Advancing Ambiguity

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ABSTRACT

Ambiguity is an important concept for HCI because of its pervasiveness in everyday life, yet its emergent nature challenges the role of design. We examine these difficulties with regards to Aoki and Woodruff's [1] proposal to use ambiguity as a resource for designing space for stories in personal communication systems. We challenge certain assumptions about ambiguity and propose a set of design and evaluation guidelines that flow from this re-conceptualization of ambiguity and design.

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Ambiguity, interpretation, CMC, design

ACM Classification Keywords

H5.m. Information interfaces and presentation (e.g., HCI): Miscellaneous. H.4.3. Information Systems Applications: Communication Applications

INTRODUCTION

One of the many challenges facing HCI is the conceptualization and treatment of ambiguity in design. Gaver, Beaver, and Benford [7] defined ambiguity as the admitting of multiple interpretations and proposed this as a "resource for design" to the CHI community in 2003, in contrast to prevailing views of ambiguity as problematic or in opposition to usability and efficiency. Through art installations and critically designed HCI applications, Gaver and fellow designers have demonstrated the usefulness and value of ambiguity in design, such as eliciting self-reflection or heightened engagement [e.g. 2,5].

While the pioneering work on ambiguity in HCI could be dismissed as fringe work for art or critical designs, Aoki and Woodruff successfully demonstrate its importance for our ordinary, everyday interactions. Specifically, they examine non-responsiveness and subsequent face-saving activities in interpersonal communication, such as A failing to return B's phone call and later explaining, or accounting for her lack of response. Since B only knows that his call was not returned, there is space for A to explain her unresponsiveness with a story that both accounts for her behavior and maintains their social relationship. These are not "stories" in a pejorative sense; instead, Aoki and Woodruff emphasize that space for stories, regardless of their veracity, is essential for maintaining and nurturing social relationships.

In light of this understanding, Aoki and Woodruff caution that typical design objectives for new Personal Communication Systems (PCS) may jeopardize the space for stories because they may reduce ambiguity by: 1) improving the effectiveness of transmitting information, by providing more information and awareness about our communication partners (e.g., "lightweight communication") or 2) offering more opportunities to initiate communication and share information (e.g., "always on" mobile technology). Within this analysis, however, is a problematic assumption: that more information necessarily leads to less ambiguity in social relations.

In the present paper we review and critique the significant contribution on ambiguity in design made by Aoki and Woodruff, and then take up their call to develop further the theoretical, design-oriented and evaluation principles raised in their piece (p. 189). In particular, we draw on the human communication and pragmatics literatures to re-examine the conceptual relationship between technology design, evidence, intentions and ambiguity, and we develop design and evaluation principles for PCS's that flow from this re-conceptualization. Although privacy issues are clearly related to ambiguity in design, we do not discuss their implications here (see [7]).

RE-CLARIFYING AMBIGUITY

While it is intuitive to assume that more information in a given situation should reduce ambiguity, research in human communication and pragmatics [e.g.4] suggests that this is an oversimplification of the relationship between information and ambiguity. This is especially the case in the context of interpreting the intentions of social actors in mediated communication. We argue instead that the information afforded by various PCS's shape the interpretation, or story space, and that this space evolves

over time through the development of conventionalized interpretations of ambiguous situations.

Research examining meaning and understanding in social interaction suggests that it is not possible to know with absolute certainty the intentions of another social actor [e.g. 4]. Instead, we interpret intentions of others based on available evidence, which may vary in quality. For example, the failure of A to return B's instant message provides only weak evidence regarding A's intentions. That is, the range of interpretations regarding the non-response is quite open. Stronger evidence may come from an away message stating that A is away from the computer, but this is not entirely conclusive evidence either (e.g., A could be at the computer but not wishing to be interrupted). Even in a perfect information transmission setting, in which B knew everything that A was doing, and B was able to communicate freely with A, B cannot with absolute certainty know what A's intentions are (e.g., A can be providing misleading evidence, mistaken evidence, etc.). Our assessments of others' actions in our social relationships are always based on our interpretation of the relevant evidence (see Fig 1).

In this approach, ambiguity emerges from the multiple interpretations available for any intentional act in a social relationship. As such, evidence does not necessarily reduce or eliminate ambiguity, but instead constrains and shapes the space of possible stories or interpretations of an event or behavior. In interpreting intentions within social interactions and relationships, we are always faced with ambiguity.

Human communication has developed a number of strategies to deal with the ambiguity inherent to social interactions. One of the most important strategies is the development of conventions to account for frequently recurring ambiguous situations [4], such as non-responsiveness. For example, users of "push-to-talk" technology have very little evidence regarding the intentions of their partner when there is a delayed response, a frequent event in "push-to-talk". Over time, and with use of the technology, users tend to converge on a salient explanation to account for the delayed response (e.g., by interpreting their partner as busy or otherwise occupied) [1, p. 185]. While ambiguity remains, the story space narrows as interpretations become conventionalized.

