What Doesn't Change Across Form Factors in Interaction Design

Users.

Users don't change.

There are no new ideas in the combination of words below, you create the ideas and meaning as a viewer and user of this document.

Although the concept of 'the user' is perhaps the only thing that doesn't change across form factors when considering user experience design, the users, their selves, do change. Of course we know this is true because we are reactionary and adaptive organisms existing in a constantly changing environment. Our interests, capabilities, dependencies, and expectations are in flux with our surroundings. We are all users, and only through an understanding of ourselves, do we uncover our understanding of others.

There are, however, certain properties of the human mental construct that remain constant enough to create around and, with reasonable certainty, predict a user's response to the imposed stimulation. This in fact drives to a founding stone in this essay that when creating for users, we are invoking a simple action-reaction process not unlike that at the biological or sub-atomic level. We have the concepts of a receptor and stimulator (probabilistically more physical) and the concepts of an impulse operator and reactionary value (probabilistically more energetic).

Considering first the receptor-stimulator construct, we must appreciate the problem of designing for user experience as visual communication problem solving; dependent on a language as alive as the object that inherits it, but also consisting of 'atomic' building blocks that form the inputs for predictive calculations. These basic shapes of the visual language act exactly as the phonemes of verbal language and are universally recognized and 'spoken' across all cultures and demographics. An example here would be a circle- it may be called many things, but it is always a circle and recognized, or received by, its never-ending roundness. This roundness then acts as a vehicle for non-specific user reactions such as comfort, safety, and time-dilation.

So there are receptors of the human mental architecture that don't change across humans at the most basic level or over time (much)- if they do change over time, they change isotropically. There are also stimulators, the building blocks of the visual language, that do not change at all.

We can liken this phenomenon to that of our taste receptors where we have the same receptors for sweet and sour; it is our cultural learning and development that alters these receptors making them more or less affinitive for a particular taste, yet the existence of the receptors is the same. The stimulators, the chemical combinations that invoke sensation, are constant because of the electrochemical laws that govern their shape in space.

Naturally following the pattern of our surrounding universe, elements of the visual language are drawn together, interact, and create higher order structures and groupings invoking patterns and sequences catalyzing new reactions in viewers, or users. Not only are new shapes instantiated, but also new spaces- the encapsulating envelopes and framing devices of the visual language- the negative space is altered, and new meaning is realized. As we consider form factors, we must take into account this space surrounding the object and not just the object itself.

Let us define what we mean by form factor in this context before going forward.

A form factor is that container for an interface, for the construct of the interface, and for the user of the interface.

With this definition, we understand the device and the user are both form factors that must be accounted for in design. So we are not just thinking in terms of pixel dimensions or metric units, but also in terms of human intelligence, cultural affiliation, age, or any other number of human properties. While this broad definition of a form factor may seem to intimidate or retard the genesis of design, it is actually more useful than aversive because it forces us to rely on those fundamental human properties that are universal, and in this way things are created that appeal to the greatest audience with greater assurance of their impact and potential reaction.

We also see that the form factor is the space in which the user experience takes place- it is an empty container for processing, interaction, and design. The form factor is not the limiter or catalyst of design problems of user experience as it is typically approached. The major cause of problems in user experience design is the lack of user (human) understanding at the fundamental level during the design phase.

As the word ‘interface’ was mentioned, let’s define that before going forward as

An interface is a constructor that maps a set of inherited functions onto any set of given data to allow for impulse, action, and potential cognition.

So the interface is that active glue which binds the form factors of design, of space, and of the user. We can understand this programmatically as the functional constructor bringing variables and methods into an active or kinetic process. The interface architecture does not exist without the three form factors, yet its elements (elements of the visual language) do exist independent of design and the user, but not of space.

If we now take a big picture perspective of this lecture so far, we will see that all users have fundamental receptors, and therefore, predictable responses to visual stimuli. That user experience design is a process of visual problem solving relying on the same principles of reception and reaction as those on the biological and sub-atomic levels. That form factors include the users as well as the used objects and interfaces.

Let’s continue down the path of understanding the user then to realize specifically those things that don’t change across form factors. From a visual communication problem solving strategy, we can break designing for the user down into concepts of energy and in this way continue to steer toward the foundational and fundamental elements that govern user experience.

We can begin with the potential energy side of the equation or the design planning phase. The visual problem is solved by accounting for universal human traits and conforming the design to draw out (enhance) or push back (de-emphasize) the responses originating from those traits. Let’s take for example the human trait of curiosity. Curiosity is biologically an open receptor for electrochemical change with a high amount of potential for energy change and according to physical law, there is a tendency toward equilibrium with an increase in entropy. (This is the action potential). When the receptor is covered, it undergoes a conformational change and this change, paired with a series of electrochemical responses, indicates the process of learning at the macroscopic level. (A protein folds according to the naturally allowable folds and the system

remembers or learns its abilities). At a higher perspective level, the receptor's host learns this process of stimulation and physical change comes from an external source and the paths of certain stimuli are attributed to a system of rewards and punishment. (Cause and effect are attributed to this process as a method of understanding and predicting the future).

This is a universal process shared inter-culturally amongst all humans and we must search out those other unchanging traits when designing across form factors.

In another language of study we can view this process in terms of linear algebra and the state vectors of quantum mechanics. Let's pretend we are in the human basis | h > and we create a very simple equation that equates the operation of an interface on a human user to produce some sort of impulse as an eigenvalue. The equation looks like:

$$\text{human basis, } | h > : I | h > - i | h > = 0$$

In its simplicity we see the human basis as a state vector which is unchanging and we emphasize the likeness of all humans under specific visual stimulation. So we design our operator (I), the impulse of the interface, to produce a measurable and predictable reaction if we understand the unshifting state vector.

If we tend now toward the kinetic energy side of the equation, the design and manufacturing process itself, the visual problem across form factors can be solved in numerous ways. Essentially these methods all employ the use of reshaping information to 'fit' the form factor. This is done spatially and temporally. Spatially, the technique is essentially to bifurcate the data from one form factor and reconstruct it to fit the alternate form factor. During this process, information can be lost, the architectural elements can be critically broken and the interface's ability to allow for potential cognition as we have defined it can be jeopardized.

This precipitates an issue at the pinnacle of user experience design, especially across form factors, that design is not about haphazardly placing shapes within a frame, it is about composing a message with utmost sensitivity to user cognition. It is also not about squishing and smushing information to fit various form factors- each form factor, whether human or object or interface has its own intrinsic properties that convey the presented information differently. For example, a tablet is held differently than a phone, and therefore will be interacted with differently. The direct translation of visual data from one form factor to another by reshaping it should be approached with exceptional care.

The most impactful and effective visual design is nearly identical across form factors- it does not depend on the spatial constraints of the display, only on the unchanging fundamental properties of the user. And, here lies the difficulty of this problem; a difficulty that energizes those that undertake the search for its solution.

Temporally, information is reshaped by understanding the user's 'read' of the presented message. (Note that the reading action is necessarily time-dependent). This is not only done by the local placement of objects within an interface, but also by employing those elements of design that again call to the human receptors of visual processing. Namely contrast, composition, and conservation of energy for the user. Through contrast, importance is established- high contrast elements are read first while low contrast elements fade into 'second reads' or beyond or are not read at all. Composition is the layout of the interface and it is clear that the human form factor will

read a composition differently based on cultural learning. However, this can be tailored through the use of contrast. Conservation of energy is a principle followed by the rest of the universe and we are no exception. We will read information with a default minimal effort and increase or decrease this effort based on our interest in the subject matter. The majority of failures in translations of visual information across form factors occur because at least one of these principles is not respected.