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Operationalizing culture with design cards in cross-cultural design: Translating critical knowledge into provocative insights

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Introduction

Operationalizing culture is "one of the most fundamental issues cross-cultural researchers face" (Matsumoto & Jones, 2009, p. 324), as stated in *The Handbook of Social Research Ethics*. Inconsiderate research design could "ignore the large degree of individual differences that exist in human behavior" (p. 325) and eventually "vindicate" cultural stereotypes the researchers mean to avoid.

In the field of cross-cultural design, a big challenge is how to inform and guide the design process with a sophisticated understanding of culture. This design challenge is a contextualized problem of *operationalizing culture* in practice. Insensitive design recommendations could end up strengthening the cultural essentialism designers want to leave behind in this increasingly globalized world. For example, designers should be more careful when recommending an online event scheduling system for American users that includes more granular and precise time units (e.g., options at 15 minute precision level) than what is recommended for Mexican users. The recommendation makes sense as American culture is considered monochronic, which prefers punctuality for meetings, while Mexican culture is not. However, what if some individual Mexican users might want to take more proactive actions to counteract their polychromic cultural influence for intercultural collaboration?

To craft a technology that is both usable and meaningful to local users, it is difficult to develop a rich comprehension of local culture and then form design proposals out of it, at a time when designers must deal with a broader range of cultural, social, aesthetic, and ethical dimensions due, in part, to globalization. As a matter of fact, critical design researchers contest that a fundamental issue is how to develop expert sensibilities in reading culture and situating design in appropriate and appealing ways "to improve the current state of human existence" (Bardzell, Bardzell, Forlizzi, Zimmerman, & Antanitis, 2012, p. 288). In many design cases, the complexities of local cultures are often literally and narrowly translated into interface features

without any deeper reflection. Those practices of cultural operationalization are usually implied by a simplistic logic of causal relations.

As an attempt to address the design challenge of operationalizing culture, this essay reviews the current state of operationalizing culture in cross-cultural design practice and presents a case study of design cards, one popular design toolkit genre in the field. My goals are two-fold. First, I aim to examine the methodology of operationalizing culture to improve cross-cultural design practices. Second, I want to assess the role of design cards for the operationalization of culture. With this case study, I hope to explore what will be an effective way of incorporating complex cultural influences into the design process and of transforming sophisticated understanding into design insights.

I begin the essay by unpacking the concept of operationalizing culture. In doing so I review the challenges of operationalizing culture for culturally sensitive design practices. I then study some of the best practices of design cards to see how this genre transfers theoretical frameworks of complex human situations into accessible scaffolding, and how two types of cards are structured to tap into the complexities of local scenarios and to produce useful design insights. Based on the analysis, I end with a discussion of the methodological implication of operationalizing culture vis-à-vis design cards.

Operationalizing culture in cross-cultural design: What is it? Why is it difficult?

In this section I review the current state of operationalizing culture in cross-cultural design and approach operationalizing culture as a methodological issue. I examine the relationship between operationalizing culture and defining culture, define the operationalization of culture in cross-cultural design based on a dialogic view of culture, and discuss some challenges of cultural operationalization.

What is it?

Operationalizing culture somewhat sounds like a paradox. Since "the cultural turn" in the humanities and social sciences began in the 1970s, culture has become the foreground of many research discourses. Its existence and influence are so pervasive that almost everything is a cultural practice from the lens of cultural studies. Therefore, how could we single out one entity, separate it from the rest, label it as culture, and then operationalize it? And where do we operationalize it? This might explain why we probably will not see the discussion of operationalizing culture among the critical cultural scholars who follow the interpretive intellectual tradition—the question itself sounds "politically incorrect." However, for social scientists that conduct practice-oriented research concerning cultural issues or in the intercultural context, operationalizing culture is a daily reality. Such discussion can be found from the research literature of psychology (Matsumoto & Jones, 2009), marketing (Singh & Pereira, 2005; Soares, Farhangmehr, & Shoham, 2007), economics (Licht, Goldschmidt & Schwartz, 2007), e-commerce (Li, Hess, McNab & Yu, 2009), education (Hand, 2006), Human-Computer Interaction (HCI) (Bardzell et al., 2012), and professional communication (see this issue), to name a few.

This paradox also indicates that the operationalization of culture is closely related to the characterization of culture in particular research, and that operationalization only happens after culture is identified and defined. Different understandings of culture will lead to different approaches of operationalizing culture. Consequently, when we are not happy with the outcome of operationalizing culture, the first thing we should check is how culture is viewed and approached there.

One common problem in cross-cultural design is the disconnect between action and meaning: concrete user activities are frequently missing in design practices, and usually only static, out-of-context meanings are transferred through design. As a result, the designed technology is usable, but not meaningful, to local users. For instance, a German car navigation system that lists a massage salon in the category of personal care would probably cause a usability problem in China: a Chinese driver rarely relates "massage salon" as a personal care business based on her local experience, and instead she would search for a massage salon in the entertainment category.

