by asking them to consider one simple idea: "What would Apple do?"

However, that Apple is influential is only part of the story. To assess Apple's influence on the field of product design, it is important to understand why designers believe Apple is so successful and how they interpret that success story. These perspectives demonstrate that as in the case of GM, a tension exists between schemas of rationality and creativity. However, unlike with GM, in which the tension is visible among divisions of the company, with Apple, the tension is evident in competing interpretations of Apple's success.

Creativity at Apple

For designers who tend to be creatively-oriented, Apple represents the legitimacy of creativity. For these designers, Apple's success is rooted in its organizational culture, which values individual intuition over systematic testing. These respondents see Steve Jobs as a crucial figure in fostering Apple's creative culture. They argue that it is through Jobs' dictatorial approach that Apple is able to achieve success. They posit that Jobs has created a culture at Apple in which the intuition of designers is valued. This description is noteworthy because it aligns closely with schemas of creativity already established.

Quentin, who works at Swan Communications, a competitor of Apple's, provides a representative assessment of Apple's success. He spoke of Apple with admiration. He explained that Apple's creative ethos provided a consistent style and vision that made its products easy to use and successful in the market. He praised Steve Jobs' strong style of leadership as evidence of a company whose creativity is guided by a single voice. He explained that in contrast to Swann Communications, designers have great latitude to carry their creative visions from start to finish. Jobs and other designers have the ability to decisively follow their instincts and intuition.

Simeon portrayed Apple in similar ways, emphasizing the company's creativity. He explained that when he was hired as a design consultant for CleanWorks, CleanWorks needed his creative vision. He contrasted his approach with CleanWorks' saying "[CleanWorks] is the opposite of Apple. They research, measure, and test everything." Simeon portrays Apple as a company driven not by

rationality, but by creativity. In describing his own creative expertise, he emphasized his own boldness and vision. He said, "I tell [Spencer] when he's being an idiot, and that's something I'd say in front him." He goes on further to say, "I have to give [Spencer] credit for coming to me and having an awareness of [CleanWorks'] limitations. That may sound egotistical, but . . ." For Simeon, he sees his own value as someone who can provide the creative thinking that CleanWorks lacks. It is notable that one of the ways he makes sense of his creativity is through referencing ideas about Apple's culture. For Simeon, Apple is a broader cultural reference point for what it means to be driven by creativity.

For creatively-oriented designers, Apple's success is explainable in part due to the style of leadership that guides design work. My informants often referred to the 'dictatorial' nature of design at Apple, in much the same way as Harley Earl's leadership was described. Designers argued that Steve Jobs, and to a lesser degree other Apple designers, act as dictators. These informants explain that designers at Apple are able to be decisive about product design using their own perceptions of what works best. Furthermore, this system in which designers are given power and discretion without great burden to provide rationale affects the organizational culture throughout the company. The role of autonomy, expertise, and intuition in these descriptions mark these narratives as creative schemas.

During my research, I was able to briefly interview one Apple employee. James is a web developer and is responsible for designing online applications for customer support and service. His direct interaction with the primary product design

teams is limited, but he did share a story that reveals something about Apple's organizational culture. He said he went to get lunch one day while working at Apple's sprawling Cupertino, California campus. When he got to his favorite lunch counter, he found out there was "no longer meat at the taco bar." He said that rumors circulated rapidly, and the consensus amongst the rank and file workers was that the directive had come down from Steve Jobs himself, without explanation. James followed up his anecdote saying that Jobs is "incredibly detail oriented," exerts "an insane amount of control," and that "there's a level of fear" amongst the employees. While I could not verify the veracity of this story, James' message was clear. Even within Apple, there is a belief that Jobs is a dictatorial leader. James states that at Apple, designers "get very little customer input" and "Apple doesn't do focus groups . . . it would never be for a secret product." James descriptions promote the notion that Apple is run in a dictatorial fashion in which Jobs and perhaps lead designers have great creative discretion.

Designers outside of Apple tend to provide a similar narrative about the dictatorial nature of Steve Jobs' leadership and the discretion afforded to designers. Rick describes Jobs and Jonathan Ives, Senior Vice President of Design at Apple, as 'dictatorial.' However, from Rick's perspective, the fact that Jobs and Ives "really care about design" allows good design to flourish at Apple. Rick relays a story of his understanding of Apple's development of one of its early successes, the iMac computer. He explains that Jobs was willing not only to push his workers to adhere to his vision of good design but that he was also willing to do the same for Apple's

suppliers and partners. Rick says that in 1992 or 1993 Apple was designing the iMac and was not going to include serial ports, parallel ports, or floppy drives. Discarding these 'legacy' connection technologies would mean costly redesigns for Apple's partners and suppliers who would have to redesign their technologies. In addition, this move would force users to purchase new technology. In place of these technologies, Apple introduced "this USB thing," a nascent connection port that was largely unknown but would ultimately be adopted as a new standard. Here Rick explains that Apple made a bold and dictatorial decision to discard 'legacy' technology for the purposes of pursing what Jobs thought was a superior solution.

Rick tells a similar story of Jobs' willingness to disregard the interests of partners and workers. He says that when Apple rewrote its computer operating system in 2001 to create its OS10 operating system, it again disregarded legacy technology. Not only would a significant portion of existing hardware not work, but also much software would need to be revamped. Rick states that for example, Apple's software partner, Adobe Systems, who designs popular software such as the photo editing program Photoshop, was forced to completely redesign its programs to work with Apple's new systems at great cost. Rick explains that this type of bold decision making is uncommon. He contrasts Apple's approach to that of its main competitor, Microsoft. He argues that Microsoft lacks the type of clear leadership that Apple has. As a result, "Microsoft tries to please everyone. They don't want to change things too much, but they don't want to change things too little." He argues that in each new iteration of Microsoft's Windows Operating System, the company maintains

compatibility with a broad range of previous hardware and software. Rick believes this unwillingness to make dictatorial decisions is what has led to the "failure" of Microsoft's recent efforts. For Rick, Apple's success is rooted in the individual discretion of its leaders.

