Doing with Icons makes Symbols: The (Dys)functionality of the User Interface

-Norm Friesen, July 2011

Introduction: “Media Theories of the Unconscious”

It is not often that Vygotsky, Lacan and Kittler are referenced together, let alone in a discussion of user interfaces. But all of them have a common interest in the “mediated” development of the subject. Based on this, I consider each in the light of the relatively recent mediation of computer functions via the “windows, icons, menus, pointer” interface. I begin with a discussion of psychology and psychoanalysis; next, I review Kittler’s reading of Lacan. Finally, I conclude by focusing on the role of psychological categories in the early development of the modern graphical user interface, specifically in the work of Alan C. Kay.

In 1933, the year before his death, Vygotsky famously wrote that “the central fact about our psychology is the fact of mediation.” Mediation for Vygotsky is emphatically technological, with the sign serving as the fundamental psychological, humanizing tool. Through the incorporation of the sign in activity, Vygotsky explains, “[p]sychological processes as they appear in animals actually cease to exist; they are incorporated into this system of behavior [organized through the sign] and are culturally reconstituted and developed to form a new psychological entity.”

Mediation as a central fact of psychology --or of the emergence of the human subject—is also prominent in Lacan’s account of the imaginary. In the imaginary, specular mediation is paradigmatically provided by the humanizing technology of the mirror.

The jubilant assumption of his specular image by the [infant]... seems to me to manifest in an exemplary situation the symbolic matrix in which the I is precipitated in a primordial form... It is this moment that decisively tips the whole of human knowledge into mediatization through the desire of the other [and that] constitutes its objects in an abstract equivalence... (emphasis added)

This moment or “act” does not does not quickly “exhau[t] itself, as in the case of the monkey;” in it, nothing less than “all knowledge” is mediatised in relation to “the other.” But for Lacan as for other theorists, these decisive moments or stages have both a diachronic and developmental significance, as well as a synchronic, systemic one: “In the first place, [the mirror stage] has historical value as it marks a decisive turning-point in the mental development of the child. In the second place, it typifies an essential libidinal relationship with the body-image” --one in which this image transitions “from a fragmented body-image to a form of its totality.”

Mediation and technologies of mediation, whether the sign (Vygotsky), the symbol (Piaget), or the mirror (Lacan), all play central roles in accounts of human development and activity. They are not simply metaphors enabling, say, a particular conception of memory, perception or language --as is the case for Plato’s wax tablet, Descartes’ camera obscura or Chomsky’s computational “language organ.” Instead, media form the organizing principles for the psyche and its functions overall; they provide the pivotal moment for maturation and humanization --the point where human development allegedly diverges decisively from its animal
predeterminations. But in these contexts, media are not simply the basis, cause or source of psychological phenomena; they are inextricable from and in a sense even constitutive of them.

For Friedrich Kittler, of course, connection between media and psychological or rather, psychoanalytic phenomena, is well known and unidirectional. It is exemplified in the gramophone, film and typewriter/computing machine, which are recast into a “media theory of the unconscious” (Bolz) in the form of Lacan’s real, imaginary and symbolic (respectively).

Only the typewriter provides writing as a selection from the finite and arranged stock of its keyboard. It literally embodies what Lacan illustrated using the antiquated letter box... [giving] the symbolic ...the status of block letters. Film was the first to store those mobile doubles that humans, unlike other primates, were able to (mis)perceive as their own body. Thus, the imaginary has the status of cinema. And only the phonograph can record all the noise produced by the larynx prior to any semiotic order and linguistic meaning. ... Thus, the real --especially in the talking cure known as psychoanalysis-- has the status of phonography.

The “distinctions of Lacanian psychoanalysis,” as Geoffrey Winthrop-Young writes, “appear as the ‘theory’ or ‘historical effect’ of the possibilities of information processing existent since the beginning of this [the 20th] century.” “Media and information machines,” as Kittler puts it bluntly, have “culture as their independent variable.” Of course, what I want to explore here is not the machinery of a specific recording and storage medium, but the “meta-medium” of the computer and its interfaces. I examine the history of these technologies specifically in the light of the relationship Kittler posits between media and psychoanalysis, or more broadly, media and psychology.

“You have yet to become the Medium”

Alan C. Kay is widely credited with having developed the combination of windows, icons, menu and pointing device (sometimes known as the “WIMP” interface), while working at Xerox PARC in Palo Alto California over the 1970’s. After being famously copied by Steve Jobs in the Mac computer, this interface has proliferated across computer screens, smartphones, tablets and many other devices. It too devolves to three basic psychological categories. But this interface is related to these categories in a rather different way than Kittler’s gramophone, film and typewriter.