Behind this simple and literal translation of cultural meanings and interface features is a popular view of culture that regards culture as "the collective programming of the mind" (Hofstede, 2001, p. 1) in the intercultural and transcultural design context. This view characterizes cultural differences in terms of value-oriented cultural dimensions such as power distance and uncertainty avoidance. Built on well-developed intercultural communication theories from established scholars such as Hofstede (2001), Hall (1983), and Victor (1992), these value-oriented dimensions categorize cultural differences into comparable measures to guide the processes of internationalization and localization (e.g., Aykin, 2004; Baumgartner, 2003; Ess & Sudweeks, 2005; Singh & Pereira, 2005). To a large extent, the popularity of this approach comes from the accessible framework it provides for cross-cultural comparison, i.e., cultural dimensions. However, those cultural dimensions represent dominant cultural values that are derived from national cultures. Other meaningful subcultural factors are often missing in this operationalization, such as the individual user's gender, age, organizational affiliation, and ethnic groups.

Other than this approach, culture is also regarded as "the whole way of life" we live through (du Gay et al, 1997). An increasing group of scholars maintain that culture is emergent, fluid, becoming, and practiced (Myers & Tan, 2002; Slack & Wise, 2005; Weisinger & Salipante, 2000). To address the disconnect and associated usability breakdowns like the German car navigation system, I advocated a dialogic view of *local culture* for cross-cultural design (Sun, 2012). For me, local culture is the dynamic nexus of contextual interactions that manifests numerous articulations of practices and meanings. This dialogic view sees *culture* "as an open set of practices and as an energetic process with meanings, objects, and identities flowing across sites in diffuse time-space" (p. 25).

Culture constituted dialogically can help us form a more complex picture of cultural realities in cross-cultural design. This social practice view of culture places rich user activities on center stage, and thus embodies vivid meanings, to manifest "culture in the making." It is deeply situated in local practices with a recursive process of structuration between structure and agency, between the community and the individual, and between a local context and the global world.

This view is not an intersubjective approach, and I hope this essay can clarify some confusion about it (see Thatcher, Tan, & Getto, 2013).

At a time when designers must deal with a broader range of cultural, social, aesthetic, and ethical dimensions due, in part, to globalization, there is a need for a more sophisticated understanding of culture. This understanding appreciates various aspects of culture. For example, it recognizes the methodological accessibility of the cultural dimensions approach and sees it as part of the submerged portion of the iceberg, interacting with (as well as affected by) the surrounding, constantly moving water. At the same time, the overall iceberg of culture is an entity that is emergent, fluid, becoming, and practiced. Furthermore, this understanding suggests an integrated scope to approach and operationalize culture from the macro level (i.e., broader sociocultural context) to the micro level (i.e., immediate context). In the fields of user experience design and HCI, the design of interactive technology goes beyond the mere interface: on the macro level, designers need to approach sociocultural influences in order to "[shape] technology to produce positive outcomes" (Shneiderman, 2011, p. 11). This includes critical design considerations to address sociocultural issues such as agency, identity, values, and structures of power, ideology, dominance, and hegemony on a macrosocial level. On the micro level, designers are expected to delve into concrete actions to "design and build innovative interfaces and deliver validated guidelines" (p. 10). This usually refers to design implementations to achieve efficiency and effectiveness for task performance.

To create culturally sensitive designs for local users, complex cultural influences need to be operationalized in certain ways so that the rich understandings of local culture could be transformed into design insights for product design. Guided by the dialogic view of culture, I see cultural operationalization consisting of two components in cross-cultural design: incorporating complex cultural influences into design processes (i.e., gaining cultural insights out of user research through the design process), and transforming the rich understanding of local culture into design recommendations (i.e., applying insights to form design implementations). From the epistemological viewpoint, designers will only be able to incorporate the cultural influences they are able to identify out of their research. And this is why operationalizing culture comes after and is built on defining culture.

Why is it difficult?

Operationalizing culture is difficult due to the following challenges in cross-cultural design practices. First, to solve the disconnect of action and meaning in final designs, we need to come up with cultural insights that integrate action and meaning in design research, but we still have a long way to go. Elsewhere I reviewed three approaches of representing local culture as "needs analysis" for cross-cultural design in a chronological order (see Chapter 1, Sun, 2012). Those approaches include the anecdotes in the form of DOs and DON'Ts originated from random experiences of intercultural encounters (e.g., certain colors of taboo should be avoided for certain cultural groups), value-oriented cultural dimensions (e.g., power distance, uncertainty avoidance, individualism vs. collectivism), and structured fieldwork methods including contextual design (Beyer & Holtzblatt, 1998) and design ethnography (Salvador, Bell, & Anderson, 1999). I found that the approach of DOs and DON'Ts does not have a systematic way of sorting out action and meaning. The approach of value-oriented cultural dimensions only looks at a static view of

meaning without examining concrete user activities. While the approach of structured fieldwork methods is able to tackle both action and meaning, thanks to its hermeneutic lens, it only does so in an incomplete way, as discussed next.

