Understanding Microinteractions as Applied Research Opportunities for Information Designers

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Designers and communicators who work in computational spaces often consider the "big picture" of information design. This approach requires researchers to scrutinize the complex nature of human discourse. They must also study the interactions with, and relationships to, technology as people speak with and write to one another. Humans communicate and computers operate within multilayered organizations or inside other complex information environments, so it is not surprising that these investigations of communication are frequently multifaceted.

Big picture research is characterized by various research methodologies. One popular example is the case study model of organizational knowledge management and communication practices that include thoughtful considerations of designers, products, audiences, and sociopolitical contexts. Such case studies may be designed to catalyze practical improvements within an organization as well as generate new ideas and theories about information design. While useful in many ways, this popular, expansive category of applied research has led to a gap in knowledge and an opportunity for additional focusing. This gap has emerged because more narrowly focused design details within these environments are left unconsidered or are insufficiently analyzed.

Details like these are important since they generate insights into particular patterns of user activity. These insights add to a comprehensive understanding of the holistic experience of users as they interact with products and software. For example, applied research studying information communication practices as they

exist in organizational ecosystems (e.g., Davenport & Prusak, 1997) is necessary and important, but this type of broad investigation may sacrifice analysis of very specific interactions that occur within those products in tightly defined boundaries. These low level features are useful in describing how audiences interact with information and information systems.

The purpose of this paper is to explore more narrowly focused units of inquiry within information design and to suggest one strategy for methodically discussing these issues using microinteractions as natural boundaries for investigating user experience. This approach suggests a new area of opportunity for applied research with the potential to contribute fresh ideas of practical value for use in the study and design of information systems.

Microinteractions Explained

The microinteraction is an area of opportunity for information designers to consider as a framing tool for naturally bounding user experience in applied research studies. Applied research in this context means systematic inquiry designed to generate practical outcomes in information communication practices. A microinteraction is a small function within a larger system or product that is dedicated to a single task and only does one thing (Saffer, 2014). Examples of microinteractions in which users frequently participate include silencing a phone using the mute button, completing a signup form on a web site, typing into a form field that evaluates the password's security strength, or posting an entry on Facebook. Microinteractions are useful for many informational tasks such as accomplishing a focused objective, connecting information and devices, displaying small units of data, adjusting settings, or turning features on and off.

Triggers, rules, feedback, and loops/modes are the components that make microinteractions work (Saffer, 2014). Triggers are actions that signal the start of a microinteraction. In a mute microinteraction, the trigger is the button, switch, or rocker panel on a user's mobile device that activates the muting feature. Although many triggers are physically or virtually initiated by

humans, a system can also activate a trigger by automatically responding to behaviors or data within the system. Automatic triggers are activated according to internal or external events. Such events may be connected to any number of things such as the event handling state of a software program, the time of day on a local PC, the proximity of a mobile device to predetermined GPS coordinates, or the current weather conditions near a sensor array.

Rules are logical parameters that specify the mechanics of a microinteraction. Rules establish boundaries for functionality and describe the behavior of a microinteraction. When a trigger is activated, the system enacts these rules so that appropriate and expected responses are provided to the user. When a mobile device is muted, for example, the rules specify the electronic procedures that are activated to physically mute the device. Rules also display the feedback provided to the user to demonstrate that the muting feature is initiated. Such feedback may convey visual (e.g., showing an icon badge), haptic (e.g., starting vibration), or auditory (e.g., sounding a beep or tone) information in discrete or combined forms. Rules can be complicated, however, in that there are often exceptions or irregularities within the system that must be considered and accounted for.

For example, Apple's decision to allow external alarms to bypass the mute state provided for an interesting anecdote, and an infuriated audience, when a New York Philharmonic orchestra was interrupted by an executive's iPhone alarm (Saffer, 2014). However, not including this rule would mean that individuals who accidentally left their device in the mute state at night would not be awoken by their alarms, leading to frustrated users. Apple engineers decided that despite being muted, the rules of the iPhone mute microinteraction should allow external alarms to play audio. As this example illustrates, rules within microinteractions deserve careful consideration and may present conundrums in which designers must choose between two or more imperfect solutions to design challenges. Feedback can be useful in these situations to signal the current state of rules and use information design to better communicate the affordances of microinteractions to users.

Feedback occurs when microinteractions provide information back to the user in response to a trigger. In a metaphoric sense, if good

interactivity is comparable to good conversation (Crawford, 2002; Garritt, 2006), then feedback allows a microinteraction to *speak* after a period of *listening*, or waiting for a user-generated or automatic trigger to occur, then *thinking*, or applying its rules based on the state of the system. The purpose of feedback is to illuminate or clarify the rules of a device or system for its users (Saffer, 2014). A basic form of microinteraction feedback, provided when muting a mobile device, is displaying a colored band. This visual cue provides confirmation that the mode is activated and the rules associated with that state are now expected by users. This example illustrates why feedback is useful in already designed products, but feedback is also critical in the design of microinteractions. It can provide useful data suggesting directions for revision during iterative design cycles (Brown, 2009). For example, if user testing reveals that users are not able to easily identify feedback when triggers are activated, that is likely a problem that needs addressing in future versions of the product.