In sum, the various types of evidence provided by different PCS's do not simply reduce ambiguity in a simple one-to-one relationship. Instead, technologies can provide evidence that shape and mold the story space available for accounting for our actions within social relationships. If this is the case, what are the implications for ambiguity in evaluating and designing space for stories?

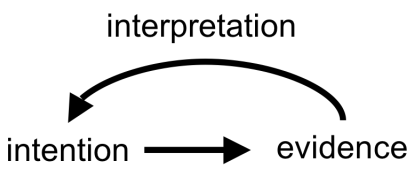

Figure 1. Intentions are always a matter of interpretation.

Designing Space, Not Stories

The charge to create space for ambiguity echoes moves in HCI to design *for* experience, place, or appropriation [e.g.8] rather than designing these aspects *into* a system. In this section, we examine Aoki's and Woodruff's designs and suggest ideas for maintaining the goal of designing space for stories as opposed to designing the stories themselves.

Aoki and Woodruff's design for non-responsiveness revolves around the idea of leases that moderate access from mobile phone callers. In their first example, people possess a limited number of lease contracts that expire over time. This expiration provides a face-saving story for asymmetric desires to cease contact (i.e., A wants to end communicative association with B). In the second scenario, the lease expires if the users do not engage in enough proximal contact, measured through the context-aware functionality of their phones. This design allows social partners to blame the structure of the lease for the cessation of mediated access to one another (i.e., if A and B are not around each other enough, the technology and not one of the social actors, ends the association).

Both lease examples run into a similar problem: they tell stories as opposed to *creating space* for stories. In the first scenario, the dejected partner is told, in a sense, "I'm sorry, but you are no longer in my top list of contacts." In the second scenario, the termination of contact allows for non-responsiveness but does not allow for the important collaborative act of face-saving to follow. The leases allow for dismissal but fail to account for face-saving as a collaborative act where both parties agree to maintain harmony.

This could lead to the conclusion that the designs simply failed to address the face saving activities they were designed for, however, there is an additional caveat. Leases are proposed as an alternative to screening calls because the latter is a burden and requires changing one's behavior. However, managing a series of leases all with different parameters and properties would also require new behaviors and present new burdens. The point here is that space already exists for explaining unresponsiveness (e.g., "my phone was off," "I didn't have reception," etc.). This does not suggest that there is no role for design, that space for stories exists no matter what we do, but this observation suggest the need for further guidelines.

Design Provocations for Creating Space

In this section, we use existing PCS designs and propose new ones to reconsider design spaces for the emergence of ambiguity. These provocations are influenced by [7] but focus on face-saving and non-responsiveness with PCS's. As provocations, the design ideas require implementation and testing before developing into set guidelines.

1. Design for Opposites

Designing for non-responsiveness suggests telling stories whereas designing for both responsiveness and non-responsiveness suggests creating room for stories. The lease errs on the side of supporting one and not the other – why have a lease other than wanting it to expire? A lease presumes temporality rather than the fact that relationships will often go through periods of close, distant, desired, and undesired contact.

Instead, consider the effectiveness of Caller ID for both responsiveness and unresponsiveness [3]. 'Alyson' may use the feature to take or to screen calls. She may even play with the fact that calls often appear with the number 'withheld' as a reason for not answering one. Or, consider the feature of a vibrate ringer, ostensibly designed so she can still take calls without disturbing others. She may also use this feature to claim she didn't respond to a call because she didn't hear it. One way of perhaps improving the lease idea would be to push it in the opposite direction, toward responsiveness. If 'Darcy' knows a lease could also be used to effectively maintain contact, then he won't immediately draw the conclusion that he was demoted to a relationship requiring limited access.

2. Design for Convention Building

This second guideline concerns the transparency of shared evidence. If Darcy knows what his caller knows, and they both know how features of their systems work and can be manipulated, this allows the space to construct stories to maintain their relationship in the face of unresponsiveness.

As a possible example of this feature, current mobile phones give individuals information about their own calling context, e.g. signal strength, but not about the person they are calling. Imagine instead if Darcy calls Alyson and after a series of rings, he goes into her voicemail and leaves a message. In his 'calls made' directory, he sees the time of his call and Alyson's signal strength (high, low, unknown). On the flip side, in Alyson's 'missed calls' directory she can see what information was shared with Darcy. In other words, she knows what he knows and can decide whether to use signal strength as part of the story about missing his call. If they both know her signal strength was low, this is a plausible reason for non-responsiveness. If they both know her signal strength was high, this is no longer a possibility. This additional information reshapes rather than reduces the available space for stories.

3. Design for Something Else

Related to designing for opposites is designing for something else all together. This is a call for oblique design, designing for alternate experiences that in turn allow space for stories. By way of example, consider the eMoto phone messaging system designed for communicating affective information in multi-media phone messages [6]. Although this seems to have nothing to do with non-responsiveness and face saving, one could imagine the additional affective information being appropriated for such service. For example, imagine Alyson has not heard from Darcy in a long time and suddenly she receive an eMoto message with the text "Hi, how you doing?" set against a dark somber background. She might interpret this as evidence that he had been feeling blue and this was why he was out of touch. She may even offer this interpretation to Darcy, providing a new space for a face-saving story.

