

# Personalized Interactions with Reality Based Interfaces

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## ABSTRACT

In this paper, we describe a perspective on the evolution of HCI toward *personalized* interfaces, moving toward unique customized interfaces that possess expressive qualities defined by their end-users. The increasing availability of personal portals and configurable skins, coupled with the means to distribute personalizations, allow a wealth of novel interface mappings to coexist. We reflect on potential social implications of personalization.

## Keywords

Reality-based interfaces, tangible interfaces, sensorialism, portals, customization

## INTRODUCTION

This paper aims to draw attention to the increasing ability for a user to have *personalization*, or *individual customization of sensorial expression*. The trend we are reporting is highly relevant to the discussion of reality-based interfaces [10], as we believe that the personalization aspect will give incentive for people to enhance their personal affinity and value for their interfaces. We describe examples of personalization, and discuss important features for promoting personalization: ease of customization and distribution.

We also propose some metrics for describing these interfaces. This paper is prompted by significant development of the next generation of interfaces which expand on the traditional desktop metaphor by enhancing sensory integration. Some of these initiatives revolve around augmenting graphics with touch and spatial orientation (such as augmented reality and virtual reality) [7], while others aim to emphasize the information available in the physical world (e.g. tangible interfaces and reality-based interfaces)[5].

These research fronts, however, have largely been focused on the *development of customized* platforms that support a wide range of specialized scenarios (for example, Figure 1 displays a information interface called metaDesk, which was only demoed in research contexts [5]). These research



**Figure 1. Tangible Media Group's metaDesk allows how users manipulate and display information simultaneously, demoed at the Media lab in 1997.**

tools have, with rare exception, not been commercialized for general use. There has been little incentive or ability for a large group of consumers to acquire non-WIMP interfaces such as tangible, augmented reality or virtual reality interfaces. In order for the next generation of HCI to become pervasive, we feel there must be a way for users to learn about and access new interfaces. These interfaces must also be easily reproduced or mass-produced somehow. The rest of this paper discusses some features of personalization, and how new, personalized interfaces can be made accessible to non-research users.

## BACKGROUND

We note that ergonomics and cognitive science have received much focus in prior interface design research. These research approaches are based on performance metrics, such as have led to enormous achievements in understanding how to design more efficient and intuitive interfaces, and improve accessibility for a general populace. For example, the desktop metaphor has allowed users to understand how to navigate a file system, and organize documents [15]. Meanwhile, ergonomics is assessed by means of Fitts law-type usability experiments, for example, target acquisition times for comparing menu layouts [14].

Rather than enhancing performance or increasing functionality, there is some evidence that there are other, features of interest for new interfaces. For example, one study found that although mixed initiative voice menus were efficient, users preferred system-initiative menus [17]. Other research has been done on more subjective measures, like pleasure and playability of an interface[2,3,4,8,11].



**Figure 2. This Ambient Orb (left foreground) allows a user to customize colors associated with trading activity.**

Along this line of thought, we believe personalization is another research area that is equally important.

### **PERSONALIZATION**

Personalization is the ability of an interface to be customized, by allowing the user to alter the sensory experience. (Examples of personalization are devices which support interchangeable faceplates.) Personalization allows the underlying utility of a device or application to remain the same, yet, the interface between the person and the sensory experiences are alterable. Some devices allow flexibility in the input/output method, like the Ambient Orb[1], allows users to map financial performance to color (figure 2.)

Personalized interfaces are interfaces that can be customized, allowing users some degree of flexibility in input/output modality, display and control. For example, a user may choose to increase the size of the buttons on their browser, or change the look of the buttons altogether. Instead of using a ring tone on a mobile phone, a user can decide to receive vibrations alerts. Sensorial, aesthetic mappings can be changed at the user's whim. Parts of interfaces can be pared down or augmented.

Personalization serves to enhance self-expression and identity, rather than optimizing the interface function. As objects are increasingly differentiated based on design, they begin to take on their own identity while reflecting the self-expression of their users. Consumers are increasingly more sensitive to branding, using design to differentiate themselves rather than being content with mass-produced functional products. Norman presents five different levels of customization, from no customization to creating a whole new product, and suggests that users inherently want to customize ("we are all designers", p.224)[16]. In any case, the two essential characteristics for successful personalization are *ease of customization* and *ease of distribution* for sharing the customized interfaces.