Second, designers are not used to connecting the critical vision and macroscopic understanding of culture from the broader sociocultural context to the microscopic reflections from the immediate context. This is a soft spot for many design ethnography studies. Due to the limited timeframe, the collected data of users' in-situ experiences primarily come out of their immediate contexts, and the influences from a broader political, social, and cultural contexts are often ignored. The resulting design research could end up with unsophisticated design recommendations.

Considering the design case of Facebook Japan website[1] (Sun & Hart-Davidson, 2014), that website has been facing strong resistance from its local users since its official release in 2008. This is because Facebook sticks to its real-name user policy and refuses to follow local Internet protocols—Japanese users prefer to use pseudonyms to network with friends. While the website was able to beat local competitor MIXI and rose to the top around 2012-2013 after vigorous marketing campaigns, it gradually lost its market share half a year later. In this case, a microscopic exploration would lead to a naïve recommendation that a better design could be devised if Facebook Japan would fully respect local cultural values as I first thought (2012, p. 251). However, an exploration from the macro level indicates that this is unlikely to happen considering the commercialistic nature of the transnational corporation of Facebook: in the era of big data, the real-name policy is a tool for a platform owner like Facebook to access, control, and utilize users' data for business revenues (van Dijck, 2013). An inauthentic identity fails to meet advertisers' "truthful" requirement and would hurt "the clarity and coherence" of the data Facebook collects. Therefore, a set of design strategies that only considers the design issues on the micro level will not work here.

Third, when the macroscopic understanding of a local context is presented to triangulate the microscopic insights, the integration and translation of design insights could suffer from "a problem of unintegrated scope" (Spinuzzi, 2002). The "macroscopic" understanding of a local context—the broader sociocultural influences such as the political economy and the technological infrastructure—is often accomplished through data-collection methods (e.g., targeted observations, walkthroughs, and interviews) that function on the micro level. The mismatch between the project focus and the data-collection tools implies that there is an underlying work structure that has "a causal, foundational relationship with the other levels" (p. 4). This conflicts with sociocultural theories that support "co-constitutive" relationships between levels, and thus causes "a problem of unintegrated scope." Furthermore, it misses "the reciprocal changes" across different levels (p. 13).

Overall the mismatch happens not only at the phase of gaining cultural insights out of user research but also at the phase of applying insights to design implementations. From the hermeneutic stance, the interpretation of local culture is regarded as an open process that leads to

[1] This case is included to illustrate the importance of connecting the macro level and micro level, but the case itself was not conducted with the methodology of design ethnography.

multiple versions. In contrast, the data collection methods derived from the empirical, and sometimes positivist, tradition tend to funnel messy and fuzzy cultural findings into measurable datasets and generate one version of cut-and-dry "needs analysis."

In many design cases, we often see a simplistic, linear translation between the macroscopic cultural values and microscopic design features. For instance, a website for a local culture with a high power distance index is recommended to highlight branding images to address users' preference for authority. A text-only web version is advised to serve the needs of vision-impaired users. However, the former case might miss other design opportunities to address broader cultural issues like information access. The latter will not help to close the digital divide vision-impaired users have already suffered in their daily lives due to poor website maintenance for text-only versions. Framing design affordances as discursive relations will help us to come up with design solutions that take positive social change as a primary goal (Sun & Hart-Davidson, 2014).

A case study of design cards

As an attempt to address the challenges of operationalizing culture, I study one popular design toolkit genre in the field, design cards, to gain inspiration for effectively incorporating complex cultural influences into the design process and translating a deep comprehension of local culture into design insights.

Genre of design cards

For the past two decades, design cards have been widely adopted in the design process to engage multiple stakeholders, tap into design scenarios, and negotiate design ideas. Used in focused design activities and design games, they help to construct design scenarios and brainstorm for inventions and interventions. While they were not intended to study local culture per se, they have helped generate conversations about and develop deeper understandings of local culture and subjective user experience. Therefore, I chose this genre as a case study for exploring the operationalization of culture.