In a number of texts on his work at Xerox PARC, Kay explains importance of Jerome Bruner’s interpretation of Piaget’s preoperational, concrete operational and formal-operational stages. Bruner translated Piaget’s stages into three “mentalia” which are at least as much systematic and synchronous as they are diachronic and developmental. Kay explains:

Our mentalium seems to be made up of multiple separate mentalities with very different characteristics. They reason differently, have different skills, and often are in conflict. Bruner identified a separate [synchronous] mentality with each of Piaget's stages: he called them enactive, iconic, symbolic.
Kay continues by connecting these psychological categories to user interface design:

Now, if we agree with the evidence that the human cognitive facilities are made up of a doing mentality, an image mentality, and a symbolic mentality, then any user interface we construct should at least cater to the mechanisms that seem to be there. But how? One approach is to realize that no single mentality offers a complete answer to the entire range of thinking and problem solving. User interface design should integrate them at least as well as Bruner did in his ...curriculum ideas.

The similarity of Bruner’s mentalia to Kittler’s Lacanian “media theory of the unconscious” is salient. The enactive is physical and tactile, the iconic is visual and analytic, and the symbolic, correspondingly, is abstract and systematic. The similarity and opportunities for comparison extend even further when Kay, like Kittler, links these three psychological categories to corresponding technologies. For Kay, of course, these technologies are constitutive of the computer’s myriad representational and interface layers:

1) pointer-driven elements and actions, allowing selection and deselection, scrolling and zooming, dragging and dropping;
2) icons, windows and menus that present and organize options for pointer-driven operations, and
3) the symbolic mechanisms functioning at various levels of representation in the computer.

As Kay explains, the mouse or pointer is enactive, allowing you to “know where you are [and to] manipulate” objects as you would, physically and bodily, in the real world. Visual interface elements (icons and windows) are iconic, allowing the user to “recognize, compare [and] configure.” Programming, finally, is symbolic in its abstraction and its ability to “tie together long chains of reasoning.” The latter is exemplified in the object-oriented Smalltalk language that Kay—also being the inventor of object oriented programming—was developing around the same time.

The correspondence of these three categories and technologies to those discussed by Kittler could form the basis for an extended discussion. Kay’s focus (and that of his student, D.C. Smith) on manipulable objects, the user’s “desire,” visual arrays and gestalts, and symbolic (programming) architectures could make engagement with the computer interface interpretable as a series of elaborate “fort-da games” —as the site of many other intersections of desire with the real, imaginary and symbolic.1 That is not my focus here. I instead briefly turn to Kay’s reading of McLuhan, which he identifies as the source of his most significant insights:

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1 The enactive domain of pointing and clicking, dragging and dropping (and more recently, of multi-point finger movements) is in some ways comparable to the thread and reel in Freud’s (grandson’s) fort-da game or even Lacan’s das Ding, “the thing in its dumb reality” (1992 [1986]: 55): the thing that is a “no-thing that only becomes something through the desire of the subject.” It is interesting to read a passage from Kay such as the following while keeping these psychoanalytic constructs in mind:
Though much of what McLuhan wrote was obscure and arguable, the sum total to me was a shock that reverberates even now. The computer is a medium! ... the most important thing about any communications medium is that ... anyone who wishes to receive a message embedded in a medium must first have internalized the medium so it can be "subtracted" out to leave the message behind. When [McLuhan] said "the medium is the message" he meant that you have to become the medium.

In another intuition of comparable insight, Kay echoes Vygotsky and Lacan in realizing that children --with their concrete, ludic orientation-- are uniquely well positioned to thus incorporate and internalize new means of mediation: "If the computer is... a medium, then it must be extended all the way into the world of the child." Thinking of children as paradigmatic computer users presented Kay with opportunities and challenges that were quite different from those that were already persistent in computer engineering culture --a world of command interfaces and computer manuals. For Kay, children as learners brought with them the genetic epistemology of Piaget and lent credence to Bruner's multiple mentalities. In using the computer, children could progress through the mentalia of the enactive, iconic and symbolic, rather than simply being told to "read the f***ing manual" ("RTFM") --as programmers and technicians had been demanding of users since the 1950's.

"Doing with Images makes Symbols"

Unlike programmers and technicians before him, Kay guided his design with the overtly welcoming formulation, "Doing with images makes symbols:"

The slogan ...implies --as did Bruner-- that one should start with --be grounded in-- the concrete "Doing with Images," and be carried into the more abstract "makes Symbols." ... because none of the mentalities is supremely useful to the exclusion of the others, the best strategy would be to try to gently force synergy between them in the user interface design...

Kay also provides a table showing how this linkage of the three mentalities is to occur:

<table>
<thead>
<tr>
<th>DOING with IMAGES</th>
<th>mouse</th>
<th>enactive</th>
<th>know where you are, manipulate</th>
</tr>
</thead>
<tbody>
<tr>
<td>icons, windows</td>
<td>iconic</td>
<td>recognize, compare, configure, concrete</td>
<td></td>
</tr>
<tr>
<td>makes SYMBOLS</td>
<td>Smalltalk</td>
<td>symbolic</td>
<td>tie together long chains of reasoning, abstract</td>
</tr>
</tbody>
</table>

This combination of technologies, mentalities and activities points towards a type of visual-kinaesthetic computer programming, a kind of manipulation of images to produce sophisticated

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The object-oriented nature of Smalltalk was very suggestive. For example, object-oriented means that the object knows what it can do. In the abstract symbolic arena, it means we should first write the object's name (or whatever will fetch it) and then follow with a message it can understand that asks it to do something. In the concrete user-interface arena, it suggests that we should select the object first. It can then furnish us with a menu of what it is willing to do. In both cases we have the object first and the desire second.
symbolic results. In the course of formulating this combination, Kay and Smith were the first to use the term “icon” in the sense it bears in technical contexts today. The most elementary illustration of what Kay meant in speaking of “doing with images makes symbols” can be provided by “properties” dialogue box for an icon taken from a Windows 3.1 system (figure 1). Here, doing with or clicking on the image or icon for the Netscape Web browser “makes” the symbols of the command line, executing the said program.

