

# **Metaphors for the Virtual**

**Interfaces and the Internet**

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# Introduction - Metaphors for the Virtual

A common facet in any design practice is to incorporate familiar metaphors that help with a user's ability to determine the intended use of a new object. Variations of this design theory have been around for thousands of years, as long as humans have needed to use tools and had to tell others how to use them. Some instances can be called intuitive design, like the handle of a hammer fits in a hand and the position and shape of the hammer's head is all that is needed to be communicated to the hammer's wielder to know how to use it. Other instances of new design require training; the tool's use must be demonstrated or accompanied by instructions for the tool's user to follow. Even with an instructor and detailed instructions, a user may become confused or intimidated by the complexity of a new design. The difference is "knowing that" something works versus "knowing how" something works. This is where metaphors have been fruitfully incorporated; they state that something *is* something else, unlike a simile, which states that something is *like* something else.

When we engage with a computer interface, we use metaphors to actively create the illusion of space. This perceived space does not exist a priori, concurrently, or separately from physical reality, as many techno-utopianists believe. Rather, our immediate use of metaphors in part constructs the illusion of digital space into which we project ourselves -a specter, an avatar- such that we believe ourselves to have entered 'cyberspace'.

In this essay, I will move chronologically through the history of the graphic user interface's metaphors - the Desktop, Paper, Window, and Highway Metaphors - and then to current day 'search engine culture', with Filter Bubbles and algorithms of curated content.

Our current digital milieu is marred with the self-contradiction created by search engines: we now have greater access to information, but that information is being mediated by corporate and governmental filters. A second self-contradiction is the illusion of a rhizomatic space in the

internet. A commonly held belief is that the internet equals freedom: freedom from persecution, freedom from conformity, freedom from control. However, gravitational centers such as Google, Facebook, and Amazon have warped the flowing space of the internet, giving weight to highly mediated, highly constructed data, “Alternative Truths”, that, in turn have had very real effects on our physical world. To the general public, these effects are not seen to be as harmful as an event that occurs in ‘real’ space, because we perceive digital events as being “virtual”, non-existent and separate from our physical reality. For this reason, I will incorporate the terminology of Deleuze and Guattari, who describe “virtual” not as something non-concrete and ethereal, but rather as something that has the potential of happening. I will explain how the incorporation of this new definition of virtual has been enfolded into our working practice of digital interfaces, and how the slippage between the terms “virtual” and “digital” has influenced our understanding of computer interfaces. The constructed metaphors of computer interfaces have obfuscated our understanding and appreciation of our interactions with the digital, and the language we use to describe digital spaces is limited by the historically created and corporately endorsed metaphors of computer interfaces. The ideologies of government and corporate interested have been designed into these metaphors, in order to appear “invisible” and seamless. In order to have adequate conversations about our rights and liberties within these “virtual” spaces, we must no longer consider them non-existent and ethereal.

# The Desktop Metaphor

The Desktop Metaphor has been the de facto method for designing and thinking about computer interfaces since its inception. In 1968, Douglas Engelbart, head Researcher at the Alto Corporation, gave a presentation that has come to be known as “the mother of all demos,” in which he described the use of windows; hypertext; computer graphics; the computer mouse; word processing; a collaborative real-time editor; and much more (Reimer, 3). Since then, Graphic User Interfaces (GUI) have taken advantage of the increased pixel count offered by modern day LCD and LED monitors and screens to create more aesthetically appealing designs, but have largely utilized the same graphical structure of Window, Icon, Menu, and Pointer (WIMP). These four elements have been featured in almost all interfaces since their inception. Their widespread use is mainly to achieve consistency, so that a user doesn’t have to acclimate to a new interface when using different programs or computers.

Consistency is a prevalent concern, but another problem is the ability of a novice user to carry out complex interactions with the computer without knowing command lines and shortcuts. In order to facilitate this interaction, the Desktop Metaphor was created. A learning tool that is utilized in many disciplines, a metaphor is used to describe something new in terms with which the user is already familiar from past experiences (Lakoff, par. 4). This is the foundation of the Desktop Metaphor. Since the majority of the programs for the early desktop computer focused on word processing and file organization, the metaphor of treating files as “papers,” placed in “folders” (directories) and archived in “storage” (computer memory) was implemented (Reimer, 1). This specific arrangement is known as the Paper Metaphor, which is a subset of the Desktop Metaphor.

The Desktop Metaphor has had complete control over computer interface design for decades, with several mild alterations over the years. Some of these are technical

improvements: notably, the ability to layer windows; keep several windows open in the same view; the action of minimizing programs to a taskbar, etc. These developments have maintained the various metaphors at the expense of design innovation. Why haven't there been any large changes to this organization?

Remember, the point of using metaphors is to reference a structure with which the user has had prior experience. This is called a skeuomorph: when a new design mimics formal ornamental cues from a known structure. The term's etymology is derived from Greek, skéuos (σκεῦος), meaning container or tool, paired with morphé (μορφή), meaning shape. Examples include the painted rivets in plastic tools that used to be metal, or a digital "soundboard" program whose layout mirrors the physical soundboard's panel. The objective of skeuomorphic design is to directly emulate the design of an earlier established machine or tool. This familiarity is supposed to facilitate the user's ability to jump right into using the program or tool with a minimal learning curve.

In regards to the desktop, the design decision to base the interface on a simulated environment implies a specific kind of interaction. A "desktop" refers primarily to a work environment: a place for papers, filing, and writing to take place. So the graphics are limiting the user's perspective to a top-down view of a desktop, where files can be pulled up and read, top to bottom. The directionality implied by this description gives the implication of physical space.