Loops and modes are used to customize the rules within microinteractions. Such customization creates additional flexibility through programmatic means such as conditional logic or repetition. Modes customize microinteractions by allowing them to focus on specific types of data. A hypothetical example is an embedded feature within a more complex vehicle-based application. The feature contains a mode that allows a user to enter a specific highway. The microinteraction then uses that single data point to provide an alert when traffic congestion is detected. Loops provide the ability to run microinteractions over and over again for some length of time or for a certain number of iterations. They also run infinitely or end only when a user shuts down a device. Loops are interesting within the context of microinteractions because they allow systems to adapt to the expertise of users. This can be accomplished by reducing the amount of contextual information provided to users as they become more familiar with a system. This is a strategic technique in information design known as progressive reduction (Saffer, 2014). Identifying the components and functions of microinteractions in a formalized, strategic way proves useful for applied researchers. For example, as the looping scenario above demonstrates, such an approach is useful to help researchers to

better understand progressive reduction and other tactics for information shaping that are of practical use to designers.

Strategies for Applied Research

What makes microinteractions particularly interesting from an applied research perspective is their fine degree of granularity. For example, microinteractions can be used as framing devices for focusing research questions. Consider a common type of microinteraction: the text box used to post data to an interactive web site. Rather than crafting a broad hypothesis that is difficult to evaluate, such as perhaps "Using collaborative Wiki documentation makes engineering groups more productive," considering the system's microinteractions might suggest more focused hypotheses that are easier to evaluate using tighter boundaries. Continuing the Wiki example, a reformulated research hypothesis based on a microinteraction might read "Engineers who post regularly to the group wall in the Wiki perform better in collaborative project work as evidenced by the length and quality of their postmortem technical reports." While this may or may not be a good hypothesis, the simple act of focusing attention to a focused area of the overall information system (the group wall postings) makes it easier to clarify and specify the way in which that claim will be evaluated.

Another area of opportunity in evaluating microinteractions from an applied professional communication perspective lies in identifying particular types of microinteractions that interact with other system components in interesting ways. Research in information architecture presents different heuristics with which to evaluate information systems. For example, web sites are analyzed and refined using strategies concerned with the grouping, labeling, navigating, and searching of information (Morville & Rosenfeld, 2007). Microinteractions can be clustered together according to a set of categories developed for context-specific purposes. The identified role of those types of microinteractions within information systems then suggests labels for the groups. If an information designer doing applied research were evaluating microinteractions within an online information environment, for instance, she might label and define groups such as these:

- **Dead-end microinteractions** are ineffective or poorly designed interactive elements that prevent users from moving into subsequent areas of an information system. An example is a password form field that is broken or disconnected. Locating and improving upon dead-end microinteractions means improving the overall usability and efficiency of an information system.
- **Bottleneck microinteractions** are small interactive elements within the environment that routinely frustrate users or prohibit them from progressing through an information system in a reasonable amount of time. The identification and correction of bottleneck microinteractions can be used as a means of quality improvement within the system. A CAPTCHA identification system which uses illegible characters that are frequently misidentified by users can be a bottleneck microinteraction. It might eventually develop into a dead-end microinteraction, if frustrating enough for users. Removing bottleneck microinteractions increases the speed at which information can be transmitted and received, thus creating positive changes within a designed system.
- **Gateway microinteractions** are interactions that must be completed before access to other areas of the information system is provided. A login page that is both a gateway and a dead-end microinteraction is particularly troublesome as it means a user would never be able to experience a system fully, since she could never progress past the login screen. Analyzing data from gateway microinteractions and using that data to improve designed entry points will likely lead to improved user retention and the recruitment of new users.
- **Springboard microinteractions** are small interactions that propel users into larger or more complex interactions, thus prolonging the virtual experience. Identifying springboard microinteractions provides opportunities for tweaking areas of an information system with the greatest potential for return on investment. A fun widget to change the hairstyle of an avatar in an online game is a springboard microinteraction that compels young players to spend additional time playing an online game. This data focuses designers and developers on product features

with a high return on investment. This return on investment can be measured quantitatively in terms of user experience satisfaction ratings, numbers of impressions (i.e., "hits"), or the duration of user engagement sessions.

This section demonstrated some potential areas of applied research that map well to existing strategies used in information architecture. However, there are also additional areas of potential for research using microinteractions that are also deserving of study. For instance, the boundaries suggested by microinteractions can be usefully combined with other design strategies in interesting ways. A technique such as journey mapping, which provides graphical representations of user experience over time (Howard, 2014), already captures microinteractions that are part of a user's session with a product. Considering microinteractions within this context does not mean developing a new product or strategy, but rather considering small subsets of information and experience with which to do data analysis. In this way, aggregate trends and themes can be identified that help a designer identify the types of productive or destructive microinteractions described here.

Conclusion

Sometimes, in order to understand big picture communication design, it is necessary to reframe large information scenarios into a collection of smaller units with more manageable and clear boundaries. Microinteractions provide one opportunity for this type of focused analysis. They are useful for highlighting clearly defined interactions within an information system and suggesting specific research questions that focus on those interactions. The resulting research that investigates those questions then generates ideas for the design of new products or the refinement of existing ones.

By evaluating a system in terms of its most basic features using microinteractions, researchers in information and communication design can drill down into system aspects that may be overlooked in more broadly scoped considerations. This technique creates new opportunities for applied research and suggests new ideas for

making practical refinements to existing information architecture products.

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