Other designers I interviewed expressed similar ideas about why Apple is successful. Simeon, the Principal of SimeonDesign, made a number of references to Steve Jobs. Simeon explained that though he did not know Jobs personally, he believed that Jobs was 'highly involved" in all of the details of key projects and was 'dictatorial' in his approach. Simeon told me he believes that many companies try to emulate what Apple does, but they don't truly understand what it takes to be successful.

The dominant understanding of Apple's success as being driven by creativity persists amongst many designers, but it is not unchallenged. In fact, some designers take a far more critical stance, labeling these beliefs about creativity at Apple as myths.

Rationality at Apple

Not all respondents believed that Apple represents a version of creativity in which intuition is used in the place of more rational user research. A select cadre of respondents challenged these views and characterized them as myths. These respondents argued that Apple was not the bastion of creativity, but rather Apple operated in many of the same rational ways as other corporations. In arguing this

position, these informants tended to defend their more rationally-oriented perspectives. However, they also highlight the ways in which ideas about Apple's creativity serve as idealized myths for creatively-oriented designers.

Towards the end of my research, I spoke with Wes, the organizer of the UXA meetings, about the comments I had heard from other interviewees about Apple's approach to design and user testing. He provides his take on these common beliefs about Apple's creativity:

> David: So, I think I told you this last time – everyone I talk to brings up Apple at some point . . . but I get conflicting accounts and maybe you have some insight about it. Some people seem to describe Apple as not doing any user research that involves outside users . . .
>
> Wes: That is such a myth. That is not true. . . They do more user testing than anyone else. They make more prototypes than anyone else. They do. That's a myth. I have no idea where it got started from. I have a buddy of mine that works for Steve Jobs, and when I first heard that, I said, 'dude, someone told me you guys don't do user testing.' And he goes, 'that is so not true. We do more user testing than anyone else.' And then I saw an article about prototyping and it was someone from Apple saying 'we do more prototyping than anyone else in the business.'
>
> David: Okay.
>
> Wes: You know, Apple will do 17 prototypes where someone will do one or none. It's a myth. It's not true.

Wes' response clearly indicates that he sees the belief that Apple operates on principles of insular creativity as having no basis. However, while he does not have an explanation for the origins of such beliefs, he goes on further to explain why he thinks this perspective continues.

> David: Why do you think that myth persists?

> Wes: I think there is a belief that, you know, Steve Jobs is Apple, and to some extent that's true . . . but I think from a user experience standpoint Steve looks really heavily at the data that comes from user research.
>
> David: Okay. Do you think this is a case where Apple is a big organization, so they *are* their target audience?
>
> Wes: No, no, no. Let's be very clear. The term user experience came out of Apple in the 1980's. They were the first company to have a user experience group. They had the largest user experience groups, and they hired the best people. Donald Norman still consults there. I mean it doesn't get better than Apple. Don came – anyone who has been great in this field passed through the doors of Apple.
>
> David: And so the last part of the myth, though, is that they don't test with users who don't work at Apple.
>
> Wes: I doubt that that's true at all.
>
> David: Yeah, I have no basis of knowing. It's just…
>
> Wes: I know. I heard the same rumor, but when I heard it…
>
> David: It's like a more internally sealed environment . . .
>
> Wes: I don't think it's true. In fact I know it's not true. As soon as I heard it I called up a buddy of mine who's been there and I said 'dude, is this true,' and he goes 'no, it's not true.'
>
> David: So the related question would be do you think there is some sort of – this myth feeds into a vision either of Apple and Steve Jobs or 'pure design', you know like some sort of more solitary artistic endeavor?
>
> Wes: I love that one [long pause]. There is an art and science to design. Again I was a fine artist for many, many years. So yeah, there is an art and science to design . . . but it's far more science than it is art . . . you have to test it with end users.

Wes believes that there is no factual basis to the claim that Apple does not do user testing. Furthermore, his response reveals that while he believes Steve Jobs may have

a strong leadership role at Apple, it is an organization that is devoted to rational pursuits.

When I was interviewing Grey, the organizer of the CHI Network, he also addressed the notion that Apple was successful because it relied on intuition and creativity, not direct and rational user testing. Like Wes, Grey argued that this pervasive notion was a myth:

> Well we all know that Apple products are all pretty good, so how do they do that? Is everyone else wrong? So I recently had the opportunity to talk to a few people who have worked at Apple, and they do get a lot of user feedback. There are also pretty good quality designers, and when I say that, I don't mean to say that they emerged from the womb with an ability to design stuff. They don't have genetic superiority or something. It's that they've done a lot of design and they've seen a lot of people using their designs. Maybe at previous jobs, maybe since everyone and their brother uses Apple products, and when they go out to a coffee shop, people are like "oh, you work at Apple, here's the problem with your product." It's not usability testing in the formal sense, but it's informal. You could call it ethnography if you want to, but it's feedback. So they're in a unique position to get that kind of feedback. They also pay a lot of attention to their forums, apparently. So any kind of Apple forum, so when bugs are reported or when people don't like various things, everyone is talking about this stuff because of the cult of Mac. And they do pay a lot of attention to that.

For Grey, the notion that Apple does not do user testing is unfounded. He argues that Apple does indeed test heavily. However, the form of their user research may be distinct because of the active way in which users offer feedback to designer.