What is the goal of such physical constructions of digital space? Why go through the effort of creating a user experience that relies on the perception of a physical space? Again, as stated, the objective in the construction of any design metaphor is to increase a user's ability to easily pick up a new tool and intuitively know how to use it (Erickson, 4). As Thomas Erickson noted in his essay "Working with Interface Metaphors": "Metaphors function as natural models, allowing us to take our knowledge of familiar, concrete objects and experiences and use it to

give structure to more abstract concepts” (Erickson, 1). In this case the abstract concepts involve a computer program. There are several correlations between skeuomorphic design and GUI’s:

- 1) Perceived affordances: where the user can tell what an object provides or does based on its appearance, e.g. the handle of a hammer fitting into the palm of one’s hand.
- 2) Mimesis: an imitation of something, copying.
- 3) Archetype: the original idea or model is emulated: for instance, most record players fit into the archetype of their design and will not deviate from the original form.
- 4) Path Dependency: (in technology) an element’s functional behavior is maintained even when the reason for its design no longer exists.

As we can see, there has been a concerted effort to create a metaphor that maintains a connection to working in physical space for the ease of use and adaptation to new concept by a user. This is what Path Dependency means (CSDL, 1). Maintaining the function of paper folders and files isn’t needed in the context of the digital, but it mimics this functionality in order to maintain the perceived affordances of physical paper, with which the user has presumably had prior experience. The longevity of the current GUI could be taken as a perfection of the interface model. I argue, however, that the constructed metaphors of computer interfaces have obfuscated our understanding of the capabilities of and values placed on our interactions with the digital.

The developers themselves have immediate control over the nature of these interactions. In Douglas Engelbart’s original designs for the window and the mouse, he had the goal of increasing our capacity to detect and solve problems, as he states:

Increased capability in this respect is taken to mean mixture of the following: more rapid comprehension, better comprehension, the possibility of gaining useful degree of comprehension in a situation that previously was too complex, speedier solutions, better solutions, and the possibility of finding solutions to problems that before seemed insoluble (Engelbart, 3).



In many regards, the efficiency of the modern computer coupled with the wide utility of the internet, have realized Engelbart's dream. A side effect that has arisen is a reversal of what Engelbart hoped. We now have a gloated sense of having knowledge "in the head" by having access to greater amounts of information via the internet, while not actually retaining any of it (Fisher, Goddu, and Keil, par. 1).

It is the intention behind the design of the interface that imparts the message, if not overtly then through the user's use of the interface. The reasoning is that, if the original WIMP interface's visuals have remained the same on a surface level, no questions will be posed in regards to smaller, incremental changes. Jenny Preece mentions a similar intention in her essay, "Interface Metaphors and Conceptual Models (1995)": "The main goal in interface design is to develop a system image that maps the design model onto the user model" (Preece, 2). Ubiquitous computing systems have invisible interfaces, are interconnected, and intended to be effortless to use. "Invisibility" is the key word here. Invisibility is seamlessness. The purpose of a metaphor is to allow a user to come to understand an abstract idea through references with which they are already familiar. The actual system of connections being made by the metaphor is not meant to be "seen," just the subtle logic of understanding it (Preece, 1). The metaphor itself is meant to recede into the background, taking a backseat to the actions or imagery being called upon.

The invisibility of metaphors has permeated all levels of interface metaphors, especially the Desktop Metaphor. In the early years of personal computing, visual fidelity and an absolute adherence to the metaphor was believed to "increase" the metaphor's effectiveness: for instance, making the folder icon "open" when the folder was being accessed; or labeling directories as "cabinets" that store "folders"; or making the interface itself mirror design cues from other icons (Erickson, 2). These attempts were not always effective, but the metaphor was

still maintained through the practice and activities of the computer, rather than the specifics of the visuals; hence, the differentiation between modern day Mac and PC GUIs. Once the metaphor was established, however, users didn't need any more help in coming to terms with their specific interactions with the computer. We internalized the designer's metaphor, and kept it with us, so that when we approached a new interface, we could immediately call upon the metaphor to help us with the interaction. This isn't efficiency as much as it is optimization, an optimization of the user rather than the software (Engelbart, 8). Invisible metaphors can be dangerous because they themselves are hard to pin down, leading to false assumptions of the nature of the digital. Determining verified news sources from other "fake news" outlets is a current example of indistinguishable digital news metaphors. In regards to interface metaphors, what are the new metaphors for mobile devices and touch screens? We can call them tablets, in reference to paleolithic technology, or "interactive screens", but then we are building on previously established metaphors, and are already entrenched in those histories.

The ease with which the Desktop Metaphor has been internalized has led to a form of "doublethink" for the user. Here, doublethink is being drawn from George Orwell's novel, 1984. In Orwell's fictional language of Newspeak, "doublethink" refers to the simultaneous knowledge of something being true while forcing it out of one's mind in order to believe it is false. Science fiction author Arthur C. Clarke has also quipped that "any sufficiently advanced technology is indistinguishable from magic." In the case of the desktop, we *know* that the little icons on which we click aren't concretely there, that they are not *actually* the programs themselves, but we temporarily suspend that belief in order to be immersed within the Desktop Metaphor (Preece, 17). When demoing early versions of the original Mac interface for users who had never seen a computer interface before, John Siracusa from Apple explains how he:

...included an explanation of icons that went something like this: 'This icon represents your file on disk.' But to the surprise of many, users very quickly discarded any semblance of indirection. This icon *is* my file. My

file *is* this icon. One is not a "representation of" or an "interface to" the other. Such relationships were foreign to most people, and constituted unnecessary mental baggage when there was a much more simple and direct connection to what they knew of reality (Siracusa, 3).

