The boundaries between 'the digital' and our everyday physical world are dissolving as we develop more physical ways of interacting with computing. This forum presents some of the topics discussed in the colorful multidisciplinary field of tangible and embodied interaction. — **Eva Hornecker, Editor**

Beyond Video Games for Social Change

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Games are cultural artifacts that not only reflect the values of the people who create them, but also subtly reinforce or challenge the values of people who play them [1,2]. This dynamic interplay between designers and players is an important part of what makes games so appealing as a means to address social issues such as environmental sustainability, civic engagement, equity, and public health. Game play, in other words, is an experience that can force us to reconsider our relationship with the world.

But when we talk about games in interaction design, what do we mean by the word *game*? The overwhelming answer is that we almost always mean *video* games in one form or another. This is not surprising, as video games are widely popular and offer an expressive design language that includes a rich set of representations and conventions (think *lives, levels, health, bosses, power-ups*, and so on). But can fixating on this one type of gaming experience (even one as expressive as video games) constrain our thinking and limit our creativity? And are we missing out on a broader universe of games that go beyond manipulating pixels on a computer screen?

Part of the answer to these questions comes from the field of tangible interaction. One common way to think about tangibles is that they move interaction beyond the computer screen, blending physical and digital worlds and leading to more natural and intuitive interaction. I think another important way to understand tangible interaction is that it gives designers new freedom to engage broader *cultural* landscapes by thoughtfully shaping objects, environments, and situations [3,4,5]. Or, using slightly different language, designers have wonderful new opportunities to create novel interactive systems based on existing *cultural forms*. Thinking about design from this perspective can broaden our understanding of digital games and open new possibilities for the use of games to work toward positive social outcomes. Here, I'll describe two example games that illustrate what I mean by designing based on cultural forms. Both games address issues of environmental sustainability by helping families become more conscious of household energy consumption. Both games also break from the predominant video game mold, not because we set out to design "not video games," but because the types of social interactions and learning experiences that we hoped to foster led us in a different direction. Digital interaction still plays a role, but the cultural forms we build on are older (and in many ways richer) than video games.

Insights

→ Tangible interaction provides new ways to move beyond video games for social change.

→ Thinking about existing cultural forms can be a valuable starting point for interaction design.

→ Tangible interaction gives designers new flexibility to shape objects and situations to evoke existing cultural forms.

WHAT ARE CULTURAL FORMS?

I am borrowing the term *cultural form* from the work of Geoffrey Saxe. Briefly, cultural forms are social constructions, conventions, and systems of representation that evolve in societies and cultures over relatively long periods of time [6]. Take, for example, the game rock-paper-scissors. This simple hand game is believed to date back at least 2,000 years to ancient China, with variants played throughout the world. We might make some guesses about the success of this game. It requires no specialized equipment and can be played just about anywhere; it fulfills basic human needs such as resolving minor disputes and providing entertainment; and it has a certain mathematical elegance that makes it easy to teach. The broader point is that rock-paper-scissors is a highly recognizable cultural form that has persisted over a surprisingly long period of time and spread across a variety of cultural contexts. Starting with this example, here are a few other properties of cultural forms that make them valuable for thinking about interaction design:

• Cultural forms can be *evoked* in various ways by means of subtle (and not so subtle) cues. For example, the three simple pictures in Figure 1 readily call to mind rock-paper-scissors. One exciting aspect of tangible interaction is that it opens new possibilities for designers to evoke existing cultural forms while at the same time creating novel interactive experiences.

• Cultural forms involve patterns of social activity. Rock-paper-scissors is a relatively simple example that involves the coordination of two people over

Figure 1. Rock-paper-scissors hand gestures.

short time periods. Other forms can involve more people over longer periods in different configurations. The point is that these patterns are recognizable and stable despite variations in surface detail. This property of cultural forms is useful to think about when creating interactive experiences where the quality of social interaction is critical to the success of the design.

• Along with patterns of social interaction, cultural forms involve resources that individuals can bring to bear on an activity [6]. These resources can be cognitive, physical, social, or emotional in nature. Even for a simple game like rock-paper-scissors, these can be surprisingly sophisticated. Players have the ability to remember and reproduce various hand gestures and rhythmic verbal phrases; they can enact and negotiate the rules of the game with another person; they can construct an internal representation of their opponent's mental state to anticipate their next action; and they can cheat or bend the rules ("Come on, how about best 5 out of 7?"). As we set out to create interactive experiences, it's worth considering such culturally based resources that users can bring into a situation [5].

• People continually appropriate and repurpose existing forms in light of shifting goals and expectations. Saxe's research with trade-store owners from remote areas of Papua New Guinea provides a vivid example. The communities that Saxe studied used a base-27 counting system in which body parts were enumerated, starting with one thumb and ending with the little finger on the opposite hand. Saxe documents the ways in which trade-store owners adapted traditional counting forms to incorporate Western currency systems

operations such as addition and subtraction. The traditional forms were not eradicated or replaced but rather were restructured and adapted to incorporate new forms, in this case Western currency systems. The implication for interaction design is that cultural forms can be remixed and repurposed to create novel experiences.

