Physical social contraptions sparking inspiration for understanding interaction in and with dynamic contexts

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ABSTRACT

A major challenge for developers of interactive devices and systems is the understanding of dynamic social contexts. To help address this challenge, the concept of "social contraptions" is proposed. These interactive installations and performative interventions can be employed as designerly explorations of unpredictable situations. Responses to one physical contraption, a giant revolving door are presented and discussed in relation to the themes it manifests for developers.

Keywords

Social interaction, design experimentation, design research

INTRODUCTION

The contexts in which information technology products are used are increasing in their complexity [1]. How contexts may become more complex is in itself a complex and unpredictable topic. It is interesting to note what few writers in this area seem to acknowledge is that understanding context may become increasingly difficult due to technology resulting in contexts becoming ever more dynamic. Or, in other words, as more attention is given to context, the more complicated it gets.

The importance of understanding context

Understanding both physical and social contexts in which information technology is used has been identified as being of increasing importance to successful design and development. In the 1980's Suchman coined the term "situated action" in describing how the material and social aspects of a user's situation are key determinants of their actions [22]. More recently, Randall points to the "social context of system use" being a major factor in "successful design work" [20] Forlizzi and Battarbee also emphasise that it is crucial for designers to "understand the social and collaborative aspects of interaction and experience" [8]. Whilst Schiek et al have pointed to the need to understand not only the social, but also the physical aspects of context as a dynamically derived "emergent situation" [21]. Oulasvirta et al go further and emphasis that for their sphere of interest, there is a need to understand a whole raft of different contextual aspects:

"A thorough appreciation of physical, social, interactional, and psychological contextual factors is crucial in the design of ubiquitous computing applications" [19]

Paradoxically, the emphasis on contexts is driven both by these technology developments and the progression of a seemingly opposite theoretical drive that design should not be driven by technology but instead prioritise the needs and interpretations of end users of products and services [6] [13] and often related approaches that emphasise social aspects such as distributed cognition [10] and activity theory [17].

Many of the researchers who are proponents of emphasising understanding context can be criticised on the grounds that they are also proponents of technology and design directions such as tangible [11] and ubiquitous computing [24] which can be seen as having the byproduct of making contexts harder to understand. However, irrespective of critiquing proclamations that elevate the importance of understanding context, it is hard to imagine context as having a negligible effect on the success of most, if not all design. David Nye explains how it is social processes that determine if, and how a technology is adopted: "latent in every tool are unforeseen transformations" [18]. By this, he means it is not the appearance and functions of a technology that make it attractive to use but rather how people perceive and assist each other to exploit it for: *"when humans posses a tool, they excel at finding new uses for it"* (ibid).

SPARKS AT THE EDGE: SOCIAL CONTRAPTIONS

Benford et al [3] proposes that designers should focus on extraordinary behaviours and boundary conditions as a means to improve their design. My interest is in how unusually positive behaviour, particularly in relation to the boundaries between people, might be provoked. *Social Contraptions* is proposed as an umbrella term for a variety of experimentation in social situations. The aim of a social contraption is to engage nontechnical or mixed audiences in a natural setting with an interactive intervention and their fellow participants, particularly those with whom they were previously unacquainted. How people individually or collectively respond to, avoid or exploit such a dynamic situation is proposed to help with understanding how

CHI Sparks, June 23, 2011 Arnhem, Netherlands

interaction design can affect and be affected by complex dynamic contexts.

Social sparking through collaborative contraptions

Social contraptions are intended to have an effect upon social situations. Although contraptions are relatively low tech, the aim is that the situation will share qualities of novelty, instability, indeterminacy and interdependence of contexts made more complex by more advanced networked technologies. The word contraption is used to refer to the interventions because it hints at complication and elaborateness rather than simple effectiveness. Something labeled contraption has the implication of being a slightly ungainly, but nevertheless effective contrivance, rather than an elegant device.

A social contraption can be considered as positioned halfway along an imaginary continuum between *social mechanism* and *facilitation*. That is to say, a contraption is neither wholly deterministic, nor a wholly personality driven, subjective process. The word contraption also has associations with the fantastical inventions of Heath Robinson [9] and Rube Goldberg [23] and thus also connotes a certain unpredictability and liability to malfunction without warning. This seems fitting because the unforeseen processes and results of any group interaction are to be acknowledged and embraced by those concerning themselves with understanding dynamic contexts. Also, similar to Robinson and Goldberg, how the contraption functions, although elaborate, is not intended to be completely obscure. Furthermore, these contraptions may also be labelled social because participants in encountering them, are to varying degrees, part of the contraption for other participants. The social is both the ingredients of, and the aim behind the contraptions.

Positive breaching environments

This approach differs from Garfinkel's [7] original notion of breaching experiments that explored responses to deliberate violations of social norms. Here the design interventions can be said to offer an invitation, encouragement or provocation for participants to behave in unusual ways towards each other. Thus social contraptions can be seen as a participatory breaching experiment or in a sense; the situation could be described as a breaching *environment* that is co-created by the responses of participants. Two kinds of social contraptions are presented: physical contraptions and cyranic contraptions. The former are mechanical art gallery installations and the latter is a participatory experience involving one person repeating the words of an unseen other.