What we know of concrete reality is that there is a document in a folder, sitting on top of a desk. The implication that there is some interface or barrier in between us and the action of grabbing the paper inside the folder is counter to our perception of how we operate in concrete reality. The translation of the iconographic symbol as being the thing itself is the primary means by which digital metaphors have been naturalized. In Peirce's semiotics, an icon is a sign that is meant to recall the thing it represents by looking similar to the referent. In the Desktop Metaphor, the icon itself supplants the program or file for which it is a shortcut. The icon is now a thing in and of itself; it is, in fact, "real", and is more than just a grid of colored pixels (Preece, 5). In the history of computer interfaces, this is the moment of transition from understanding the differentiation between the "concrete real" and the "digital," to the conflation of the two into one unit, the virtual, and the beginnings of viewing the virtual as a separate, occupiable space (Laurel, 26).

# Paper Based Metaphors

Most metaphors have some variance built into them, a kind of nebulous “it means what I want it to mean when I need it to mean this specific thing”. Very poetic. From an interface design perspective, however, this is undesirable. In a well-designed interface there can be no branching meanings of a metaphor, no unexpected paths to take. This will cause a user to become confused, disoriented. Thus, a highly curated, strictly maintained metaphor is created, and in order to interact with the interface, we - as users - must submit to the designer’s predetermined usage (Reimer, 3). Think of it in manual terms: We know what a hammer’s function is because of its shape and the form of our hands (Texas A&M, 2). Now this sounds simple, but what happens when what we’re really talking about is a text editing software akin to Microsoft Word? The austere surface of the interface is structured not to appease the user and “increase performance” while serving to “make the activity easier,” but to train the user into a certain mode of thought, which brings with it an understanding of boundaries. These boundaries ultimately lead to a restricted perspective, a limiting of the vocabulary to a narrow set of terms, establishing what those terms mean in a specific context, and limiting the ability to realize and break down these barriers. In short, deconstructing metaphors serve to make ideology transparent.

In order to explore how a metaphor in digital culture restricts a user’s ability to see past the interface and into the underlying ideology, let’s break down the most basic and commonly used metaphor: The Paper Metaphor. In real life, paper has properties that we can count on it to always have. These expectations are based on humanity’s several millennia of history of using it. When we pick up a piece of paper we know that it can be filed, binded, stored, copied, and cut. We know that it is a modifiable medium; that it is portable; can come in a variety of sizes; and has been used as a means of storing and conveying information throughout history.

Reading materials use paper, to print text and images. Paper has a spatial property; the frequency of use can be determined by the amount of wear and tear; and paper can be used to create indexes and graphs, etc (Preece, 36). These examples are in direct relation to how paper, as a real object, has been turned into an icon as part of the Paper Metaphor.

Conspicuously absent from this metaphor are some of the less immediate properties of paper: its potential to be folded, dyed, collaged. These properties of physical paper have been left out of the Paper Metaphor. Why? The subversive aspect of interface metaphors is that the designer can choose not to acknowledge physical properties of the real world in order to maintain the integrity of the digital metaphor (Preece, 12). This cutting off from concrete reality diminishes the authority of the referent in the metaphor. The icon that represents the metaphor on the computer monitor moves in to fill this role, replacing the referent. This phenomenon was discussed in the first section, The Desktop Metaphor.

Metaphors allow users to come to a new interface and use their knowledge of past experiences to interact with the program or device. That interaction is internalized and reified by the subsequent usage of the metaphor. The icon becomes the file itself. Metaphors that are convenient for day-to-day life can facilitate an accelerated internalization process. Oftentimes the metaphors are so small, so ingrained in our conceptions of our environments, that we don't readily read them as metaphors (Lakoff, 2). In George Lakoff and Mark Johnson's essay, "The Metaphors We Live By," these *ingrained* metaphors are *brought to light*. They *clear the fog* on how many metaphors are truly *among us*. They explain that the metaphors present in our language make us rely on these metaphors to build visualizations of what we are doing and talking about (Lakoff, 7). We describe time as "passing by"; we grab the "arms of a chair"; and "follow trains of thought." Metaphors function in the same way with regard to interfaces and the virtual. For example, what actually happens to our file when we "copy" it? Do the technical

logistics of where the temporary data is stored and created really matter to the user as long as they understand the metaphor of “copying”?

There are certain breakages of these metaphors, however, that do not readily accord with the function the metaphor describes: for instance, having multiple windows open of the same folder, or a hypertext link going somewhere other than where the user assumed. These instances break the metaphors, but surprisingly, they don't challenge a user's understanding of the virtual space (Preece, 37). It appears to be intuitive that someone could have multiple finder windows open looking inside the same folder, or come across a broken link without experiencing a jarring break. Users have come to terms with these occurrences within digital spaces, accepting them as “natural” features of the digital. The problem then becomes how to conceptualize the digital without relying on these established metaphors in order to see the underlying logic that is specific to the medium of the digital.

# The View from a Window

The window, as used in a computer's graphic interfaces, is a section of the screen usually sectioned off with visual bars or lines, that serves to hold content separate and distinct from other areas of the screen. The history of the development of the Graphical User Interface (GUI) is long and complicated, and knowing all of it isn't necessary for understanding the implications thereof. If the reader has touched or even looked at a computer screen in the last two decades, that experience is enough to understand how a computer interface functions. A brief yet thorough synopsis can be found in Jeremy Reimer's essay "A History of the GUI" (Reimer, 1). What is important in that history is the creation of the separate window, and its ability to be moved, resized, layered, and overlapped with other windows. Another important development was creating icon-based interfaces, as opposed to a text-based display. This simplification of representation cemented the GUI as iconic, representing directly (via resemblance) the implied function of the interface.