• Finally, cultural forms are interpreted and enacted differently by people depending on their background and the context. For researchers in HCI, the idea that a fundamental building block of interaction design (which is what I'm proposing cultural forms should be) can vary dramatically depending on the background of the user population is a bit unnerving. We have a tendency to favor design principles rooted in more universal or innate aspects of human experience. However, overreliance on universals can also have the unintended consequence of limiting the creative landscape and rendering valuable cultural resources less visible.

TOWARD A DESIGN PROCESS

When we evoke a cultural form through the use of designed artifacts, spaces, or situations, we cue predictable patterns of social activity as well as valuable resources. I propose that an important part of the interaction design process can involve thinking about these aspects of the user experience and about the kinds of cultural forms that might bring about desired outcomes. Here are a couple of short examples that illustrate what I mean.

Example 1: Ghost Hunter. In this example, our intention is to help families become more aware of the ways in which they consume electricity at home by encouraging family members to work together to actively explore their home.

We also want to shape the experience so parents feel comfortable guiding and interpreting the experience for their children. Working from the standpoint of cultural forms, we identified children's search games like hide-and-seek and I-spy-with-my-little-eye as good fits for the types of activities we were targeting—ones in which people search in odd places (behind couches and so on) to find hidden things. Hide-and-seek seemed especially promising because it can be evoked with simple imagery and because it's a game in which parents support their children as they learn to play.

To realize Ghost Hunter, we attached a simple electromagnetic field (EMF) detector to a tablet computer. As the device gets close to a source of electricity, it starts to flash and beep. This hardware solution leads to a completely standalone device that has the added benefit of working in any indoor setting without the need for an augmented environment. When families identify a source of electricity, they can select the device or appliance from a list of icons and learn more about its typical energy consumption, both in "on" mode and "standby" mode.

We evaluated Ghost Hunter with seven families in the Chicago area. By analyzing video of parents and children using Ghost Hunter together (see Figure 2), we observed a variety of strategies that parents used to support their children's learning. These strategies included offering physical assistance, hinting at where to look for additional sources of electricity consumption, and elaborating on conceptual knowledge.

Example 2: Turn Up the Heat! This is a board game designed to help families think about the energy they use to heat and cool their homes. Our project team had originally intended to create
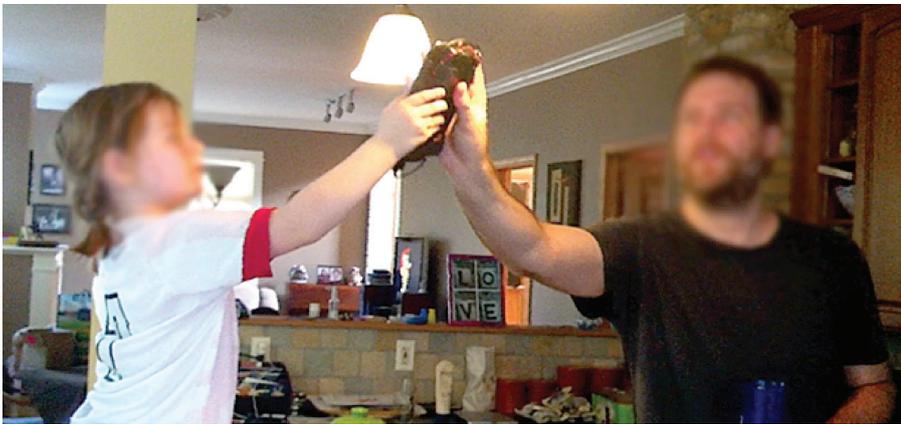
Figure 2. A family playing with Ghost Hunter in their home.

Figure 3. The board game Turn Up the Heat!

an iPad app that would gamify the use of a residential thermostat to save energy while keeping family members comfortable. However, thinking about this project from the perspective of cultural forms, we started to question the use of a tablet computer on its own. As is the case with the first example, we were looking for a way to engage entire families in thinking about trade-offs related to comfort, money, and energy. We therefore switched the project's direction, keeping the iPad as only one part of a cooperative board game. With this move our intention was to capture the enjoyable social activity of a family game night. Learning scientists have also demonstrated the potential for board games to be valuable learning environments, in part because the players themselves are responsible for enacting and enforcing the rules of play [7,8]. In our resulting design, called Green Home Games: Turn Up the Heat! (see Figure 3), players work together to

earn comfort points and green points while keeping costs down as they move around a game board representing the four seasons of the year. The iPad is used to simulate a home's energy use through heating and cooling systems. Play testing with families in the Chicago area is helping us understand how social interaction around the board game can help family members make connections between the game world and their own home, including thinking about how to save energy and money.

WHAT NEXT?

Thinking about interaction from the perspective of cultural forms gives us a new language for understanding design and the beginnings of a process to generate novel physical-digital experiences. In the case of games for social change, the flexibility of tangible interaction combined with a broader consideration of what we mean by *game* can open new possibilities for creating culturally rooted experiences.

ENDNOTES
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