### **Ease of User Customization**

What makes personalization so interesting is the variety of product categories where consumers can now participate in creating the look and feel of the end product. Potential buyers are given many levels of choices, so the product

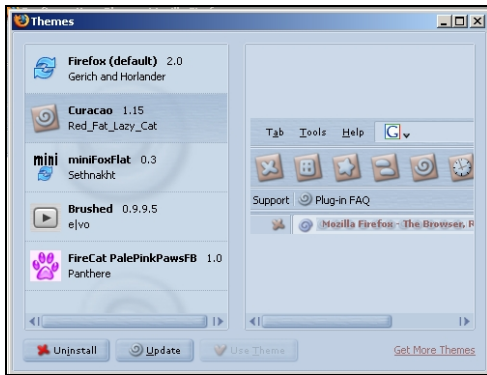
they take home is unique, designed around their personal preference. Instead of only choosing from among few possibilities, such as faceplates, buyers have the option of creating custom products that no other person may have an identical copy of. This flexibility in look and feel was a design approach that had been applied in fashion and accessories, and has finally migrated to other sectors.

For example, the Scion car model allows a potential buyer can specify what type of external body shape and internal audio features they would like ([www.scion.com](http://www.scion.com)). People accessorize their phones with custom faceplates covers, ringtones, backgrounds and tassels. The user can then differentiate their objects from those of other users.

Another example of personalization we'll discuss in personal portals. For example, Mozilla's firefox (<http://www.mozilla.org/themes/download/>), allows users to download themes and extensions that reflect the user's preference (figure 3). Themes (or skins) are mainly graphical alternatives to the basic interface (see figure 3 right), while extensions allow custom functionality specific to the user (such as the ability to have an Amazon or Google search bar). The ease of skinning a Firefox browser requires two clicks-- the user first clicks on the available skins to download and clicks again to select the theme to use. A restart is required, but the customization is executed within seconds.

These individualized portals reflect the preferences and priorities of a specific user. Another user might find another selection of sensory modalities, themes, and extensions more useful. Once changed, the sensorial experience of using the interface is unique to the user. For example, if interfaces were swapped between a business man's portal and a sixteen-year-old girl's browser, they might find the other person's interface unintuitive and inefficient. The businessman's phone might emphasize sleek lines, large screen display areas, and minimal audio and tactile display, while a youth might prefer bold colors, ornamental details, and loud audio and tactile stimulation. In response to an alert, the professional's device might vibrate while the teenager's device blinks.

In order to support personalization, designers should account for *how* personalization can occur, by creating a consistent mechanism for altering the experience of the product. DeMichelis and Susani describe consistency in their discussion of multifunction vs. general purpose interfaces[6]. The design team needs to specify the hardware or software interface available for customization and make an effort to simplify the process of customization. A user should be able to browse available options and select the ones they want, while time to configure the customization is minimal. In embedded devices, forcing a user to go to a website to configure their mobile phone, for example, may be too complex and involve too much effort.



**Figure 3. Firefox themes are selected by clicking on the button next to the graphic.**

### Ease of Distribution

A distribution channel for customizations is another key aspect to enabling users to successfully personalize their devices, software, or hardware. We see a vast array of internet tutorial sites for downloading custom versions of operating systems and applications (for example, Winamp, FireFox, Messenger). Many freely available and open-source software initiatives support downloading extensions and themes. Meanwhile, a mobile phone user can go into a convenience store and find accessories and faceplates. Most of all, the internet, combined with the established product distribution patterns help consumers access information and select among many personalization options.

## DISCUSSION

### Personal Fabrication

At the MIT Media lab, there is ongoing research in tools for developing nations, particularly in the context of Fab Labs (<http://fab.cba.mit.edu>), a project headed by Professor Neil Gershenfeld. Gershenfeld sees a revolution in personal computing called, personal fabrication. With the right types of tools and sharing of information, remote villagers can create their own workshops and make custom tools and share knowledge about their solutions through the internet[9].