Grey argues further that Apple's success is not limited to the way it gathers feedback, but is influenced by the dynamics of the organization that provide vast resources and a design culture that prioritizes certain decisions:

> And also, there's a whole separate side of that. Let's say that I'm doing a lot of testing and I'm getting a lot of data and I know which ones work and which ones don't, will I ever be able to put that into practice . . . there are a lot of reasons I can't get that into practice. At the moment I've got a design [of my own] that I have built that would improve the product and it's sitting on the shelf for two years, but it's sitting on the shelf for two years because we don't have the engineering resources to build it. And that's not entirely uncommon. And who knows, maybe it's the best business decision.
>
> The difference at Apple is that the designers kind of rule things. And Steve Jobs is a very unique CEO in that he actually has design skills, unlike most CEOs who think they have design skills . . . So you need feedback in the design phase. It has to happen in some way, shape, or form. And when you get the feedback, it helps if you actually have the power to make it happen. And eventually to hold off delayed shipping until something is good enough, which is something that I think only Apple does.

For Grey, Apple success is not, as some designers believe, necessarily based on an inherent creative ability. Grey does make an argument that Steve Jobs and Apple designers do have great influence, but he does not focus on their ability to exert that power to pursue their own creative vision. Instead, he argues that they use their influence to allocate resources to enable projects that are reliant on testing and engineering.

After listening to Wes' and Grey's assessments of how Apple operates, I was still perplexed. What were the origins of these starkly contrasting accounts of Apple's approach to user testing and feedback? Later on, I asked Grey to weigh-in on the genesis of these common beliefs that Apple operates primarily on creative expertise:

> David: What's interesting is that Apple comes up all the time when I talk to people, and it's such a prominent example. It seems like this idea that Apple doesn't do testing or doesn't gather user feedback is a really prominent belief amongst designers who I have talked to, let alone the public. But you and [Wes] actually are the two people who

> I've talked to who have said that it doesn't actually work that way at Apple. But everyone else I've talked to seems to believe that it happens without [user] feedback. I guess one of the things I'm interested in is that it's a pervasive belief that seems to persist, but I'm not sure where it comes from.
>
> Grey: That's an interesting statement. Well for one thing, whenever you read news reports they always say that Apple doesn't do usability testing, and it's usually people who aren't really usability experience people themselves, and they haven't really dug into the details of what's actually happening. And it is true that usability testing isn't the only way to get user feedback. And I think there's something deeper, much deeper, than that, which is there is the cult of Mac. It's called the cult because it's religious, and the whole concept of religion is belief . . . faith. It's not about testing. It's not about testing or the examination of the real world. It's not about disproving. It's about faith that something somewhat supernatural is happening, and I think that's exactly true of Apple. They have produced some pretty nice things, and everyone just kind of wants to think there's something kind of supernatural happening there and it's unexplainable: "It must be the designers. There must be a central source to all that. It must be their wisdom or their unique qualities or their all-powerful nature that's making these perfect devices."

Grey argues that believers in Apple's success often attribute that success to the 'unique qualities' or 'wisdom' of Apples designers, and he believes that adherence to such beliefs demonstrate an almost 'religious' belief in a 'supernatural' qualities of those designers. Grey's perspective draws-on notions of design as innate intuition that were common amongst designers I interviewed employing creative schemas. Clearly, Apple serves a meaningful, role in the belief systems of my informants, even when those beliefs contrast.

Grey spoke further about his take on the origins of these conceptions, or possibly misconceptions, about Apple:

> I reread . . . I can't remember whether this is Daniel Dennett . . . yeah, I think this is Daniel Dennett . . . his "Darwin's Dangerous Idea." It

> delves into a lot of psychology and why people have so much of a problem with evolution and that kind of thing. And I think he made this point, and maybe a few other people have made it as well, but it's the concept that we tend to attribute centralization to intelligence. So we see an anthill, and we think the Queen is directing things. We see a country operating, and we think the President is directing things. And it's because maybe we're wired to think of things that way, or maybe we're so used to the brain being the director for our body, but we're not very good at understanding decentralized systems. So the CEO is directing everything in the company. . . "it's Steve Jobs." Well yeah, Steve Jobs is a major influence, but he's not the whole company, and he doesn't know about every detail that's going into every product. And I think his designers know that and take advantage of that. And so I think there is a tendency to oversimplify and attribute central causation, which gets back to religion again.

Grey's description of the tendency to attribute central causation to phenomena like Apple's success further reinforces his perspective that Apple serves as a sort of myth of creativity. In his analysis, he provides an explanation that cites Daniel Dennett, a philosopher and cognitive scientist, and draws on rational concepts that examine the way that humans perceive the relationship between the brain and the body and how complex systems work. His take clearly demonstrates his tendency to employ rational schemas. However, his interpretation of Apple's success hints at a larger dynamic. Even as Grey, like Wes, challenges the veracity of beliefs about Apple's culture and success, he affirms that the myths do indeed exist and hold sway amongst his colleagues. They seem to serve as a strong reference point for him as well.

Like Grey, Gregory asserts that the notion that Apple does not do user testing is a myth. After Gregory told me the story about Netflix's founder developing Netflix using both his personal intuition and his systematic approach to the company's operations, he went on to talk about Apple's unique corporate culture. He had

asserted that Netflix was successful because it provided a great user experience, so I asked how he knew what a good user experience was.

> David: How then do these companies [you have mentioned], like your Apples or your Netflixes or others, determine what the customer experience should be? Where have you landed in trying to figure out how [these companies] decide, or how should they decide, what [the user experience] should be?
>
> Gregory: [My colleagues and I] really want to know, what do they know. What are they doing that everybody else isn't doing. And what I can tell you is that they watch, listen, and anticipate. Now, different companies do it differently because different companies have different cultures. For instance, you've got a guy like Steve Jobs. Now everybody points to him and says 'oh my god, he's unbelievable', which he is. But the reason why I bring him up is because the fallacious perception about a guy like Steve Jobs is that he sits in a room and comes up with an idea then tells his people what to make.
>
> Apple's not gonna ever tell you anything--they're very [concerned with privacy], although we've interviewed some former Apple people and it's been wonderful-- what we can tell you is that a guy like Steve Jobs, he doesn't call things focus groups, or he's not necessarily going to tell you that he wants a study that assures him that the probabilities of the findings are less than 2% and he wants an enormous sample in that study so that it can be projectable from here to China, or whatever. That's not how they operate.
>
> Now I'm not making fun of that, because we talked to other companies and that's exactly how they operate. Some of them are very open and they say we do market research. Other companies say "we don't do market research. I've got a pool of friends that – maybe it's ten, maybe it's twenty or thirty --- that I believe represent the most of the market I'm targeting, and so I quickly build a prototype, and if they like it, we build another prototype and we refine it. And then we show it to a larger group."
>
> But I find that there's an aversion—my background is totally respectful of research . . . but I find that there's a whole bunch of people that if you mention research you will empty the room. Even if they respect the scientific method, they don't want somebody to say they're doing market research. And I find that totally interesting because, I'm like . .