4. Design for Extremes

The guideline of designing for extremes is related to strategies advocated by Gaver et. al. to "block expected functionality" or "introduce disturbing side effects".

We used these strategies to push on one of the troubling aspects of the leases – the fact that sharing culpability with your mobile phone means you also share control. What if we pushed the idea of culpability to its extreme? Imagine a phone with its own personality that becomes subversive or subservient for no apparent reason (see Fig. 2). Unanswered calls or calls cut off mid-conversation result in explanations such as: "I'm sorry. My phone got up on the wrong side of the bed," or "Ugh. Sometimes my phone has just got a mind of its own. I treat it right and this is the service I get." Contrary to the lease example, which provides a backdoor for eventually ending a relationship, the personality phone is more random and unresponsiveness therefore seems less targeted or premeditated.

5. Design for Over-Interpretation

The final provocation is also partly inspired by Gaver et.al's strategy to point out things without explaining why and to over-interpret data. This inspired us to think about the idea of un-responsiveness itself. Why design simply to explain away un-responsiveness? Why not design to draw attention to or augment un-responsiveness?

For example, imagine if Alyson's messaging client had a pause embellisher (Fig. 3). Each time she paused for more than a set number of seconds, the vacuum is filled with original music or animations leading to a new explanation for delays: "Oh, I'm sorry, I was watching my pause."

Figure 2. A phone with a hang-over.

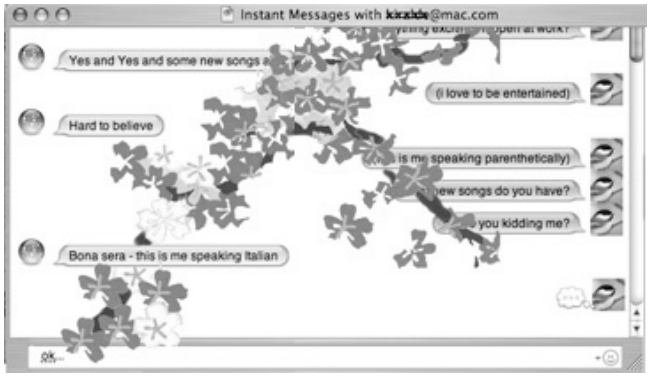

Figure 3. The Pause Embellisher: Cherry Blossoms blooming during a lapse in conversation.

We present the above ideas as provocations for inspiring ambiguity in designs for unresponsiveness. These prompts are not exhaustive, but serve as a stimulus for developing the conversation around designing for space and not stories.

Evaluating Space for Stories

Since ambiguity is theorized as situated and constructed, the evaluation of a system must also account not only for the features of a system but the specifics of the situation in which the features are drawn upon for face saving acts. Aoki and Woodruff make this same conclusion when they critique an isolated features-based analysis of different PCS's (p.186). We agree and underscore two important limitations in this analysis. First, in the push to talk system they evaluate, the participants are described only briefly as a close-knit group of college students. However, the characteristics of the people interacting with the system, for example their experience with cellular radio or their use of other media for communication, is critical for understanding how they interact with the features of the system under review. The situation they are placed in is equally important: how was their experience framed? A group of security guards in a work environment will likely use the same cellular technology in different ways. In other words, the features themselves are not by themselves responsible for their uptake and appropriation [3].

The second reason for evaluating space for stories in use is that the salience of different features may change over time. In other words, not only would different people respond differently to the same set of features, but the same group of people will likely develop new conventions over time for the same set of features. For example, when a user first begins using a new channel such as instant messaging, the synchronicity and one-to-one support of the medium, like a telephone, may prime the user to expect undivided attention and immediate responses. However, over time and use, the user may start to re-conceptualize instant messaging as a staccato medium, with a pace of starts and stops. At this time, the recordability of instant messaging may become a more salient feature drawn on for story-making.

In summary, the evaluation of space for stories suggests orienting away from the goal of predicting a set of feature's impact on the emergence of space for stories and instead evaluating the features' impact on the story space in the specific context of use. As designers, our scope of control and influence lies with the attributes of the system, but as evaluators, we must account for expectations and conventions of people in interaction with these designs.

CONCLUSIONS

The work of Aoki and Woodruff to bring ambiguity to everyday designs represents an important advance in HCI and here we attempted to take up their call for further theoretical and design work. At the theoretical level, we have emphasized the importance of not mapping ambiguity in one-to-one relationships with evidence or media features. Instead we propose that the impact of evidence provided by PCS's must be considered in the context of how it shapes the story space for accounting for behavior in a social relationship, and how the story space changes over time as conventions develop with use. With this theoretical starting point we have proposed a series of provocations for maintaining space for stories and the implications for evaluation of ambiguity in use.

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