"BLENDER" A PHYSICAL CONTRAPTION

Blender was a social contraption deployed within an art gallery in an effort to spark social interactions, as reported along with examples of other physical social contraptions in [15] and has also been argued to have potential value for researchers concerned with embodied interaction [5].

Blender consisted of a configuration of moveable walls rotating about a central column in a room (Figures 1 - 4). This interactive installation could be likened to a large revolving door or a giant four bladed human powered propeller. Blender' was positioned at the centre of a fixed circle of chairs. The four revolving door wooden panels or "blades" were shaped and sized so that they would pass closely over the knees of guests seated on the chairs.

This revolving door was engineered around a sure axle the structural column of the art gallery. Thus, despite its considerable weight, it was easy to push the panels from any point except very close to the column. The circle of chairs filled the width of the room and so in order to progress through the gallery, guests needed to revolve the barrier by pushing and/or move in the same rotational direction as and when another guest pushed the doors.

Through this arrangement, it was intended to create a continuously circulating social situation, which might spark interactions between seated and standing guests. An aim of this contraption was thus to create a social situation in which being a stationary "wall flower" was impossible since the edge of the circular space contained the fastest moving part of the contraption.

Figure 1: Blender (left) blades would pass over the legs of seated guests (right).

OBSERVATIONS

People Adapt

It was marked how quickly people adapted to the fluidity of meanings, roles and affordances that were presented by the social contraption.. For instance it was hard to discern any transition between *Blender* fulfilling a role as a toy, barrier and table. Or any transition between being manipulated by a single user or by pairs, or small groups. Although often many people were around the *Blender*, it was difficult to say how many were manipulating it at any time – and how many were being manipulated *by* the contraption.

Balancing pleasure and risks

Interacting with strangers can be very pleasurable but is perceived to carry some risks [14]. The perception of such risks inhibits social interactions and thus may diminishes the pleasure of such gatherings.

The physical contraptions changed the character of social situations by causing people present to perceive that the situation contained physical risks. Avoiding physical harm is commonly considered more important than avoiding social discomfort. Therefore the perception of immediate physical risks reduces the priority of social risks and thus

may reduce inhibitions concerning spontaneous social interaction. However, responses to potential physical risk vary widely, some may embrace the opportunity to create danger which can be to the detriment of others' pleasure. This reading of responses to *Blender* suggests that designers concerned with complex contexts should consider how to offer users means to discover and decide their own preferred balance between risk and pleasure.

Ubiquitous computing is heralded as making all objects and systems everywhere, connected, track-able and manipulate-able. A social contraption may offer a window onto what occurs when only making a small portion of an environment or small number of people are connected and manipulate-able. Interventions such as *Blender* can be one way to inform reflection upon questions such as: do people prefer to have their actions constrained?

Figure 3: Seated viewers could temporarily "see" and "be" in two "rooms" at once.

Inside out sharing of attention and understanding

It took much less effort and strength to spin the *Blender* when seated at its edge, compared to standing near its centre. This is an illustration of a well known physics principle, but this mechanical advantage was hard for many visitors to grasp as they were immersed in the situation rather than viewing it from a distance. The physical and social dynamics generated by the contraption served to distract people from comprehending how it worked

Responses to, and strategies to cope with such division of attention varied amongst those encountering the contraptions. Some participants seemed to treat obstacles to their perception as a challenge, which could be tackled through either physical exertion or by requesting cooperation. For instance, the barriers of the Blender seemed a spur for several guests to attempt to get close to the floor and look under it, or stand on tip toes or jump up in order to see over to the other side. Others were keen to move quickly, because if they stood still or moved too slowly, they "might miss something" or "not know who is here". Another standing guest that was curious as to what was happening in other sectors of the Blender called out to ask if somebody was on the other side of the wall and upon receiving positive replies, asked their respondents to describe what they could see.

It may be useful to envisage such sharing and division because the attention of any user of many networked systems can be described as having their attention divided at least three ways. That is to say that they are attentive to

- their immediate environment
- their interface into a digital system, and
- who and what they may be interacting with through their interface.

Users vary

The contraption provide a vivid reminders that users of a multi-user system may differ widely in skills, experience, and motivations which may affect the implementation of a system. For instance, participants were clearly seen to vary in their haste, prior experience with similar systems, prior acquaintance with other users, physical size, dexterity, strength and degrees of bravery, confidence, predictability, uniformity, originality, imitation, and sociability.

Although computing has potential to reduce or remove the salience of some of these qualities such as physical size and strength of users, many or all of these qualities do have equivalents in electronic systems. It is well documented that how people behave socially in virtual or other electronic environments may differ markedly from their everyday lives [16]. An interesting issue that *Blender* raises for developers of embedded systems is whether their systems should camouflage, invert or amplify the varying characteristics of their users. For instance although a frail elderly person may have been given the ability to move a large object, a strong youth was not made any weaker by attempting to interact with the contraption.