> . if it's market research or medical research, it's just another kind of way of using the scientific method.
>
> But I think the world gets divided . . . there's organic ways . . . Do you wake up at two in the morning and somebody says, 'God, I got it,' or is it a very systematic approach where you've got it 'sciened-out.' Those are the – maybe there's a third way one that I don't know – maybe you know (laughs). But I don't know . . . but what you find is that it's a cultural thing, and it's a combination . . . so the net of it is that it's a combination of organic and systematic, and no smart company that I have ever seen, even if they were totally created by an organic way, a big 'ah-ha' in the middle of the night or whatever, moves forward without using some systematic way of defining the market, of understanding the competition.

Gregory claims to have inside knowledge of Apple's operations and argues that Apple does not operate as an organization focused on creative intuition above other factors. His position is clear when he states that there is a "fallacious perception" about Steve Jobs as an isolated genius sitting in a room coming up ideas and delivering mandates. Instead, Gregory thinks that Apple, like all successful companies, relies on a systematic and scientific approach to gathering user data and testing products. While he emphasizes that this systematicity works in concert with creative, or 'organic,' factors, he is clear that a myth exists about Apple.

Conclusion

Without more direct knowledge of the way Apple approaches design work, I am not in a position to evaluate the truth claims offered by my interview respondents. However, these claims do provide valuable insights into the way designers understand the nature of product design work. There is clearly disagreement about how Apple has become successful. Overall, the two sides of the debate regarding the nature of

Apple's success reflect the divide in schemas between those who tend to draw on notions of creativity and those who tend to draw on rationality. The creative interpretation paints a picture of Apple as an insular organization in which Steve Jobs and other designers have great discretion and design using intuition and expertise with little-to-no user testing. The rational interpretation challenges the truth to this image and portrays Apple as driven by testing, feedback, and iteration, much like other organizations. However, the nature of the disagreement about what makes Apple successful is only part of the story.

What is most notable is the way in which Apple serves as a powerful legitimating force. Even though there is disagreement about *what to think about* Apple, it is clear that individuals within the field of product design *are thinking about* Apple. Apple serves as a significant force in shaping discourse about product design. Primarily, the myth about Apple centers on its creativity. Adherents of this view marshal Apple as a source of legitimacy and perhaps a way to challenge more dominant logics of rationality. This role of creativity bares similarities to that described by Weber and shown in the case of General Motors. Creativity is thought to have the potential to provide a competitive advantage, and for some, Apple's success demonstrates that this potential is significant. Furthermore, this view suggests that in order for creativity to thrive, a dictatorial leadership is necessary, as it was in the case of Harley Earl at GM. However, critics of the role of creativity at Apple speak with passion in response, making claims that attempt to delegitimize this ideology in favor of a logic of rationality. Regardless of the true source of Apple's success in the field

of product design, it is clear that it serves a powerful role in the individual schemas of contemporary product designers.

VI. Conclusion

The technological systems in our society are widespread and structured in complex ways. To understand the construction of these systems, it is necessary to understand who plays a role in designing and shaping them. Scholars in the sociology of technology have provided valuable research towards this pursuit. They have established a body of research that is based on a symmetrical theoretical and methodological approach to studying the social construction of technology. SCOT scholars in particular have done much to provide an understanding of the previously unexamined active role of users in these processes. However, as I have argued, this scholarship has its limitations.

SCOT research tends to portray designers as lone individuals, isolated organizationally and having little-to-no interaction with users. These designers are presented as relying primarily on I-Methodolgy, in which their own preferences drive design decisions. My research has aimed to address these limitations. I have drawn

on conceptual tools from organizational culture in order to develop a more thorough understanding of key issues. I have closely examined the way designers and others involved in the development of technology make sense of their work. By using the notion of cultural schemas, I have looked for patterns of discourse in how designers not only evaluate what good design work is but also what role users play in the process. I have also examined the ways in which these schemas translate to practices within organizations. Finally, drawing on new institutional theory, I have attempted to establish links between these individual level schemas and broader contemporary contexts. The result of these efforts has been to provide a more thorough understanding of the social construction of technology and a corrective to previous scholarship.

Overall, my research findings show that the design process cannot simply be understood as designers acting as lone individuals, designing based on their own preferences. Instead, interaction between designers and users is quite common. This interaction can be understood as taken either direct or indirect forms. Direct interaction involves designers gathering feedback using a methodological toolkit including usability testing in labs, live A/B testing, surveys, focus groups, card sorting, ethnography, and other methods. With these methods, designers attempt to gather information directly from users regarding a product that may be in stages ranging from conception to final testing. Though the exact methods of interaction vary, using a mix of these tools is the norm amongst product designers.

Designers also gather feedback from users in indirect ways. In this approach, designers draw on experience based in their own past direct interaction with users or on that of others in the profession. This indirect approach to gathering feedback may seem to have similarities with I-methodology; however, there is an important difference. SCOT research uses I-methodology to describe designers using their own preferences to inform their design decisions: designers are designing for themselves. In contrast, my research shows that even when designers do not engage in direct methodologies, they describe themselves as employing user feedback. Sometimes designers recall and make use of past or secondary research. At other times, the process is more representational, whereby designers imagine themselves *as* the users. On the surface, this representational approach may look quite similar to I-Methodology. However, designers assert that they are not designing for themselves but for their users.