However, this example illustrates both the success and failure of the approach outlined in Kay’s table. The terms mouse, icons, and windows from the table are all self-evidently recognizable to any computer user. This is despite the fact that these terms, thus configured, would have appeared surreally incongruous to someone walking into Xerox PARC off the street in 1976. The same can’t be said, of course, for Smalltalk—or for any other iconic or image-based programming language or technology. These remain generally unknown to this day. As a correlative, it is also clear that while everyday use of graphical user interfaces involves “doing with images” (clicking, scrolling and dragging), this visual-kinesthetic activity typically does not result in “making symbols” – specifically in Kay’s sense of tying together long chains of abstract reasoning. At the same time, composing and manipulating symbols (e.g., in documents, email, spreadsheets) now largely occurs via computer interfaces. However, it does not take place through the manipulation of icons; but rather, via the keyboard, a technology which long predates Kay’s multiple innovations.

It is all too tempting to conclude with Kittler and others that this represents a failure in functional terms, a kind of dysfunctionality. Users are given the illusion of control over the computer, but are actually profoundly constrained in terms of what they can do. Instead of becoming power users, they are rendered symbolically impotent, “wimps” or “idiots” (e.g., Heidenreich, 1999).

In articulating this same argument in “Es gibt keine Software,” Kittler is characteristically unsparing in his conclusions. Our symbolic powerlessness in the face of the computer is tantamount, he says, to the end of writing itself. In fact, Kittler identifies this juncture as occurring around the same time as Kay’s development of his graphical user interface (although he does not link the two explicitly):

> The last historical act of writing may well have been the moment when, in the early seventies, Intel engineers laid out some dozen square meters of blueprint paper (64 square meters, in the case of the later 8086) in order to design the hardware architecture of their first integrated microprocessor. This manual layout of two thousand transistors

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2 Smith in particular worked on ways in which “[c]ommunication between human being and computer [could occur] by means of visual entities called ‘icons,’ [which] subsum[ed] the notions of variable, reference, data structure, function, and picture.”
and their interconnections was then miniaturized to the size of an actual chip, and, by
electro-optical machines, written into silicon layers. [With this] our postmodern writing
scene could begin. (1997, pp. 147-148)

Since the early seventies, as Kittler would have it, writing –whether for computer design or any
other purpose-- has taken place not in the analogue world of pen and paper or the proto-digital
world of the typewriter. It has instead been banished far below the word processor and
operating system of the day, Kittler argues. Writing now occurs in a realm where its operations
and effects are unknown and (for us) unknowable:

in a perfect gradualism, DOS services would hide the BIOS, WordPerfect the operating
system, and so on and so on... All code operations, despite their metaphoric faculties as
"call" or "return", come down to absolutely local string manipulations and that is, I am
afraid, to signifiers of voltage differences. ... like modern media technologies in general,
[computers] have been explicitly contrived in order to evade all perception. We simply do
not know what our writing does. (1997, pp. 150, 148)

Positing the existence of “perfect graphic user interfaces,” Kittler says that such technologies
ultimately “dispense with writing itself,” thus “hid[ing] a whole machine from its users.”

Conclusion: The Perfect Graphic User Interface?

But of course, there is no such a thing as a “perfect graphic user
interface” that would utterly banish writing and the symbolic from
human-computer interaction. There are instead only imperfect
interfaces, which Kittler himself indicates entail a kind of writing in
which signification is related only indirectly to its causes and effects.
I conclude by suggesting that such writing may well be part of the
dysfunction of the symptom. The symptom, after all, is a
signification or metaphorical manifestation of underlying conditions,
but one that is not directly expressive of them. It appears where the
three registers –enactive, iconic, symbolic, or rather, real,
imaginary, symbolic-- come into contact with one another. “The
symptom,” Lacan says, “arises where the world failed, where the
circuit of symbolic communication was broken: it is a kind of
‘prolongation of communication by other means.’"

Writing becomes a necessity, if not with pen and paper, then at the very least on the computer
screen when unadorned messages reporting on Kittler’s BIOS and other hardware appear.
Significantly, in the case of an iPod, iPhone or iPad, this kind of writing appears in a process
known as a “jailbreak:” an escape from the law –specifically from the law as manifest in the
enforced congruity of Apple’s software and hardware. At these moments, software, in its
(sometimes deliberate) imperfection or dysfunction, contrary to Kittler’s assertions, surely does
exist. And this symptomatic breakage suggests that mediation is not only a central fact of our
psychology; but that our psychology is also a central fact of mediation.

Figure 2: An iPhone being “Jailbroken”
References:


