Treading Uncommon Ground: Designing for New Shared Experiences through Appropriation

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ABSTRACT
To construct design strategies for the appropriation of everyday common technology, we adopt Clark's theory of language use as a framework for the creation of meaning, practice, and convention. We then discuss other language-based design strategies for appropriation, and propose a spectrum of attributes to act as a guide in the design of context-aware technology for public spaces. As an example of such a system, we present Imprints, which was designed to enhance the role of museum visitor participation beyond information receiver to an active creator of new conventions through social awareness and expressive license.

INTRODUCTION
Technology design for experience evokes connotations of rich, complex, authentic engagements that defy the traditional codification and abstractive approach to system design. Designing *for* experience as opposed to designing experience into a system requires leaving the system open to appropriation and interpretation by people who adopt the technology [6,15]

Appropriation of technology has been explored from a variety of perspectives – historical, critical, sociological, psychological, to name but a few [8,16,18]. Some pundits claim that our culture today is defined by appropriation [11], although there exists the recognition that culture has always evolved through a dance of assimilation and accommodation. From these accounts, the conclusion emerges that people will and do appropriate technology. The retrospectives about this phenomenon detail how technologies are adapted, but strategies to promote adaptation must still be inferred.

In this position paper, we begin with a brief look at how language, as an everyday common technology, is appropriated and how theories of language use inform the way we think about design. Next, we look at specific strategies in designing for appropriation and explore these in a series of projects. We identify several areas for future exploration in the search for guiding principles for creating design conversations open to user participation and direction.

UN/GROUNDING FOR APPROPRIATION
We have found Herbert Clark's theory of language use [5] an instructive lens for looking at appropriation. In Clark's theory, language use is portrayed as a collaborative activity in which meaning is constructed by building on common ground, which refers to the mutually shared experiences, mores, expectations, propositions, perceptions, etc. of the collaborators. The development of syntax governing language, for example, is a form of common ground. We understand sentences partly through agreed upon rules for subjects, verbs, objects and other parts of speech. The dependence on common ground for future common ground presents 2 interesting questions: if common ground is constructed on common ground, where does common ground start? Where do new conventions come from? Clark dismisses these thoughts as a philosophically interesting but not practically relevant. However, we would posit that new meanings and practices, and therefore insights for appropriation, are forged through treading on uncommon ground.

Despite Clark's minimization of the problem, he does reflect on the movement from uncommon to common ground. When shared common ground between participants does not exist, for instance, he suggests common ground may still be forged through misapprehension. In other words, people may start with a false sense of shared understanding or experience. Ultimately, their new construction of common ground becomes the solid base for building as opposed to the original mistake. Anyone who has taken on a new subject area of study, and discovered years later that he or she had misconstrued one of the fundamental tenets has experienced this type of grounding from the uncommon. Manipulating misunderstandings or confusion may have relevance for appropriation design strategies, but for the purpose of this paper we will concentrate on Clark's treatment of playful language as another scenario depicting movement between common and uncommon ground.

In discussing playful and non-literal language, such as irony, hypothetical speech, and imaginations, Clark identifies two aspects of language use relevant for appropriation. In the use of exaggeration, for example, one of the reasons it works, is because there is awareness of the violated norm. To say something like "I am so tired I could

sleep for days" is meaningful to people because they are aware that this dramatically exceeds convention; the chance of someone taking this statement literally is therefore diminished. The appropriation of language in this way succeeds because it includes a signal in the form of the violated expectation to give a clue for how it should be interpreted.

In addition to awareness, the second important aspect about playful language is the license to play. This license is illustrated well through observing irony in action. Irony partly works through the construction of in-groups and out-groups, like an inside joke. The signal that someone is speaking ironically need not come from the actual statement uttered but through who is privy to the inside meaning. If I make the statement, "what a hat!" to someone wearing a particularly obnoxious lid, I would be using equivocal language meant to not hurt the wearer's feelings. In this example, there is no in-group/out-group distinction. But, if I said "what a hat!" to one of my friends regarding a third person, an in-group code is established and communicated. In this example, the same sentence, even expressed with the same tone, can be appropriated for different uses: in the first case for politeness, and in the second case for conspiracy.

This admittedly surface look at Clark's theory of language use provides insights into how appropriation of an everyday technology, namely language, happens. The movement between the uncommon, i.e. the lack of shared experience or meaning, and the common ground underscores the importance of two important aspects. First, it is through awareness of conventions that rule-breaking can occur with intention. This suggests that conventions not only allow for communicating existing experiences but as a foil for forging new ones. Secondly, appropriation also requires the license to participate or play with forging new ground. In many cultures, this license to use language and speech freely is held as a right to be protected dearly. We draw on both these insights in designing technologies for appropriation.