The prevalence of these forms of direct and indirect interaction is not to say that I-Methodology does not exist. On a few occasions, designers acknowledged the existence of I-Methodology. Most often, these designers described this approach disparagingly, accusing others of this practice. However, my research shows that direct designer-user interaction is far more common. Furthermore, this interaction involves not just those with the title of 'designer' but a wide range of individuals involved in the design process, including engineers, project managers, researchers, and a host of others whose job titles overlap these categories. These findings provide a corrective for previous SCOT research that presents designers as lone individuals in

isolation from both users and others involved in the design process. However, that interaction between designers and users occurs regularly is only part of the story.

My findings demonstrate that the ways that designers attempt to make sense of the role of users varies considerable and reveals a divide with regards to the role of users in the design process. Designers use two main contrasting schemas to make sense of their interaction with users: rationality and creativity. These schemas organize discourse and practice and affect the likelihood of users to influence the design process.

When designers use schemas of rationality, they tend to use language that indicates a clear means-end instrumentality and draw on notions of 'scientific' hypothesis testing and validation. These designers tend to see users as test subjects who provide valuable data to be carefully measured and then applied towards a specific goal. While the goal may vary by project according, the means-ends orientation is clear. In terms of practice, these designers tend to use research and testing methodologies that allow for direct user interaction. In some organizations, elaborate usability labs exist to provide ready access to testing. When these designers talk about their testing procedures, they often describe the surprises they encounter that lead to design insights. This orientation shows that for these designers, user testing is not simply a symbolic process, but rather it holds instrumentally rational value.

In contrast, designers who employ schemas of creativity tend to use the language of art and focus on individual intuition and talent. In terms of practice, these

designers tend to be resistant to discussing their design process. These designers often mystify the design process and even liken it to creating 'magic.' Those who are willing to speak of their design process describe engaging in some of the same research methods as more rationally oriented designers. However, the range of methods is more limited. While creatively-oriented designers use some direct interaction methods, these methods are often modified to involve less direct user involvement. Creatively-oriented designers even engage in research outings in which users are not present at all; instead these outings are experiential for the designers, who take on the role of users. When making sense of these practices, these designers do not use the language of testing and validation. In contrast, they talk about these practices as being 'inspiring' or providing 'authentic' experiences. Overall, for creatively-oriented designers, this more indirect user research focuses on confirming or refuting the designers' own intuitions or perhaps previous research.

For some designers, rationality and creativity are not mutually exclusive. These designers argue that a hybrid approach, in which both schemas are used, can be effective. These designers assert that there may be times in the design process when one approach is more valuable than the other. Though this perspective is somewhat limited, my evidence suggests that some designers see creativity playing a more important role when new ideas are conceived while rationality is paramount during execution phases. This evidence supports two conclusions. First, even with this hybrid perspective, the existence and contrast between these two dominant schemas is

reaffirmed. Second, designers actively interpret the value and legitimacy of these design schemas.

The implications of these contrasting schemas are significant for addressing power relations in the construction of technology. My research shows that under schemas of rationality, designers actively seek direct user feedback, and users are therefore more likely to have opportunities to influence the design process. In contrast, designers' focus on individual intuition and talent under schemas of creativity means that users play a less direct role in the design process and therefore have less potential influence. This central finding underscores the importance of examining the interaction of designers and users, an approach that is generally missing from SCOT research.

To further understand these design schemas, my research places them in broader historical and contemporary contexts. My findings demonstrate that early in the history of mass production and of the product design profession, rationality and creativity existed in tension. The case of General Motors provides historical precedence for the tension between these schemas. General Motors' struggle to rationalize the work of creative individuals and their subsequent organizational strategy of implementing a harsh, even dictatorial, leadership shows this tension.

My research also shows that a form of this tension can be seen in the connections contemporary product designers make to prominent organizations in their field. Through frequent references to Apple, designers negotiate the legitimacy of their schemas. A wide array of designers acknowledges the prominence of Apple and

argues that Apple has significantly shifted the practices of product design work. For creatively-oriented designers, Apple represents creativity that is driven by intuition. These designers argue that Apple's dictatorial approach in which designers have great discretion and control is the integral to its success. More rationally-oriented designers challenge this notion, arguing that Apple's creativity is a myth. These designers claim that Apple engages instrumentally in direct user testing practices as much as, if not more than, other companies. These positions reflect the contrasting schemas of rationality and creativity employed by product designers when describing their own work. This research suggests that as in the historical case of General Motors, a tension exists between understandings of design as rational or creative. This struggle for legitimacy has implications for the social construction of technology and the role of users.

Ultimately, the aim of my research is to provide a more complete understanding of the social construction of technology. My concern is with not only understanding how the technological systems that surround us come to be shaped but also who has access and opportunity to influence these processes. With these concerns, my research has provided correctives to previous scholarship, in part by borrowing conceptual tools from the study of organizational culture. However, while my research is a step towards a more complete understanding of these issues, further complementary research would continue to develop this fertile area of study.

To more fully examine how designers understand their work and the role of users in technology, additional ethnographic research would likely prove valuable.

My research incorporates some participant observation: I attended a number of professional association meetings and observed a series of usability tests. However, my data is primarily discursive, based on interviews with designers and others involved in the design process. Further ethnographic research would help determine how schemas of rationality and creativity are negotiated in everyday practice by these individuals. Descriptions of these practices and the in situ sense-making by those involved would provide texture to the accounts provided in my research. Some areas of particular interests would be how user feedback does or does not translate into direct impact on final product designs. While my research provides some insights in this regard, the discursive nature of my data limits claims regarding the impact of each schema on final product designs.