The high walls of the *Blender* separated people in different sections but the reduction in visibility seemed to serve to increase the demand for interaction. Environmental interfaces may in part aspire to reduce the degrees of perceived disconnection between people and/or objects and systems. However, responses to *Blender* illustrate that creating scarcity of access to actors may prove more engaging. Brucker-Cohen's experimental newsgroup format that restricted the quantity of members to six at one time is an online equivalent of this quality. The temporariness of their membership of his aptly named *Bumplist* was found to lead to participants placing emphasis on the act of belonging [4] rather than the content of their communications whilst subscribed. The suspense of not knowing who might be revealed upon the rotation of the

blender seemed also to increase engagement. A more recent digital manifestation of such suspense can be seen in the popular web service *Chat Roulette* that randomly connects webcam users to other webcam users.

Figure 4: Effecting direction of revolution required negotiation.

CONCLUSION

This paper has argued the importance for developers to understand increasingly complex use contexts and proposed interactive installations as one way to open these up for exploration. Observation of *Blender* makes visible pertinent themes for developers. This includes how people share and act selfishly in unexpected ways; how different systems appear from different perspectives; how users vary very widely in their responses particularly in relation to matters of adaptation, flexibility and control.

ACKNOWLEDGMENTS

Thanks to SILO Design and other members of Glasgow School of Art and The Chateau, for technical support and thanks to Jared Donovan for conceptual and theoretical contributions.

REFERENCES

1. Brereton M., & Buur, J. (2008). New challenges for design participation in the era of ubiquitous computing. *CoDesign*, *4*(2), 101–113.
2. Cui, Y., & Roto, V. (2008). How people use the web on mobile devices. 17th international conference on World Wide Web 79(pp. 905-914). Beijing, China:
3. Benford, S., Schnädelbach, H., Koleva, B., Anastasi, R., Greenhalgh, C., Rodden, T., Green,J., et al. (2005). Expected, sensed, and desired: A framework for designing sensing-based interaction. *ACM Trans. Comput.-Hum. Interact.*, *12*(1), 3-30.
4. Brucker-Cohen, J., Bennett, M., Agamanolis, S., Cummins, F., & Doyle, L. (2004). BumpList: developing beneficial email list structures..*CHI '04 extended abstracts* (pp. 1538-1538). Vienna, Austria.
5. Donovan, J & Mitchell, R (2010). Social contraptions and embodied interaction. *UBICOMP 10 Proceedings of the 12th ACM international conference adjunct papers on Ubiquitous computing.* Århus, Denmark
6. Endsley, M. R., Bolté, B., & Jones, D. G. (2003). *Designing for situtation awareness: an approach to user-centered design*. London: Taylor & Francis Group.
7. Garfinkel, H. (1964). Studies of the Routine Grounds of Everyday Activities *Social Problems*, Vol. 11, No. 3 (Winter, 1964), pp. 225-250
8. Forlizzi, J., & Battarbee, K. (2004). Understanding experience in interactive systems. *DIS 2004* pp. 261–268). Cambridge, MA, USA.
9. Hamilton, J., & Robinson, W. H. (1995). *William Heath Robinson*. Brighton: Pavilion.
10. Hollan, J., Hutchins, E., & Kirsh, D. (2000). Distributed cognition: toward a new foundation for human-computer interaction research. *ACM TOCHI, 7(2), 196.*
11. Hornecker, E., & Buur, J. (2006). Getting a grip on tangible interaction: a framework on physical space and social interaction CHI 2006 (Vol. 1, p. 437).
12. Kling, R., & Star, L. (1998). Human centered systems in the perspective of organizational and social informatics. *Computers and Society*, *28(1), 22-29.*
13. Krippendorff, K. (2006). *The semantic turn*. London: Boca Raton.
14. Leary, M., & Kowalski, R. (1997). Social Anxiety. New York, NY: Guildford Press.
15. Mitchell, R. (2009). Physical contraptions as social interaction catalysts. *3rd International Workshop on Physicality*. Cambridge, UK.
16. Messinger, P. R., Ge, X., Stroulia, E., & Lyons, K. (2008). On the Relationship between My Avatar and Myself. *Journal of Virtual Worlds Research*, 1(2).
17. Nardi, B. A. (1996). *Context and consciousness: activity theory and human-computer interaction*. The MIT Press.
18. Nye, D. E. (2006). *Technology matters*. MIT Press: Boston MA.
19. Oulasvirta, A., Kurvinen, E., & Kankainen, T. (2003). Understanding contexts by being there *Personal and Ubiquitous Computing, 7(2),* 125-134.
20. Randall, D., Harper, R., & Rouncefield, M. (2007). *Fieldwork for design: theory and practice*. London: Springer-Verlag.
21. Schieck, A. F., Briones, C., & Mottram, C. (n.d.). A Sense of Place and Pervasive Computing within the Urban Landscape. *Space Syntax Symposium, Istanbul*
22. Suchman, L. A. (1987). *Plans and situated actions: The problem of human- machine communication. Cambridge*: Cambridge Univ Pr.
23. Wolfe, M. F., & Goldberg, R. (2000). *Rube Goldberg*. New NY: Simon & Schuster
24. Weiser, M. (1993). Ubiquitous Computing. *COMPUTER* (vol 26 no. 10) 71–72