DESIGN STRATEGIES FOR APPROPRIATION

Several designers have been exploring strategies for appropriation through a form of language use, namely literary and artistic tropes. Michael Mateas [13] uses the term 'interpretive flexibility' to describe systems open to interpretation or appropriation. In interpretively flexible systems, meaning is negotiated between the user, designer, and the computational intelligence of the system itself.

Phoebe Sengers, Mateas, and colleagues [14] have been exploring a range of narrative strategies for developing believable and engaging systems. With the Influencing Machine, Sengers and collaborators [10] projected child-like drawings and ambient sounds, in response to users' selections of evocative postcards, as a stimulus for storytelling about machines and emotions. As users fed their cards into a mailbox 'machine', they constructed narratives to each other in terms of whether the machine's output was influencing them and their emotions or if their emotions and input were influencing the machine. In this example, the ambiguity of both the input to the system and the output from the system allowed users the space to interpret the meaning or intent of the system.

Bill Gaver, Jake Beaver, and Steve Benford [7] unpack the nature of ambiguity and its potential for HCI through a review of both computational systems employing ambiguity and non-computational examples from the world of art. In these examples, ambiguity defines the interpretive relationship between the user (visitor or participant) and the artifact or system. In other words, ambiguity is not only a property of objects but depends upon qualities, such as expectations, of the people who complete this relationship. Although a two-part equation, Gaver's, Beaver's, and Benford's critique focuses primarily on the properties of the object. They outline several strategies in terms of designed objects for promoting ambiguity, or a relationship marked by openness to interpretation.

The list of strategies or tactics outlined by Gaver et. al. could be regrouped into two categories: tactics of production and desired results. On the production side, they discuss employing techniques such as: imprecision or incompleteness (what they refer to as digital sfumato), exaggeration (e.g. over-representation or augmenting something that is usually unnoticed), inconsistency, incompatibility or incongruity (e.g. crashing different genres or contexts together), novelty (e.g. new roles, results, or activities), and absence (e.g. withholding expected results or information).

Many of these tactics could be conceived of as forms of 'defamiliarization' [3] where the familiar becomes strange or the strange is introduced into the familiar. These tactics alone or in combination lead to the following types of reactions: casting doubt, destabilizing, stimulating surprise, causing reflection, and invoking curiosity or creativity. In the language of Clark's theory, these results could be conceived of as treading uncommon ground. All of these tactics and reactions characterize an interpretive relationship between people and systems as an evocative, and perhaps even provocative, relationship as opposed to a didactic one.

The design strategies identified here for ambiguity, narrative involvement, and interpretive flexibility, speak to addressing some of the conditions of appropriation inherent in language use and the creation of new conventions to move between uncommon and common ground. In terms of 'awareness' of conventions and rules, these design strategies are deliberately employed to heighten people's perceptions of the changeable and jar them out of the status quo. In terms of the license to participate, this is invoked through the non-didactic nature of the message inviting, and in stronger cases requiring, participation in assigning meaning.

Design Appropriation for Public Spaces

The work mentioned above has greatly informed our work in developing context aware systems for public spaces. First, we are interested in providing alternatives to the mainstream developments of context-aware ubiquitous computing where the emphasis lay in making the system both smarter and more invisible. Instead, we use these same systems for increasing people's awareness of context and the role systems play in defining this context. Furthermore, as these systems become more embedded in everyday places, we were interested in how people would appropriate these systems for everyday meaning-making activities.

The tactics for designing flexible and adaptable systems as introduced above provide a valuable guide for exploration. But a tactics list is not a simple recipe for success. We plan to explore these tactics in a range of systems to understand varying effects of these tactics in isolation and in combination. Further, we want to begin looking at the second part of the equation identified by Gaver, Beaver and Benford, namely characteristics of people involved in the use and appropriation of the system.

As a starting point, we can describe one of our designs in relation to the specific ambiguity tactic identified by Gaver, et. al. of 'offering unaccustomed roles to stimulate imagination.' The setting we are working with is a public art museum where visitor roles are conventionally circumscribed as an information recipient [2]. The resulting technology designed for this role supports information transfer from the expert curator. Context-aware functionality for technology systems in museums tends to be used in order to 'optimize' this information delivery. For instance, location awareness systems tell visitors where they are in the gallery and usage pattern algorithms learn visitor preferences to tailor the information presented.