Further ethnographic research would also provide access to private discussions and procedures that would likely have bearing on other relevant issues. My research provides clear evidence regarding the types of interaction designers and users tend to have in the context of the formal design process. However, my access to data regarding how these individuals and organizations determine who the relevant users are is limited. Some informants mentioned that when recruiting users for usability tests, their organizations use basic demographic data to set parameters for classified advertisements. Given the complexity of the methods used by researchers and designers in other areas of research and testing, it seems likely that recruitment screening goes beyond these basic demographics. I did not have access to these documents, but further information about this recruitment and selection process might

provide valuable data. In particular, categories such as race, class, gender, age, and ability were generally absent from my informants responses. I did not probe for data on these specific user categories because my inductive research approach prioritized my respondents' own categories. As a result, my research does not directly address issues of inequality along these dimensions. Further research could not only allow these categories to be probed more directly but also provide opportunities to evaluate more broadly which users have greater opportunities for influence on the design process. These issues related to the politics of inclusion are relevant for understanding the power relations involved in the construction of technology.

Additionally, in exploring the schemas of rationality and creativity in historical and contemporary contexts, further research into the product design profession could prove valuable. My research establishes a historical context for tensions between rationality and creativity and examines ways in which contemporary designers reference these schemas in the broader field in which they work. Further historical analysis of the development of the design profession and the codification of principles of good design in educational and regulatory institutions might provide an explanation for the mechanisms by which schemas of rationality and creativity are transmitted over time and across place. Furthermore, my research suggests a relationship between leadership style and design schemas; this relationship could be more fully examined over time in both historical and contemporary cases.

Perhaps most significantly, further research that focuses on the user side of the designer-user relationship could also help more fully understand relevant issues of

power. My research addresses issues of power by examining this relationship and the types of interaction that occur between designers and users, thus providing a corrective to previous research that portrays designers and users in isolation. However, in my research I focus exclusively on the complex cultural understandings and practices of designers, not users. To more fully address this relationship and interaction, research examining how users understand their own role and that of designers in the construction of technology would be beneficial. Logistical challenges to such research exist because the site of some of this interaction occurs in facilities and usability labs in private organizations. My research shows that ethnographic access to these organizations is hindered by strict privacy concerns; however, this access is likely attainable over time.

Finally, examination of the experience of users in the designer-user relationship would potentially allow for additional insights about user experience. My research examines the role of users as understood by designers. As a result, my research can be considered to provide a somewhat static portrayal of users. I provide differentiation amongst different types of users only to the extent that my informants do. Furthermore, my research data does not examine how users understand their role or how their understandings or practices might change over time as a result of designer-user interaction or their own experiences with certain technologies. Research investigating user experiences directly would be complimentary to mine and would provide further understanding of the social construction of technology.

In conclusion, while my research has provided an important piece of the puzzle in understanding the social construction of technology, this area of research is rich with opportunities for continued investigation. The implications of research in this field of study are significant, as they push us to understand the elaborately designed and constructed world that surrounds us.

Appendices

Appendix 1 – Recruitment Email

Friends,

It's been a while for some of us, but I hope you are doing well. I'm writing to give you a quick update on what I've been up to and to ask a favor. As you know, I'm in the midst of getting my PhD in Sociology at UCSD, and right now I'm at the point in the process at which I am planning my dissertation research.

The quick overview of my research project is that I will be studying product design from a sociological perspective. What this means is that I'll be looking at how product designers, engineers, managers, marketers, and others involved in the process of designing consumer products do their work. In particular, I'll be looking at how these individuals balance their own views about what good design is with the objectives and expectations of others with interests in the final outcome.

To start, I am looking to do some brief interviews with product designers and others close to the design process. Then I plan to do some ethnographic observation at design workplaces (design studios and/or design departments within larger consumer products companies). So as a first step, I wanted to see if you might have any contacts with whom you would be willing to put me in touch for interviews or for other information. If you don't know anyone who is a product designer per se (sometimes also referred to as an 'industrial engineer'), perhaps you know someone who is part of the product design process but in the marketing department, management, or another post; any of these people would be good contacts for me.

Maybe I can help you brainstorm: possible contacts might work for companies that make computers/electronics (e.g. Apple, Sony, Hewlett Packard), Appliances/electrics (e.g. Black & Decker, Whirlpool, Braun), sporting goods/equipment (e.g. Callaway Golf, Spalding), automobiles (take your pick), tools (e.g. Craftsman, OXO), etc. Some well-known companies with operations in San Diego include DC Shoes, Callaway Golf, Kyocera America, Nissan Motors, Sony Electronics, Upper Deck, and Qualcomm.

So if you know someone who is a product designer, marketing manager, engineer, etc. in a consumer products company like one of these, perhaps you might help make a connection for me. Company size does not matter nor does location, though San Diego area contacts would be ideal for logistical reasons.

In the end, though, any inroads, be they direct or indirect, would be very helpful. If nobody comes to mind, perhaps you could pass along my inquiry to any friends/associates who you think might be able to help.

And please let me know if you have any questions.

Thank you,
David Kadanoff
Graduate Student
University of California, San Diego
Department of Sociology

Appendix 2 – Interview Guide

Background and Work History

1. Why did you decide to work in product design?
2. Have you always had the position you have now?

Evaluating Design Work

3. What's a current or past product design that you admire or wish you had done? Why?
4. What's a product you're glad you didn't design?
5. If you could change anything about the product design profession, what would it be?
6. If you had to predict the future direction of the product design field, what changes might you expect in the coming years/decades?

Interaction with Other Workers

7. Who do you work with, or interact with, most?
8. What do you tend to agree on? Disagree on?
9. What are the different types of designers most closely related to the type of design you do? How are they similar or different?

Process and Feedback

10. What are the key steps in the design process for you?
11. What type of feedback do you get during the design process and from whom?
12. After the product is designed and released, do you receive further feedback? From what sources?

Users/Testing

13. Do you design for a specific user or users? If so, how?
14. Do you or your company do market research?
15. How is that information presented and used?