One early discussion of design card method can be traced to the CARD technique developed by Tudor and his colleagues in 1992 for participatory design methodology (Muller, 2001). At its inception, design cards were used for "task-level" analysis (i.e., task flow or activity flow), to complement other "screen-level" participatory design techniques (Tudor, Muller, Dayton, & Root, 1993). Nowadays design cards are usually employed in two types of user-centered design sessions: focused strategic activities and design games. In the former case, design cards "represent process and methodological design knowledge" as the prompt and guidelines (Friedman & Hendry, 2012, p.1145). In the latter, guided with thoughtful game rules, design cards engage participants in a playful atmosphere to ignite free-styled discussions and generate design suggestions. Those elicited discussions are often open for multiple interpretations.

Varieties of design cards[2] are created to serve for these two rhetorical exigencies. Most cards are two sided, with the image(s) on one side and the text on the other side. Depending on the purposes of the design sessions, card content could be concise directions of activities as shown in the Envisioning cards (Friedman & Hendry, 2012; see Figures 1 & 3) and IDEO method cards (IDEO, 2003), or provocative questions as shown in the Tangible Interaction cards (Hornecker, 2010; see Figures 2 & 4). The third type of content is the data collected from early-stage fieldwork. For example, components of work processes are found from the CARD technique (Muller, 2001), screenshots of fieldwork video segments on the Video cards (Buur & Sondergaard, 2000) and on the Moment cards (Brandt & Messeter, 2004), pictures of the surroundings collected from field studies on the Trace cards (ibid), and keywords from user studies on the Sign cards (ibid). Clearly the first two types of card content inspire designers and co-designers to develop deep cultural insights, and the third type directly brings local cultural knowledge to the center of the design process.

Cards are not limited to a printed format. Some of the design cards, like IDEO method cards and the AGD (Art of Game Design) lenses cards (Schell, 2008), are also available in mobile apps. Other cards, such as the Moment cards (Brandt & Messeter, 2004) and the Tango cards (Deng, Antle, & Neustaedter, 2014), are linked with interactive content: the former links the screenshot of a video on a card with an RFID-tag, and therefore the video could be watched after being initiated by an RFID-tag reader. The latter is designed to include a QR code to link to the papers and websites of related principles and examples. Here the different card formats make cultural knowledge and culturally sensitive design techniques available among team members in the design process.

Design cards bring many benefits to design sessions. They provide structure, offer guidance, and help focus on the design activities as "orienting devices" (Mueller, Gibbs, Vetere, & Edge, 2014, p. 2211). They "make arguments tangible during discussions, supporting focus and helping create common ground" for generating, refining, and articulating ideas. In addition, turn-taking rules encourage participation, reduce communication barriers, and thus "support different stakeholders in making design moves on a conceptual level" for developing diverse design perspectives (Brandt & Messeter, 2004, p. 129).

From the perspective of operationalizing culture, design cards are noted for two effects. First, they serve as an effective knowledge transfer vehicle to apply theory-informed cultural knowledge to design practice. The compact and concise format of cards functions as a convenient medium for repurposing and presenting the concepts and rubrics of the theoretical frameworks, which study complex cultural situations. Abstract theories are packaged in simple design prompts with clear instructions. It is a form of scaffolding, which makes theories more accessible. In this way, design cards "bridge the gap between scholarly knowledge and design practice" (Deng, Antle, & Neustaedter, 2014, p. 2).

[2] I only review design cards that function for the purpose of operationalizing culture in this essay. Some of design cards are created solely for facilitating design inspirations and brainstorming discussions, and they do not examine local culture. An example is the Inspiration cards (Halskov & Dalsgård, 2006).

Second, during this knowledge transfer process, design cards reshape the structure of the design space to produce richer culturally informed insights. Design cards help to involve more people in the design process, stimulate design conversations, and spark new lines of thinking. For example, card-based design activities are used for engaging multiple stakeholders in the design process: they acquaint designers with local cultural knowledge for the product being designed and orient untrained co-designers (e.g., stakeholders, users) into design activities to invite discussion and generate insights. Those generated narratives of scenarios represent "a design move in the sense that it restructures the current situation to provide new insights" (Brandt & Messeter, 2004, p. 121).

Transferring theory-based knowledge into design insights through scaffolding

Next I analyze two design cards, one for strategic activities and one for design games, to explore how they translate theoretical frameworks into design prompts to study local culture through scaffolding. The three challenges reviewed earlier are used to assess their effectiveness for operationalizing culture.

Design cards operationalize culture in the design process through scaffolding. Scaffolding was first introduced as "a process that enables a child or a novice to solve a problem, carry out a task, or achieve a goal which would be beyond his unassisted efforts" (Wood, Bruner, & Ross, 1976). Now it is a popular approach in education and instructional design to help students achieve their learning goals with temporary support. These supportive strategies include guides, templates, procedures, activities, and tutors. In culturally sensitive design, complex cultural knowledge and insights need to be shared among team members, including untrained, unskilled "co-designers" (i.e., users-as-designers) and some designers who are not necessarily experienced with the particular design domain. To this end, design cards provide a combination of "materials, structure, and activities" for scaffolding support (Yoo, Huldtgren, Woelfer, Hendry, & Friedman, 2013, p. 420), as analyzed in the previous section. Figures 1-4 illustrate the scaffolding support of design cards for strategies activities and for design games.