In our physical reality, a window can often be seen as a portal or a screen, an architectural structure that allows light inside, and visibility outside. It enables interaction, and can be alternated between its two states, open and closed. While it can also be decorative, the view from the port of the window is what is important to most architects, rather than the ornamentation of the frames and panes themselves. The word's etymology can be traced back to Old Norse, *vindauga*, literally meaning "the wind's eye," from the root words *vindr* (wind) and *auga* (eye) (Harper, 1). A window's function was to allow air flow into a building, rather than light. It was the passage of something physical from exterior to interior, from outside the space to inside. This origin plays a significant role in our contemporary understanding of a window's function to be either a portal or a screen.

Viewed from outside a building, windows can give passersby a glimpse into its internal structure, a reminder that the building is not simply a facade blocking their path. A window allows sight into a space separate from that of the viewer: a restaurant window; rows of windows of an office building; the window in front of a shop; or a window into a classroom or home. Each implementation of the window functions the same; it is just the “content” of what is within the window’s frame that changes. From an internal perspective, a window is utilized as an architectural device to let exterior light into the space, and, aesthetically, to frame the (sometimes picturesque) view outside. Regardless of design, style, or features, a window’s function is threefold:

- 1) Allows light and air from outside to come inside.
- 2) Allows a view from inside going outside.
- 3) Can be alternated between two positions: open and closed (unobstructed/obstructed).

The “window,” as a computer interface element, employs some of the functions of an architectural window, lending the name fittingly to this metaphor.

The GUI “window” displays information and emits light. Within its titlebar and border boxes, the window contains text and images pertaining to the program that is running within it. The window is a view into the computer’s programs. It can be seen as a hole in the fourth wall of the computer monitor (the history of the fourth wall in regards to other media will be addressed later in this essay). The window metaphor has served to enhance a new user’s ability to conceptualize their actions on the computer. This was a challenge many early GUIs failed to address, instead opting for confusing and obscure text-based interfaces, that required users to learn keyboard shortcuts and commands with no intuitive cues from the computer itself.

The window GUI for computers isn’t the first time the window has been employed for the purposes of metaphor. Almost all mediums that have assumed a rectilinear format have, at one



time or another, been described as windows, usually proverbially as windows into the world. This had been useful for early audiences of photography, film, television, and their image-based precursor, painting.

The history of painting has its twists and turns of intentionalities, but a recurring motif has been the style of *trompe l'oeil*, meaning to fool the eye. It is the ability to create the illusion of a three-dimensionally rendered “real” object on a two-dimensional surface. Not all histories and genres of painting have attempted to fool viewers with accurately rendered scenes, but examples can be found in the majority of still life subjects such as Jean-Baptiste Oudry’s *A Hare and a Leg of Lamb*, or Pere Borrell del Caso’s *Escaping Criticism*. The act of representing an image onto canvas is a means of depicting a fixed perspective relative to the position of a viewer. In 2002 the National Gallery of Art in Washington D.C. presented an exhibition that encompassed five centuries of *trompe l'oeil* painting. In one section, painting as object, it was described as “not what is in the painting that is fooling the eye, but the whole painting, as an object.” Neoclassical, Romanticism, Realism, Impressionism, Surrealism, the lineage of new perspectives of seeing, but it has all still relied on the history of the rectilinear format and the easel picture have now been intrinsically linked with the history of painting (O’Doherty, 18). This motive, of depicting other spaces in the format of a painting, has crept through time, and even now up through modernism and onwards to contemporary genres, is the act of viewing a painting coupled with looking into, through, and beyond. Take, for example, William Anastasi’s picture series, “Six Sites,” which were images of the wall on the wall. This features the reduction of space to the space of the picture plane, contextualizing physical space within the boundaries and framing techniques of photography (O’Doherty, 32).

What this act of viewing has done has been to create an assumption of the window’s capabilities. Photography, film, and painting place the user in the position of being right on the

window sill, elbows propped up, gazing out into the world. From this vantage point, all seems at arm's length, within reach. When confronted as object, and not as image, the photograph or painting attains authority, and tricks the viewer into believing in an alternative space.

The early inspiration for the design of GUI's was a machine that could augment human intellect. Not to replace it, or supercede it, but to facilitate the gathering of data into more useful fields. Douglas Engelbart, a pioneer in GUI design and designer at the Stanford Research Institute, published an essay entitled "*Augmenting Human Intellect*" that outlined his team's goals to design the perfect computer interface. At a conference in 1968, he demonstrated many of these advances with the oNLine System, which, among other things, showcased the first multi-windowed display, using icons to represent programs and files. It also used vector graphics displayed on a CRT screen to render computer actions in real time (instantaneous feedback was an achievement for the time), and introduced the mouse and mouse pointer graphic element (Engelbart, par. 4). The program lacked the ability to differentiate borders of windows, but the assemblage of keyboard, mouse, and screen, coupled with the interface graphics of windows and icons, set the standard for GUI design (Reimer, par. 13). The format is still used today.

The window's objective is to make the viewer forget about the computation that constructs the frame. The structure of the window is not important: the pane of glass is meant to disappear; only the act of viewing through it is important. A window into another world. Windows offer viewers the ability to see beyond their current space to access information in a space separate from their own.

This is a troublesome convention when applied to an internet browser window and computer monitor. The connective nature of the internet already connotes a spatial dimension, with rhizomatic branches that can lead to other spaces. The window in a browser context

becomes not just a window that looks out on a landscape, but a window suspended above all else, overlooking the rhizome. The World Wide Web augments the window, positioning it so that all is viewable and accessible. Aerial shots have become more commonplace in the last decades, as has satellite and drone imagery, which is creating a distant, detached viewing position, the implied default perspective of the digital. Imagine the “view” from Google Maps or from a car’s GPS, or even the proliferation of aerial shots in news broadcasting or in movies. The window has escaped the perspectival confines of the wall, and is now suspended in the clouds.

To return to this notion of the window as either portal or screen: which is the computer window? A portal is an entryway, a space of passage between spaces. It allows things to move between an “inside” and “outside.” A screen acts as both barrier and filter. It has the capacity to sift information; it is a tool of mediation. Computer interfaces utilize the portal metaphor to facilitate a user’s ability to “buy into” a depiction of a space. Advertising has been using this technique of projected presence for decades, by presenting an empty space that the viewer or consumer is meant to fill with their own presence (Williamson, 77). Here, advertisement’s framing of the image acts as a portal through which the viewer is enticed to travel, to occupy the space of the ad. Of course, this is all illusionistic; no space really exists, the fixed point of the viewer is not the prime perspective any longer as modernism has shown through deconstruction (O’Doherty, 8). What remains, then, are the surface qualities of the computer interface, of the advertisement, of the image itself. Now we can see it for its true purpose: to act as the gatekeeper, to control what information reaches our eyes.

# Highways, Surfing, and Rabbit Holes

The Marxist idea of commodity fetishism has encroached upon our perception of the digital. Over the decades there have been many claims that the 'internet is dead', that it has 'changed irrevocably', and even that it doesn't exist (Dewey). Mostly, these are attention grabbing headlines for philosophical think pieces, but they do raise several points of interest. In our day-to-day interaction with digital media - the internet, cellular devices, other digital interfaces - we are disconnected and separated from digital processes. This dilemma has recently fermented contentious debate around data collection and user privacy. Do large corporations have the right to collect and store the personal information of the users who employ their services? Who owns that information? And, who has the privilege to access it? Even localized devices, like your cell phone, are constantly transmitting and receiving information based on your location, usage patterns, browsing history, time of use and duration, etc (Nusseldor, par. 6). This kind of cyber stealth is built right into and accommodated by the slick (and invisible) mechanism of the interface.

Marxism describes commodity fetishism as the distancing a consumer faces from the production of the goods they purchase. We, as consumers, are not aware of the conditions and processes undertaken to produce the clothes on our backs and cell phones in our pockets. The same phenomenon occurs with our understanding of the digital, but abstracted even further. The industrial revolution may have made machining shirts with little defects and no presence of a human hand, but it still exists in a history of handwoven clothing. Facebook, Google, and Amazon's websites reveal no presence of the human hands that created them. Where can we see the labor of the user interface developer? Of the backend programmer? The austere surface of the interface obscures this labour, makes it polished and unassuming (Nusseldor). Such websites have been made to be looked at but not noticed.

Not only is the work of the programmers and software engineers behind the construction of the program obscured, but the infrastructure of the internet itself is not present. Unseen satellites transmit; subterranean lengths of fiber-optic cable carry data; gated megastructures house fields of servers and databases. These are physical interactions between machines, without human input. A whole system is created to govern and regulate machine systems without the end user's awareness of them (Buchanon, 9). There are, of course, the engineers who maintain these systems, but these are mostly self-regulatory processes, with fail-safes and protocols for even the most benign redundancies.

This machine-to-machine system relies on a few distinct metaphors to facilitate an understanding of human-computer interaction: the "internet superhighway"; "surfing the web"; and "the information city" (Nunes, par. 3). Each of these metaphors describe an action or a place, based on our understanding of the functionality of these events in physical space. Before I break down how each of these metaphors function, it is important to distinguish these "action" metaphors from the previous section's metaphors that focused on "representation." The Desktop Metaphor and Paper Metaphors are built to aid usability for very small amounts of information, quantities that would normally be contained within a single desktop or office, for instance. These metaphors are stationary in space, and fill the space with iconographic representations of objects and programs, like folders and trash bins. These three new metaphors, however, attempt to deal with the greater space of the internet and networks on a global scale.

Let's take the internet superhighway, for example, and imagine what kind of space that is and what our expected action within it might be. On a regular, physical highway, movement is confined to one of two directions (away or towards, but this is predicated on the destination), and a speed limit is posted for drivers to follow. A highway is differentiated from other roads

because its function has been made specifically for high-speed travel over long distances. With this description of a highway, you probably already see why it is an apt metaphor for the internet. But is this because we are already familiar with it, or is it due to some truth about how we actually engage with the internet? The internet superhighway has this prefix, “super,” applied to it. This would imply a grand scale or colossal structure. With these aspects of the metaphor in mind, we can then picture ourselves as drivers in hyper-fast vehicles along the superhighway, obeying the traffic laws, and staying on the highway until we reach our destination. This metaphor is a truthful description of certain habits, such as checking email or searching a directory for a specific article of information. This metaphor puts the user in a role of high-prioritization and efficiency (Nunes). We aren’t looking to get lost and smell the roses; we are setting out with a specific objective in mind, and want to complete that task quickly. The distance of the highway also comes into play, as the global reach of the internet has the apparent ability to cross over and into other territories. The exits along the superhighway itself are highly restricted, however, only permitting you to get on and off at specific places. The term was given a lot of mainstream attention by Vice President Al Gore, who also helped with the popularization of the term “Global Village” (in regards to the capabilities of internet infrastructure) (Gore) (LaQuey, 1).

The movement along the Internet Superhighway can be compared to another metaphor, “surfing the web.” This metaphor has largely gone out of favor, as the initial need for a “cool and hip” way of describing what can be accomplished with the internet has passed (Dewey, 7). The now infamous video of The Kid’s Guide to the Internet will give you an idea of why (DEC, 1997). In its stead, however, remains the idea of what “surfing the web” means as an action. Surfing is a sport that is about freedom and letting the wave take you wherever it’s going. Taking the metaphor into digital space, it is about relinquishing control and letting the flow of the webpages

and links dictate your direction. Engaging in this activity is not done for a goal, such as completing a task or finding specific information, but rather to see what is “out there” and what you *can* find (Nunes, par. 3). With this kind of engagement, people have a tendency to lose track of time, and meander around different websites. It can also be used as a procrastination tactic. A more modern metaphoric equivalent would be to describe it as an “internet rabbit hole.” The advent of social media and timelines (another interesting metaphor to consider: representing nonlinear time in a linear space) have given platforms such as Facebook, Twitter, Instagram, Tumblr, reddit, and Youtube an absurd ability to display a near-endless supply of content to users. The constant scroll of the screen upwards displaces the user, and has them surfing an infinite wave. The only way to get off is to “jump” off of these platforms.

All three of these metaphors take the computer and internet out of a purely representational space, and into one that is mental. This mental projection we can call virtual, as it is an internal mapping of a space (Massumi, 8). Each of these metaphors will then need some way of operating, which is where Hypertext comes into play. Hypertext is the computer language used to create websites (HTML Hypertext Markup Language), and the connections between them are called Hyperlinks. Hyperlinks are the “pseudo-magical” connections that link files to one another within a network. There isn’t a clear metaphor for hyperlinks, as both an archive (think library) and a legend (found on maps) don’t quite provide the same instantaneous functionality that the hyperlink provides (Szabo). The hyperlink gives the internet its interactive functionality as well as its dimension of space. Hyperlinks provide these metaphors (“Internet Superhighway,” “surfing the web,” and “rabbit holes”) with their ability to create the illusion of relational space, the intention of a destination, and their addictive ability make a user desire whatever is just beyond the next link, just over the horizon.

## Etymology of the Virtual

Using metaphors to conceptualize the space of the digital raises the question of how exactly this space is made. When engaging with metaphors in physical space, we think of them in terms of structuring an experience. The metaphor gives us the context, intent, and action for whatever situation we are in. In George Lakoff and Mark Johnson's book, Metaphors We Live By, they liken the terminology we use to describe an argument to engaging in war: we *concede points* and *outmaneuver* our opponents. We place ourselves on a virtual battlefield when we have an argument. So when we employ metaphors for the digital, we can think of that metaphor as structuring a space. When interacting with digital interfaces, it is easy to assume that the digital space exists prior to the metaphor, when in fact, the metaphor is used to *create* digital space, or at least our perception of it. This distinction is crucial for understanding how the term "virtual" is used in relation to the digital and to the physical.

We often use the terms "digital" and "virtual" interchangeably, which has had an effect on our perceptions of digital spaces. A traditional dictionary definition tells us that the "virtual" is "existing or resulting in essence or effect though not in actual fact, form, or name." It is also used to describe something that "exists in the mind, especially as a product of the imagination," and in regards to computer science, as something that is "created, simulated, or carried on by means of a computer or computer network" (Harper, par. 1). These are probably the definitions that readily come to mind, and they do provide a decent groundwork for understanding the "virtual." A common phrasing of speech is "These things are virtually identical," or "There's virtually no chance of that ever happening." In common vernacular, "virtual" is already used metaphorically, to indicate that something is, in essence, something else, a slippage akin to the figurative use of the word "literal." "Virtual" is also used to denote something that is not part of our physical reality, that it is imaginary, ephemeral, and separate. When coming to terms with



digital computing, it was an easy and logical jump for early users to describe their actions as taking place in a “virtual” space (Szabo, par. 7).

Another use of the word “virtual” appears in the work of Deleuze and Guattari, who describe it as a state of potentiality. The term “virtual” is used to describe the available possibilities of a space. The different bodies and elements within can combine in any variety of ways, into what Deleuze calls “assemblages.” For every given situation, there is the potential for a great many possible actions. These actions and events have not happened yet, but they *can* happen, and for Deleuze that makes them just as “real” as the present moment is “real”. The “virtual” is juxtaposed with “actual,” that which is in the present and physical (Deleuze, 52). To give an example, there is a person with a knife in a kitchen. The individual can throw the knife, slam it into a wall to make a hole, put it in an oven to heat up the metal, use it to cut an apple, use it to stab an apple, etc, etc. Each of these situations are potential; they are each possible variations of the situation (Borges, 12).

Deleuzian virtuality has less to do with the probabilistic nature of these possibilities, and more with the specific arrangements of elements into assemblages (Deleuze, 234). Assemblage theory, in a nutshell, is looking at how things interact with one another in a specific context to become something other than what each is individually. This has had great impact on the understanding of simulations, as this field has primarily stayed within the realms of mathematics and science. Generally, when confronted with a hypothesis that needs to be run through simulations, the problem is ‘brute-forced’ by just throwing the problem at a computer and waiting for it to run through all the possible permutations. Examples include the many attempts at calculating all possible moves in chess, which so far has proven to be computationally impossible, as after each turn the number of potential assemblages increases exponentially. All

of these possible versions of a game of chess are what Deleuze would call “virtual,” the present state of the board being “actual” (Deleuze, 256)

Many contemporary interface design theories use Deleuze’s assemblage theory when designing computer interfaces. Assemblage theory has the ability to consider the various possible ways a person would attempt to interact with an interface. What would they click on first? What elements are they looking to be most apparent? What is getting in their way? Are they having difficulties finding a specific point of information? Interface designers can now think of themselves as architects, designing a space to be inhabited (Massumi, 3). The use of the term “virtual” begins to make sense, when used to describe digital space. We engage with a metaphor in order to make sense of visual information in the form of icons and signs, and project ourselves, as users, into a “virtual” architectural space, as avatars of ourselves, so that it is easier for us to find information. The specifications of the metaphorical space into which we project ourselves is on the terms of the designers, but since it is ourselves who construct the space when engaging with the digital interface, we see it as an extension of our own agency.

The digital could also be conceptualized as an illusion of space, which is a frequent counter-argument to the prevalence that digital space has in culture (Blas, 86). Deleuze and Guattari are quick to note that it is our perception of a space being “open” or “closed” that determines the reality of the environment for ourselves (Deleuze and Guattari use the terms “smooth” and “striated” to describe the topologies of these spaces). When we enter a concrete place - whether it be a shopping mall, library, school, or business office - because of the architecture that surrounds us, we adapt our behavior to the socially constructed usage of the space. Because of our prior experience navigating physical spaces, interface design mimetically copies the form of its physical equivalent. An online store organizes its digital items along a “shelf” on the screen, and museums and galleries position documentary photographs of artwork

as if the images themselves were the artworks, fixed into the whitespace of an internet browser instead of on the gallery wall. Computer interfaces have frequently framed these as shallow spaces, rarely incorporating a direct representation of a three-dimensional space to navigate; then why has the reliance on spatial metaphors persisted?

The Information City was a new metaphor constructed in the 1990s, as a means of negotiating the ballooning amount of data available on the internet. It was becoming impossible to think that all of this information could be stored on a “desktop,” sticking with that metaphor (Dieberger, par. 9). A new metaphor needed to be constructed, one that reached beyond the locality of a desk or office space. Access within the internet breached the bounds of these older metaphors, connecting individuals to an apparently vast network. The complexity of a metropolis allows for the maintenance of the desktop metaphor within increasingly larger metaphoric spaces: paper, file, folder, desktop, office, room, hallway, building, avenues, city blocks, districts, etc. The idea of organizing information into the gridded structure of a city seemed like the next logical step.

In popular media, cyberspace had already taken on the perspective of gridded cityscapes. The movie *Tron* (1982), depicts a network as a literal city, with programs and software occupying representations of people. Pop culture movies such as *Hackers* (1995), *The Lawnmower Man* (1992), and *The Matrix* (1999) all feature similar devices of representing the virtual spaces inside digital networks as cityscapes. Such depictions further reinforce the Information City metaphor within broader culture. The purpose of the Information City as digital metaphor was twofold: it sought to organize large quantities of information in an easily understood way, and to further “immerse” a user in the activity of engaging a computer interface (Dieberger, par. 12). This objective of “immersing” a user into a digitally constructed landscape would remain a fantasy for the technologically utopian. The ideal of digital spaces being just as

“real” as physical spaces and as equally separate would find its home in this digital utopia, and eventually be realized with innovations of virtual reality technology.

Unfortunately for the Information City metaphor, as soon as it broke out into cyberspace to fill the digital void with streets and megastructures, it was replaced with the fields of information presented by the search engine (Apprich, par. 2). For what good is walking down a digital street and browsing digital constructions of rooms storing information displayed as computer graphics on a computer monitor, when one can simply type a few key phrases into a text box and almost instantly an encyclopedic library presents itself in a plain and easily read manner? Not only was the search engine less graphically dependent on the processing power of early consumer level computers, but it just made more sense to users. But why did it make more sense? Did the internet have its modernist turn when it kept information flat on the screen, acknowledging its digital nature with all of its constraints and limitations, rather than maintaining a realistic representation of physical space? Where is the metaphor? As I already mentioned, we can think of search engines as encyclopedias and glossaries, but that would neglect the potential and relevance of the Hypertext. The search engine finally revealed the vast amount of information possible with the connectivity of internet networks. We no longer relied on rooms with folders, streets and avenues, because we now found ourselves in a virtual space far larger than either. In a sufficiently large enough lake, one can think that they are in the ocean.

It seemed that Deleuze’s rhizome found its home in the intricately networked internet. Any point can be connected to any other point, and the structure and continuity of the rhizome is still maintained (Nunes, 7). Deleuze notes that it is necessary for a rhizome to have this fluid and ever changing structure, that it be able to fold in on itself, break, and grow out into new connections. The idea of a social body or network taking the form of a rhizome is a different way of conceptualizing the space of the internet. It is distinctly non-hierarchical, not favoring origins

and roots. Sections of a rhizome can become restricted, walled off and territorialized. When this occurs, Deleuze terms this a “striation” of space, a straightening (Nunes, 4). This is similar to treating the internet as a highway. When regimented space is opened up, linked to, and made openly available, that striated space erupts into smooth and open space.

This process of alternating between open and restricted spaces readily describes our interactions with the internet. For instance, it would be unwise for a banking website to be “fluid” with its procedures, but a general purpose website that is home to a multitude of chat rooms benefits from a smooth space. Both of these types of digital space are fluid, able to transition between one or the other as groups of people change their use of that space (Buchanan, 11).

The prevailing metaphor for depicting the space of the internet is the rhizome. But, now we must consider the consequences of not acknowledging the boundaries and limitations of this current metaphor. Using the rhizome as metaphor, it would be just as utopian to consider the digital a complete rhizome as it would a functional city. This is due to the extreme presence of corporate and governmental oversight in today’s digital landscape.

The advent of social media in the mid-2000s created strong gravitational points in the “space” of the internet. There used to be nested communities of individuals, who would gather together on their respective networks, but who could leave and join a new community on an altogether different website. MySpace, Facebook, Google+, Twitter, Tumblr, reddit, Imgur, YouTube, Vimeo, Instagram, Snapchat, Discord, Twitch: each niche market has now been carved out and consolidated. In order to compete and be seen, in order to survive as a community, one must localize themselves within one of these centralized hubs (Losh, 35). Each of these large websites has massive “gravitational pull”, a term borrowed again from Deleuze to describe a point in a network that attracts and augments surrounding points in space. New barriers have been formed. We are now either online, or we’re not, and if we aren’t plugged in,

then we might as well be dead (at least the marketing for these new gravitational centers tells us). We now project our desires and fantasized engagement into these spaces, akin to the old tactics of advertising (Williamson, 74).

So, now our current conception of the space of the digital is some hybridization of a cityscape and a rhizome, constantly shifting, changing, and updating, yet regimented, territorialized, and structured. Two of the largest gravitational centers, Google and Facebook, have shown that they are not above walling off and restricting content and access. When moving into Chinese markets, Google had to alter their search algorithms in order to adhere to China's censorship laws (Manovich, par. 12). Facebook's user agreement form restricts what kind of content users can publish and post on their timelines and other users' timelines. Barriers are constructed, yet we do not see them. Clemens Apprich describes this facet of the newly corporatized internet in his lecture that describes the zones of control within cyberspace:

...this leads to a rather paradoxical situation: on the one hand, new media technologies have become more accessible and easy-to-use; on the other hand, access to the information generated by users is largely controlled by a few companies. This specific form of a "digital panopticism" insidiously affects the user by employing new techniques of data-mining and marketing research, while its centre remains closely guarded, and therefore, unreachable to the user. Hence, it seems that the network society turns out to be yet another society of control. The virtually free "space of flows" remains within strict boundaries because the technological infrastructure is increasingly controlled by commercial and state interests (Apprich, 9).

The realities of data mining, user-generated content, lack of control of personal data, targeted advertising, and the Filter Bubble, all point toward a centralized force that has the capabilities of augmenting and directing the "flow" of digital space (Pariser, 19). We, as users, do not see the implementation of these barriers, nor can they be willfully experienced. The systems in place that direct the flow of digital space are seamless, occurring instantaneously. The complex systems in place that determine the ads shown before YouTube videos are determined within

the span of time it takes for the user to click the thumbnail of a video, and for the next page to load (CGP Grey). What this reveals about the current state of digital space is that we exist in a panoptic space where we are always ushered away from its exterior walls, and the discovery of our confinement, or prevented from dwelling too long in what is at the center of the network, distracted by a new link, blue and unclicked.

## Conclusion - The Internet ≠ Freedom

Interface design has a prominent influence over our digital lives. It functions best, however, when we don't see it, when we don't notice that it is there. And when the icon we see on our screens becomes a thing in and of itself, such that we perceive it to be "real," and not merely a grid of colored pixels. This is the Baudrillardian simulacrum, collapsing the sign into the referent. This is the negation of the differentiation between "real" and "digital," the conflation of the two into the virtual. This all depends on transparent metaphors that influence our view of digital space as a separate and habitable space.

The decade-long discussion of the internet turning the world into one "Global Village" is almost complete. This torch has been carried by many: in the 1990s it was then Senator Al Gore; currently, it is Mark Zuckerberg, CEO of Facebook. The Global Village needs power centers, though, places where regulations and barriers are created: The difference between tamed internet landscape, Web 2.0, and what remains the wild, wild west. These gravitational points have warped, distorted, and augmented the open and smooth space of the internet. In order to exist, to be seen, and to communicate with peers, we must be 'jacked into' one of these gravity hubs. No longer is the internet a free space for exchange and discussion of ideas; Alternative Facts and Fake News are easily disseminated in these territorialized realms.

So what do we do about it? Is it enough to know how it all works? Are we satisfied with peaking behind the curtain and having the wizard's machinations revealed to us? I believe one answer lies in Deleuze and Guattari's "eruptions of space." If our current digital spaces are striated, mediated, discretely screened, cached, analyzed, and stored in offshore servers out of our grasp, it may take the eruptions of "smooth" space. Disrupt movement. Change the flow of information. Break barriers of regimented space. Jam the intended use. We need to make users aware of the fallacies hidden behind digital metaphors.



This effort begins by building communities that are unfixed in digital space, unreliant on gravitational centers. Even aggregate sites such, as reddit, Tumblr, and YouTube, are too burdened with seamless systems of control. These sites function similarly to print advertising, with carefully laid out interfaces to keep users engaged, drip-fed, and captured within their site. An awareness and a rejection of these systems is needed by a community whose goals are not based on likes, subscribers, and followers. A community that creates eruptions within digital landscapes, thereby disrupting and alternating gravitational space, reconstituting the rhizome, and foregoing metaphors in preference for literacy and discourse. Collectively, we need to develop a tertiary term for the internet that doesn't rely on the spatial assumptions of the "virtual" or the seamlessness imposed by the "digital."

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