References

Akrich, M. 1992. "The De-scription of technical objects." Pp. 205–224 in *Shaping Technology/Building Society*, edited by Wiebe Bijker and John Law. Cambridge, MA: The MIT Press.

Akrich, M. 1995. "User Representations: Practices, Methods and Sociology." Pp. 167–84 in *Managing technology in society : the approach of constructive technology assessment*, edited by A. Rip, T.J. Misa, and J. Schot. London: Pinter Publishers.

Anon. 2011. "Amazon.com Best Sellers of 2011 in Books." *Amazon.com*. Retrieved November 11, 2013 (http://www.amazon.com/gp/bestsellers/2011/books/).

Bijker, Wiebe E. 1995. *Of Bicycles, Bakelites, and Bulbs: Toward a Theory of Sociotechnical Change*. Cambridge, MA: The MIT Press.

Bijker, Wiebe, and Trevor Pinch. 1987. *The Social Construction of Technological Systems: New Directions in the Sociology and History of Technology*. edited by Wiebe E. Bijker, Thomas P. Hughes, and Trevor Pinch. Cambridge, MA: The MIT Press.

Binder, Amy. 2007. "For love and money: Organizations' creative responses to multiple environmental logics." *Theory and Society* 36(6):547–571.

Blair-Loy, Mary. 2003. *Competing Devotions: Career and Family among Women Executives*. Cambridge, MA: Harvard University Press.

Christian, David. 2011. *Maps of Time: An Introduction to Big History*. University of California Press.

Clarke, Sally. 1999. "Managing Design: The Art and Colour Section at General Motors, 1927-1941." *Journal of Design History* 12(1):65–79.

Clarke, Sally. 2007. *Trust and Power: Consumers, the Modern Corporation, and the Making of the United States Automobile Market*. New York: Cambridge University Press.

Collins, H.M. 1983. "The Sociology of Scientific Knowledge: Studies of Contemporary Science." *Annual Review of Sociology* 9:265–285.

Cooper, Alan. 2004. *The inmates are running the asylum*. Sams Publishing.

Cowan, R S. 1983. *More work for mother: The ironies of household technology from the open hearth to the microwave*. New York: Basic Books.

Cowan, R S. 1987. "The consumption junction: A proposal for research strategies in the sociology of technology. In The social construction of technological systems: New directions in the sociology and history of technology, edited by W." in *The social construction of technological systems*, edited by W Et Al. Bijker. Cambridge, MA: The MIT Press.

DeCarlo, Scott. 2011. "The World's 25 Most Valuable Companies." *Forbes Magazine*. Retrieved November 11, 2013 (http://www.forbes.com/sites/scottdecarlo/2011/08/11/the-worlds-25-most-valuable-companies-apple-is-now-on-top/).

DiMaggio, Paul. 1992. "Cultural Boundaries and Structural Change: The Extension of the High Culture Model to Theater, Opera, and the Dance, 1900–1940." Pp. 21–57 in *Cultivated Differences: Symbolic Boundaries and the Making of Inequality*, edited by M. Lamont and M. Fournier. Chicago: University Of Chicago Press.

Feher, Ferenc. 1987. "Weber and the Rationalization of Music." *International Journal of Politics, Culture, and Society* 1(2):337–352.

Fine, Gary Alan. 1984. "Negotiated orders and organizational cultures." *Annual Review of Sociology* 10:239–62.

Fligstein, N. 1997. "Social Skill and Institutional Theory." *American Behavioral Scientist* 40:397–405.

Florida, Richard. 2002. *The Rise of the Creative Class and How It's Transforming Work, Leisure, Community and Everyday Life*. New York: Basic Books.

Forbes. 2010. "The World's Most Powerful People 2010 - Forbes." *Forbes Magazine*. Retrieved November 11, 2013 (http://www.forbes.com/lists/2011/20/powerful-people_2010.html).

Forbes. 2011. "The Richest People in America - Forbes." *Forbes Magazine*. Retrieved November 11, 2013 (http://www.forbes.com/forbes-400/).

Ford, Henry. 1922. *My Life and Work*. Doubleday.

Fortune. 2011a. "Fortune 500 2011: Fortune 1000 Companies." *Fortune Magazine*. Retrieved (http://money.cnn.com/magazines/fortune/fortune500/2011/full_list/index.html).

Fortune. 2011b. “Fortune 500 2011: Top Performers - Most Profitable Companies.” *Fortune Magazine*. Retrieved November 11, 2013 (http://money.cnn.com/magazines/fortune/fortune500/2011/performers/companies/profits/).

Fortune. 2011c. “World’s Most Admired Companies 2011.” *Fortune Magazine*. Retrieved November 11, 2013 (http://money.cnn.com/magazines/fortune/mostadmired/2011/full_list/).

Friedland, Roger, and Robert Alford. 1991. “Bringing society back in: Symbols, practices, and institutional contradictions.” Pp. 232–263 in *The New Institutionalism in Organizational Analysis*, edited by W. Powell and P. DiMaggio. Chicago: University of Chicago Press.

Friedman, Andrew. 1989. *Computer Systems Development: History, Organization and Implementation*. John Wiley & Sons.

Gartman, David. 1994. “Harley Earl and the Art and Color Section : The Birth of Styling at General Motors Gartman.” *Design Issues* 10(2):3–26.

Haydu, Jeffrey. 2011. “Cultural Modeling in Two Eras of U . S . Food Protest: Grahamites (1830s) and Organic Advocates (1960s – 70s).” *Social Problems* 58(3):461–487.

Isaacson, Walter. 2011. *Steve Jobs*. New York: Simon & Schuster.

Klein, H. K., and D. L. Kleinman. 2002. “The Social Construction of Technology: Structural Considerations.” *Science, Technology & Human Values* 27(1):28–52.

Kline, R K, and T J Pinch. 1996. “Users as agents of technological change: The social construction of the automobile in the rural United States.” *Technology and Culture* 37(4):763–795.

Lamont, Michèle, and Virág Molnár. 2002. “The Study of Boundaries in the Social Sciences.” *Annual Review of Sociology* 28:167–195.

Lamont, Michèle, and Laurent Thévenot. 2000. “Introduction: Toward a Renewed Comparative Cultural Sociology.” Pp. 1–24 in *Rethinking Comparative Cultural Sociology: Repertoires of Evaluation in France and the United Statestle*, edited by M. Lamont and L. Thévenot. Cambridge: Cambridge University Press.

Lamont, Prof. Michèle. 2009. *How Professors Think: Inside the Curious World of Academic Judgment*. Cambridge, MA: Harvard University Press.

Leadbeater, Charles. 2000. *Living on thin air: the new economy*. Penguin.

Leadbeater, Charles. 2004. *The Pro-Am Revolution: How Enthusiasts Are Changing Our Society and Economy*. Demos.

Leadbeater, Charles. 2008. *We-think*. Profile.

Leadbeater, Charles, and Kate Oakley. 1999. *The Independents: Britain's new cultural entrepreneur*. London: Demos.

Lie, Merete, and Knut H. Sorensen, eds. 1996. *Making Technology Our Own? Domesticating Technology into Everyday Life*. Scandinavian University Press.

Lofland, John, David A. Snow, Leon Anderson, and Lyn H. Lofland. 2005. *Analyzing Social Settings: A Guide to Qualitative Observation and Analysis*. Cengage Learning.

Lounsbury, M., M. Ventresca, and P. M. Hirsch. 2003. "Social movements, field frames and industry emergence: a cultural-political perspective on US recycling." *Socio-Economic Review* 1:71–104.

Mackay, Hugh, Chris Carne, Paul Beynon-Davies, and Doug Tudhope. 2000. "Reconfiguring the User: Using Rapid Application Development." *Social Studies of Science* 30(5):737 – 757.

Mackenzie, D. A. 1990. *Inventing accuracy: A historical sociology of nuclear missile guidance*. Cambridge: MIT Press.

MacKenzie, Donald A., and Judy Wajcman. 1985. *The Social Shaping of Technology: How the Refrigerator Got Its Hum*. Open University Press.

McAdam, Doug, John D. McCarthy, and Mayer N. Zald, eds. 1996. *Comparative perspectives on social movements: Political opportunities, mobilizing structures, and cultural framings*. Cambridge: Cambridge University Press.

Molotch, Harvey Luskin. 2005. *Where stuff comes from: how toasters, toilets, cars, computers, and many other things come to be as they are*. New York: Routledge.

Morrill, C. 2008. "Culture and Organization Theory." *The ANNALS of the American Academy of Political and Social Science* 619(1):15–40.

Munday, J. 2006. "Identity in Focus: The Use of Focus Groups to Study the Construction of Collective Identity." *Sociology* 40:89–105.

Oudshoorn, Nelly, and Trevor Pinch. 2003. “Introduction: How Users and Non-Users Matter.” in *How Users Matter: The Co-Construction of Users and Technology*, edited by Nelly Oudshoorn and Trevor Pinch. Cambridge, MA: The MIT Press.

Oudshoorn, Nelly, Els Rommes, and Marcelle Stienstra. 2004. “Configuring the User as Everybody: Gender and Design Cultures in Information and Communication Technologies.” *Science, Technology, & Human Values* 29(1):30–63.

Pinch, T. J., and W. E. Bijker. 1984. “The Social Construction of Facts and Artefacts: or How the Sociology of Science and the Sociology of Technology might Benefit Each Other.” *Social Studies of Science* 14:399–441.

Piore, Michael J., and Charles F. Sabel. 1984. *The Second Industrial Divide: Possibilities for Prosperity*. Basic Books.

Powell, Walter W, and Paul J DiMaggio, eds. 1991. *The New Institutionalism in Organizational Analysis*. University Of Chicago Press.

Rommes, Els, Ellen Van Oost, and Nelly Oudshoorn. 1999. “Els Rommes, Ellen van Oost and Nelly Oudshoorn University of Twente, The Netherlands.” *Society* 476–495.

Russell, S. 1986. “The Social Construction of Artefacts: A Response to Pinch and Bijker.” *Social Studies of Science* 16(2):331–346.

Silverstone, R., and L. Haddon. 1996. “Design and the Domestication of Information and Communication Technologies: Technical Change and Everyday Life.” in *Communication by Design: The Politics of Information and Communication Technologies*, edited by Robin Mansell and R. Silverstone. Oxford University Press.

Silverstone, R., and E. Hirsch, eds. 1992. *Consuming Technologies: Media and Information in Domestic Spaces*. Routledge.

Sloan, Alfred. 1990. *My Years with General Motors*. New York: Doubleday.

Swidler, Ann. 1986. “Culture in Action: Symbols and Strategies.” *American Sociological Review* 51(2):273–286.

Weber, Max. 1958. *The Rational and Social Foundations of Music*. edited by Don Martindale, Johannes Riedel, and Gertrude Neuwirth. Southern Illinois University Press.

Winner, Langdon. 1993. “The Black Box and Finding Upon Opening and It Empty : Social Constructivism of Technology the Philosophy.” *Science, Technology, & Human Values* 18(3):362–378.

Woolgar, S. 1991. “Configuring the user: The case of usability trials.” in *A Sociology of Monsters*, edited by J. Law. Routledge.

Wyatt, Sally. 2003. “Non-users also matter: The construction of users and technologies.” Pp. 41–56 in *How users matter: The co-construction of users and technologies*, edited by N Oudshoorn and Trevor Pinch. Cambridge, MA: The MIT Press.

Zald, Mayer N, and Michael A Berger. 1978. “Social Movements in Organizations: Coup d’Etat, Insurgency, and Mass Movements Social Movements.” *American Journal of Sociology* 83(4):823–861.