The Envisioning cards are created to guide the design process through focused design activities that attend to human values and cultural practices, built on the design group's twenty years of work in Value Sensitive Design. Here the theoretical lens is presented with four key criteria for "envisioning long-term systemic effects of interactive technical systems: stakeholders, time, values, and pervasiveness" (Nathan, Friedman, Klasnja, Kane, & Miller, 2008, p.9). It consists of 28 themed cards and 4 "create your own" cards, one for each of the four criteria. Its front side presents an evocative image on a theme/concept, and the other side defines the concept and describes a focused design activity for exploration. In Figure 1, the concept of "crossing national boundaries" is grouped under the criterion of pervasiveness, i.e., "the widespread adoption of an interactive technology" (Friedman & Hendry, 2012, p. 1146). As the primary goal of the cards is for strategic design activities, the action verb "choose" is enlarged and highlighted at the bottom. Designers found the cards "catalyze humanistic and technical imaginations," as a versatile tool, for multiple design processes (p. 1147).

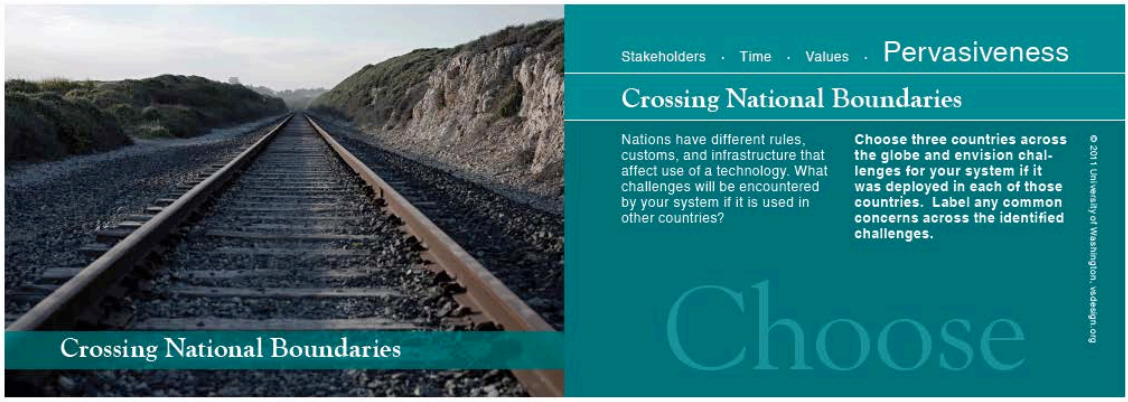

Figure 1. Sample Envisioning Card for strategic activities: Crossing National Boundaries
Left picture: Front side. Right picture: Back side. (Source: Envisioning Cards. http://www.envisioningcards.com/envision_pdfs/Pervasiveness-Crossing-National.pdf)

Tangible Interaction cards (Figure 2) show how theory-based knowledge—in this case, the Tangible Interaction Framework (Hornecker & Buur, 2007)—could be transformed into a design game tool for creative dialogue (Hornecker, 2010). Here, abstract concepts are grouped under four themes and then transformed into concrete and pragmatic questions with a game format. The four themes are tangible manipulation, spatial interaction, embodied facilitation, and expressive representation. While one-sided, each card contains a provocative question in big type, its related theme in a smaller size, and one or two images of everyday objects. Unlike the Envisioning cards, the definition of the theme is omitted to keep participants focused on the provocative question and promote creative design thinking. Accordingly, flexible game rules are carefully devised to set up a playful game context and therefore facilitate discussion. Such brainstorming sessions could produce "open-ended suggestions and design provocations" instead of "prescriptive guidelines" (Hornecker, 2010, p. 108). The designer self-assessed that the particular design card game "expand[ed] the original frameworks' utility from the predominantly descriptive, explanatory and rhetorical towards the generative, with the cards designed to stand on their own, and to provoke creative ideation through a question format, leaving space for interpretation" (ibid).

Figure 2. Sample Tangible Interaction Card for Design Games. (Source: Tangible Interaction Card Brainstorming Game. https://personal.cis.strath.ac.uk/eva.hornecker/tang_framework_cards.pdf)

Overall, the Envisioning cards and Tangible Interaction cards effectively transfer high-level and abstract theoretical frameworks for informing design processes. Cards organize theoretical constructs as coat hooks organize a closet (Maxwell, 1996): they help hang user research data and design insights to certain hooks and show the relationship between them as a scaffolding construct. Furthermore, both cards communicate clearly to teach or inform, they use simpler words to replace academic jargon, and they are neatly structured to inspire and initiate discussion.