We use variants of this technology to cause reflection on other aspects of the museum experience, such as the presence of people, the inflection of mood, and the continual negotiation of meaning as people navigate the range of resources available (e.g. the art itself, additional curatorial information, the reactions of other visitors, etc.). We create systems that people can use both as information producers as well as consumers, so that they are active participants in the formation of new conventions in the museum experience.

In one of our earlier attempts to create an available channel for information production, visitors could leave comments and questions behind while they used the handheld tour guide [1]. Despite the invitation to participate in the creation of common ground between other museum visitors, however, users felt they lacked the expert license to comment on the exhibited art, and the channel was left largely unappropriated.

In other words, just having the channel and drawing awareness of this new potential role was not enough to create license to participate. Therefore, we chose to begin by drawing awareness to activities visitors already engage in for implicitly commenting on the museum experience. By drawing on this implicit behavior, we seek to reduce the perceived inequality between the commentary license of the curator, the creative license of the artist, and the relative lack of license of the visitor to manipulate and modify the social space of the museum

With this approach, we take the same usage information of context-aware systems, but rather than using this solely as input to the system, we present this as output to visitors for them to appropriate. By varying the format of this presentation, we wanted to explore whether visitors would use information about their own presence and patterns solely as a tool, e.g. for navigation purposes, or if they would also see this information they create as a type of artistic expression.

Initial tests of possible display representations [1] led to the identification of six attributes of such systems that we will explore in detail through various installations. By playing with these attributes, we can try to identify how they work in combination, or alone, and how these attributes correlate with different characteristics of people who participate. These attributes, bulleted below, may be best understood as spectrum with polar states.

Comment [SH1]: whose equation? gaver et al.'s?

1. *Familiarity to the Strangeness*. On the one end of this spectrum, the information represented is a literal mapping such as dots on a floor plan to represent people in the space. The other end of the spectrum is more abstract or metaphorical in representation and information, such as the depiction of changing mood or atmosphere through an animation of moving colors and shapes.
2. *Systematic to Randomness.* This spectrum can be described as a light switch on one end, with a systematic one-to-one mapping between cause and effect, and random chaos on the other end.
3. *Framing.* A highly framed installation leans toward the didactic with visitors given strong clues for how to approach or engage with the information. At the other end of this spectrum, very little guidance is provided. It is important to note however that although this continuum seems easy to describe (frame/no-frame), it is difficult to control since the museum itself is a frame and people bring their own frames of interpretation with them.
4. *Finding Self in the Collective.* This is a more specific continuum that arose from our initial studies. People immediately tried to find their mark in the collective displays. We therefore found this to be an interesting

attribute to play with – i.e. how transparent one's own impact is versus the impact of others.

5. *Immediacy of Feedback.* The immediacy of feedback is related to the ease with which a visitor could find his or her own effects. In some installations, feedback will be immediate whereas in others it will be delayed.
6. *Integration with Surroundings.* An installation may be highly integrated with its surroundings in terms of content and/or in terms of form. For example, an installation that reflects similar themes to other objects in the gallery would be more integrated than an installation which was more generic.

Our biggest challenge with the spectra outlined and the development of different installations is the relative subjectivity of where a particular design will fall along these axes. As a starting point, we chose to begin at one of the more polar ends with an installation that rated high on familiarity, systematic, framing, 'self in collective', immediacy of feedback, and integration with surroundings. By examining how different people interacted with this configuration of dimension, we could then compare this with installations of varying configurations.

Imprints in the Museum

.Drawing from the spectra above, we created Imprints, a system designed to leave traces of visitor presence in the museum. Using an exhibit of the works of the Byrdcliffe Arts and Crafts Colony as a backdrop, museum visitors could personalize a digital imprint and associate this personal mark with their handheld tour of the gallery.

Prior to starting the handheld tour, visitors could make an imprint on a tablet PC near the handheld checkout point. The Imprint program had two steps: 1) selecting a background that represented the Byrdcliffe Arts and Crafts aesthetic, and 2) using the calligraphy style pen to enhance the pattern with their personal addition (Figure 1). If a user chose not to create an imprint, a default image was randomly assigned.

In designing the Imprint system, we strove for a simple palette that would produce an aesthetically pleasing mark with minimal effort, but would also allow visitors a high degree of personalization. At the same time, we needed to alleviate potential hesitation due to feelings of inadequacy in creative or personal expression so that museum visitors would feel free to engage in an experience that builds from existing common ground but explores new ground.

Once the imprint was saved, two displays were created: a handheld display and a wall mosaic, both which attempted to push on the notion of finding the self within the collective. The handheld display was intended as a tool-like form of social navigation. As the visitor selected content modules about objects on the handheld tour, their imprint would be left behind with these objects. Visitors could then ask the question "Who else visited this object?" and see the imprints of previous visitors. The second display (Figure 2) was projected onto the museum wall as a more art-like reflection of collective presence in the museum space. As an attempt to integrate the display with the surroundings, a photomosaic of a piece of Byrdcliffe pottery constructed from the individual imprints of all visitors was selected as the projected image.

A content analysis of the created imprints was conducted where imprints were coded in terms of pattern selected, type of marking added by the visitor, and the coverage of the visitors' mark. The most common, out of 12 possible patterns, were the two open frames (31.2%) indicating the desire for a high degree of freedom in creating one's mark. In terms of the mark added, signatures and initials, a readily apparent form of personalization, constituted the bulk of the markings at 32.1%. The least popular mark was simply tracing the existing pattern (5.5%), suggesting that people were not simply mimicking the pattern but attempting to add something unique or personal on top. Finally, the majority of marks used the entire background canvas (42%) whereas a much smaller percentage of marks

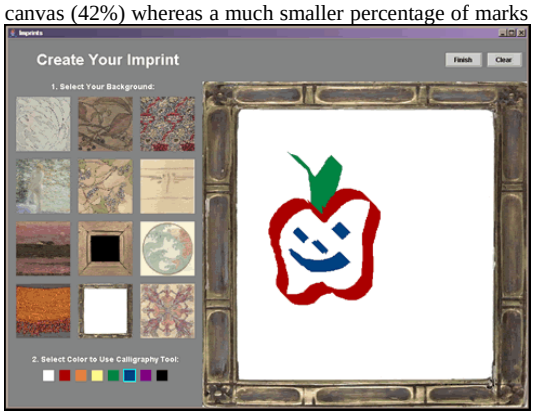

Figure 1. Imprints interface with created imprint

Figure 2. Projected photomosaic

(5.5%) were minimized and pushed to one of the corners. In sum, these data suggest that visitors appropriated the patterns provided for some form of personal expression.

Networking difficulties prevented the imprints from appearing consistently on the handheld. Initial evidence, however, suggests that visitors recognized the potential of the imprints as a stimulus for reflection on social presence.

Log data from survey respondents (a subset of 62 tour logs) showed that 95% of these visitors asked the question "*Who else visited this object?*" at least once, indicating that the opportunity to see traces of others provoked curiosity. Whereas some visitors looked for commonality and connection in the traces left behind, others looked for differences. Regardless, the data suggest that visitors were able to construct social narratives regarding the use of the imprints on the handheld.

The display of the imprints in the mosaic (see Figure 2), however, was more difficult for people to understand in the context of the appropriation of social awareness and the ability to judge self within the collective. Several interviewees commented that although the mosaic was interesting, they weren't sure what to read into it: was there some greater meaning to the collection and placement of imprints? In this vein, several people tried to figure out how they might design their imprint differently in order to make their imprint bolder or position it in the center of the mosaic. They wondered if there were rules they could have played with or if the mosaic was simply random.

FUTURE DIRECTIONS

The design of Imprints attempted to support new forms of expression through reflection of existing behaviors. The evidence collected through interviews and log files suggests a degree of reception to technology designed for personalization and social awareness. The configuration of the system in terms of the spectra of familiarity, systematic mapping, explicit framing, immediacy of feedback, high degree of self in collective, and high integration with surroundings may have led to its appropriation as a type of social navigation tool as opposed to collective artistic expression. In future installations, we intend to change these spectra in order to see what new types of interpretations and appropriations result.

However, an additional run with the Imprint system in its current format is required as well in order to achieve greater technical stability. Furthermore, initial data analysis has shown little demographic effects on people's reception and use of the system. We will continue to look at this information over longer periods of use as well as add more characteristics such as tolerance for ambiguity and desire for privacy may be expanded upon as well.

We began with language use as inspiration because of its prevalence and people's ready comfort with transforming and appropriating the meaning and use of words. Through the metaphor of moving between common ground and uncommon ground, we have identified awareness and license as important conditions or aspects of appropriation. Awareness of what is common acts as a form of scaffolding into exploring new experiences. The scaffolding plays an important bridging function as we discovered with initial attempts to allow for new forms of expression in the museum.

As computational technology becomes more ubiquitous in public places, we look to architecture to provide another metaphor to illustrate how users readily appropriate technology in physical space. Several studies [4,9,12,17] on how space is personalized into a place with emotional, social and cognitive bonds also shed light on conditions and strategies for appropriation. In a program such as Imprints, the language of personal expression and reflections of individual behavior become part of the syntax of the space itself. We therefore feel the intersection between communication and designed space will provide additional insights for future work.

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