Rather than just providing packaged solutions, visitors to Fab Labs can create and use their own interfaces to answer a need, or just for fun. Any code or examples are documented and shared online. As the ability to create customize interfaces becomes more widespread, we expect a vast array of different interfaces to become commodities, with exchanges happening and designs being adapted and reused. We cite evidence of solutions to problems specific to remote villages, such as testing water quality (Gershenfeld, p.167), or harvesting power (Gershenfeld, p. 90). As users are empowered to create interfaces to solve specific needs, they can share them, and new designs can proliferate throughout a community.

Similarly, popular websites like Hack-A-Day ([www.hackaday.com](http://www.hackaday.com)) and “make” magazine ([www.makezine.com](http://www.makezine.com)) allow people to learn about how to

create customized products from old electronics. Sites where customizations are downloaded often offer toolkits for creating and uploading new customizations, adding to the pool of selections

### Cultural diversity and Innovation

With the increasing availability of personalized solutions, we envision that diverse populations can participate in using new technology. For example, elderly web surfers might download themes with large buttons, or simplified menus and expect the same web surfing functionality as their grandchildren. Instead of relying on manufacturers to create and distribute solutions to interface problems, there might be grass-roots creation and adoption of unique solutions. Essentially, we expect that although there will be a proliferation of new interfaces, and that the interface grammars may get diluted; however, we expect that there will always be value added to the user.

### The Proliferation of Personalization

Most people are not creators, and in general, most people are consumers of content. With the advent of the internet and electronic publishing, it has become a lot easier for custom creations to be passed on and adapted. Likewise, the cost of manufacturing has decreased, and mass production of interchangeable parts is now designed into products at little cost to the consumer. As a result, we expect these personalized interfaces to be culturally rich and useful to many diverse and scattered populations. Instead of neglecting groups of users for the 95 percentile of a population, we envision that increased personalization includes previously untargeted user populations. Personalization could embody universal usability.

Personalization is the opposite of “context awareness”. There has long been a view of personalized interfaces relating to content that adjusts based on tracking the user’s behavior, such as in Amazon’s 1-Click or recommender systems. Context awareness is concerned with technology that can automatically adapt behavior. This is a misuse of personalization, with much potential for insensitive or miscues [12]. Personalization, as described in this paper, is directly controlled by the user, and relies on a user specifying behaviors for the interface. For example, a phone might be augmented with a custom accessory or bracelet. Instead of relying on the manufacturer to create an identity for the user, the user creates her own mappings so that when their friend calls the accessory lights up or vibrates.

### Humans Co-evolving with Technology

In future work, it might be helpful to have metrics for personalization, in order to better compare different products. As a starting point, possible metrics are: *variety*, *time to install*, and the *number of distinctive styles* the user is able to identify with. Affective characteristics, such as emotional tones or signals can also be used. Although these metrics might not help measure efficiency, they can certainly allow people to begin a dialogue on

personalization. It remains to be proven whether personalizations can be compared or how their effects can be assessed. McLuhan's the "medium is the message" urges researchers to examine the psychological and social impact of the adaptation of current interfaces [13]. Through personalization, better self-expression and identity may allow societies to communicate in new ways that change the nature of interactions. For example, in the case of Apple products or Saturn cars, brand affinity often becomes a social tie. Likewise, video gamers and hackers speak different languages and concern themselves with different social issues pertaining to their passions. Research can certainly be done to assess the different ideologies and viewpoints available to users of personalized interfaces.

### Convergence or Divergence?

For this workshop, there is a question about whether interfaces are converging or diverging. For the most part, we have discussed how products are converging to enable better interface personalization. While the actual interfaces are diverging in form and function, the ability to modify any interface according to a user's preferences is becoming standardized through common use or communal decision-making (e.g. the W3C consortium <http://www.w3.org/>). In essence, customization becomes a commodity, based on stable, but functional platforms.

### WORKSHOP PROPOSAL

At the workshop, the authors will demonstrate a mobile application with user interface that supports personalization. This augmented device will showcase some applications which might be useful in research on personalized information displays. While these implementations are very basic, we hope to provoke discussion on personalization applications.

### CONCLUSIONS

We have presented our alternate vision of the evolution of reality based interfaces. We hope that this paper has raised some thought-provoking issues about how society may adapt to increasing personalization of their interfaces. We also hope that research in personalization and development of supporting features are worthy of further research.

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