Similarly, other cards have been designed to expose designers to various theories. The PLEX Cards (Lucero & Arrasvuori, 2010) were created to transfer the Playful Experiences framework (PLEX) (Korhonen, Montola, & Arrasvuori, 2009), the Exertion cards were created to communicate the Exertion Framework to designers of physical play games in a more accessible format (Mueller, Gibbs, Vetere, & Edge, 2014), and the Tango cards were created to make the knowledge of tangible learning games available to designers (Deng, Antle, & Neustaedter, 2014), to name a few.

In making the leap from descriptive to generative out of design sessions, design cards solve some problems of operationalizing culture, as reviewed earlier. The crafted design activities and provocative questions help attend both aspects of action and meaning of local culture, and begin to close the divide between macroscopic insights and microscopic implementations. For example, the Envisioning cards foreground the consideration of human values and long-term effects at various stages of design, including "ideation, co-design, heuristic evaluation, critique,

and more" (Friedman & Hendry, 2012, p. 1148). Figure 3 shows such an effort on the value of "sustained friendships."

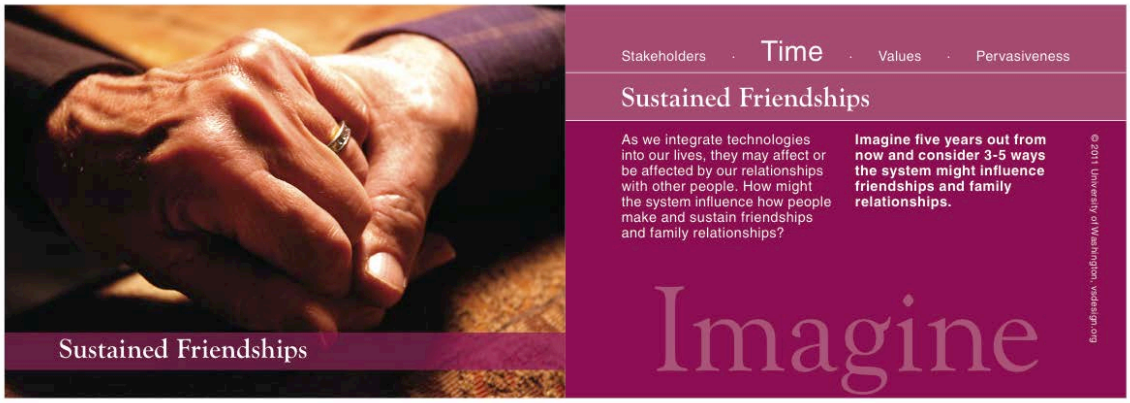

Figure 3. Sample Envisioning Card: Sustained Friendships
Left picture: Front side. Right picture: Back side. (Source: Envisioning Cards. http://www.envisioningcards.com/envision_pdfs/Time-Sustained-Friendships.pdf)

However, this is just the beginning since there is still a gap to integrate the scope between the macro level and micro level. As revealed in the reflection of Envisioning cards from the designers (Yoo et al., 2013), design features are often quickly "stimulated" by the prompts of the Envisioning cards. In one case, the researchers from the Value Sensitive Design group used Envisioning cards in co-design sessions to improve a cell phone prototype that was designed to keep homeless youth and young adults safe. Prompted by the activity presented in the card of "crossing national boundaries" (see Figure 1), one group, made up of police officers, chose to work on three cultures: India, Finland, and Mexico. The activity inspired four new features, including "cultural dress code, appropriate size of the phone, charging methods, and software modifications" (p. 425). While these features improve the design of the prototype, they do not necessarily consider deeper humanistic values sensitive to the three local cultures on which the participants chose to focus. For example, how are safety and security constructed and perceived differently in India than in the U.S.? Here we still see the design suggestions out of a linear logic, which might only imply a simplified material world of causal relations. Such a design outcome was not an isolated case. During the same co-design session, a group consisting of homeless young people was prompted to add a translation app by the same Envisioning card. Another group, composed of service providers, added features such as a contacts back-up system when inspired by the card of "sustained friendships" (see Figure 3).

Similarly, in the case of Tangible Interaction cards, among 26 cards, only three of the questions are open-ended Question Word Questions, e.g., "How can the human body relate with the space?" (see Figure 4). The rest are closed-ended Yes-No Questions, such as "Can you create a meaningful place with atmosphere?," "Does shifting stuff (or your own body) around have meaning?," and "Can all users get their hands on the central objects of interest?" (see Figure 4). A design game run by inexperienced moderators and participants could end up generating

superficial yes-or-no answers that only scratch the surface, and therefore hinder the capability of the cards to delve deeper into local culture.

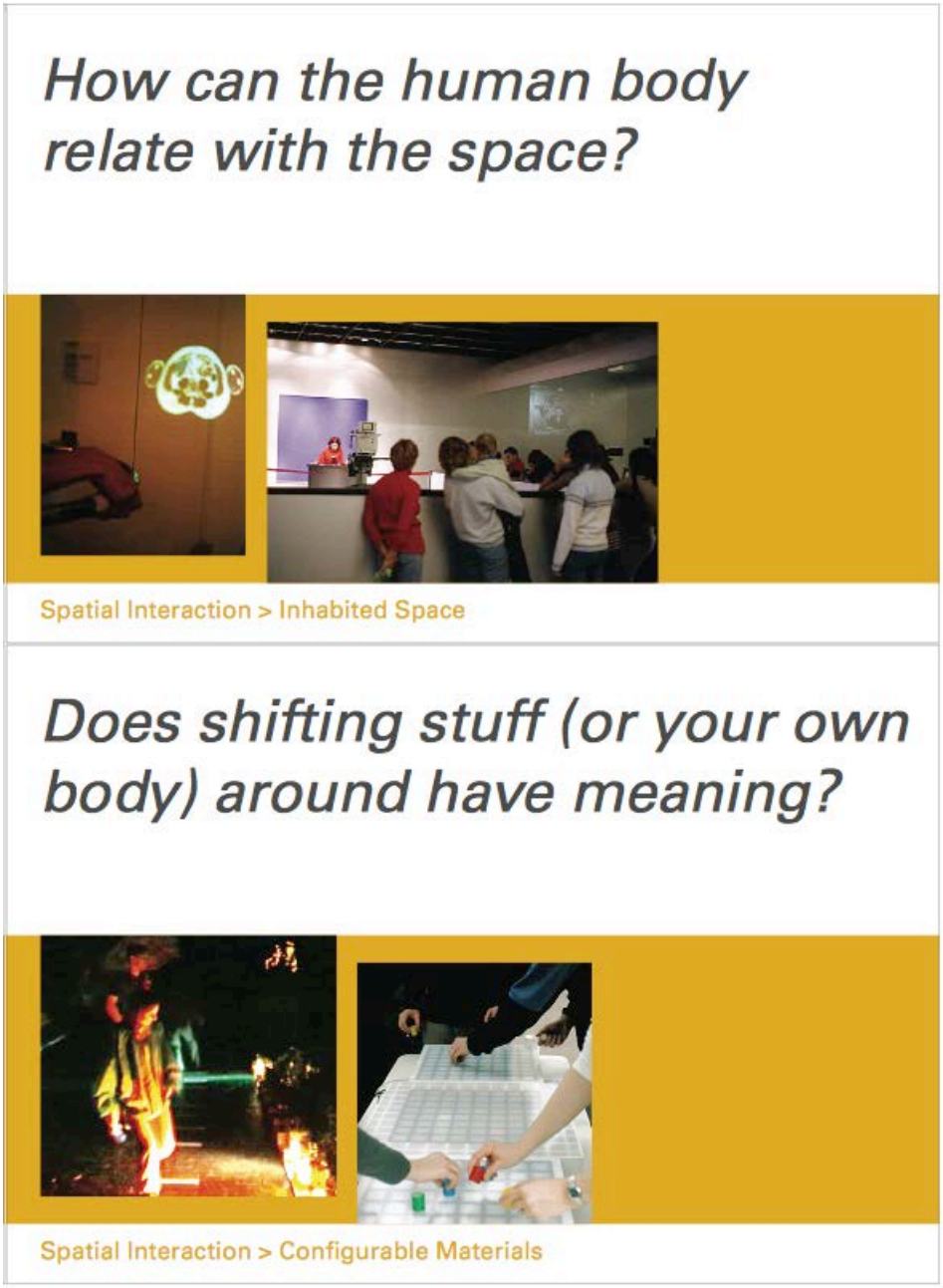

Figure 4. Question formats of Tangible Interaction cards (Source: Tangible Interaction Card Brainstorming Game. https://personal.cis.strath.ac.uk/eva.hornecker/tang_framework_cards.pdf)

As a matter of fact, transforming a theoretical framework into design cards is a form of simplified translation. Certain meanings and their associated implications get diluted and even

lost in the descriptive-to-generative process as we operationalize theory. Indeed "the linkage between (verbally-based) theory and the embodied design practices of decision-making and observations of use in deployment is problematic" (Bardzell et al., 2012, p. 293). This happens when theory-informed concepts are replaced by ordinary words for designers and co-designers (e.g., stakeholders and end-users) who are not versed in interpreting "thick culture," and when design activities are conducted in a rapid exploratory session as a common practice in the field. Maybe this reality explains why the Envisioning cards claim to "represent process and methodological design knowledge:" the primary goal of the cards is to guide the design process. In contrast, the Value Sensitive Design theory from which the cards are derived advocates building a deep understanding of humanistic values. On a deep level, this dilemma is a methodological conflict between an interpretive, hermeneutic intellectual tradition and a formal, functional empirical tradition. They clash at the design stage when rich and messy cultural influences (i.e., the interpretive tradition) are channeled into a scheme of data collection to outline accurate and implementable design requirements (i.e., the empirical tradition).

Conclusion

Though the focus of the case study essay is a design toolkit, my aim goes beyond this single design method and extends to a methodology of operationalizing culture. Clearly, the challenges of operationalizing culture are indeed an epistemological challenge. We have the need and the anxiety to operationalize culture for design practices, but we do not necessarily want to replace an interpretive and reflective intellectual tradition of studying culture with a formal and objective engineering process just for efficiency and effectiveness. And we have seen many simplistic design recommendations that reinforce cultural stereotypes, generated by a taxonomical view of culture and the cultural dimensions approach.

I maintain cross-cultural design practice is the work of *assemblage* and "a process of articulation, disarticulation, and re-articulation" (Sun, 2012, p. 65), influenced by articulation theory (Slack, 1996) and actor-network theory (Latour, 2005). Applying Latour's comments (2005) about *the social* to study *the cultural* here, "the social" is not "as a special domain, a specific realm, or a particular sort of thing, but only as a very peculiar *movement of re-association and reassembling*" (p. 7, highlight added). So is *the cultural*. A technology designed for a local culture with certain design features is an assemblage of articulations between user goals and tasks, between technical functions and cultural meanings, between work efficiency and lifestyle choice, between design and production, between the designer's culture and the user's culture, and so on.

Looking beyond, design cards are one of the design tools that incorporate complex cultural influences into the design process. Probes (Boehner, Vertesi, Sengers, & Dourish, 2007; Graham, Rouncefield, Gibbs, Vetere, & Cheverst, 2007) and reflection (Fleck & Fitzpatrick, 2010; Baumer, Khonvanskaya, Matthews, Reynolds, Sosik & Gay, 2014) have gained increasing attention the past few years among the designers and researchers who are eager to shake the dominant engineering model of HCI with new methods for engagement. In comparison, probes often function as tools for data collection via various designed artifacts—helping to gather cultural insights—and reflection serves to review and ponder on past experiences and events related to product design—helping to generate cultural insights. Design cards address both, but

more importantly, they perform as a knowledge transfer tool built on their scaffolding power. It is this scaffolding power that makes design cards relevant and valuable to our discussion of operationalizing culture here: scaffolding is what connects defining culture with operationalizing culture and is what operationalizes culture. Put another way, it plays a vital role in operationalizing theory (i.e., culturally informed theories) and then operationalizing culture.

Successful operationalization relies on successful scaffolding, which includes a sound vision of culture and a sound meditational means to operationalize culture in card-based design activities. This case study shows that the scaffolding of design cards needs to have more fluidity and openness for design provocation. Furthermore, it is important to keep in mind that the design sessions are also "culture in the making" when social and cultural norms are inscribed into the process. A s designers operationalize culture in generating culturally sensitive designs, they need to be conscious of the complex cultural influences flowing back and forth in the research site and need to find a better way of articulating and assembling them.

This case study poses good questions for how to design better scaffolding for cultural operationalization: what scaffolding scheme will help us to re-associate and re-assemble various cultural influences into design? What scaffolding scheme will help to maintain a hermeneutic stance, support an open process of multiple interpretations, connect action and meaning, and integrate macroscopic vision and microscopic reflection? Finally, what scaffolding scheme will help to traverse back and forth between the interpretive tradition and the empirical tradition? Or is that possible? As a discursive methodology, critical design believes that "the framing of critical design research itself is part of the unknown" (Bardzell et al., 2012, p. 295). In that sense, we *do theory* as we progress, or vice versa.

I shall conclude this essay with two justifications about design cards. First, to be fair, while the examples of design cards reviewed here attend to cultural issues, their major goals are not to operationalize culture as we researchers do. They should only serve as inspiration, cautionary tales, resources for adaptation, and/or a source of ideas for new innovations regarding operationalizing culture. And we need to further modify them into our community practices and develop innovative design cards that will help us to re-associate and re-assemble various cultural influences across multiple levels.

Second, it should be noted that, as one of many tools, design cards would not solve the problems of operationalizing culture as a panacea. Other tools and techniques need to be developed to complement design cards and enrich the overall repertoire. One of the goals of starting this discussion is to contribute to the collective repertoire of techniques, practices, and heuristics for operationalizing culture that are being developed by the intercultural and transcultural research community.

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