Towards an Ontology of the Interface: Identifying the Interface as a Mediation Entity

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Article frontispiece. Char Davies, Osmose, 1995. (© Char Davies) Vertical tree, digital still image captured during immersive performance of the Osmose virtual environment.
Abstract: The interface has existence. It is more than an assemblage of processes and effects; it is more than a pure relational instance. The interface can be identified as an entity in itself and in relation to others. We shall present herein an ontological work on the interface: by defining what it is and how it exists; and by discussing its relation to other entities. The interface will be defined both abstractly as a mediation complex—by identifying characteristics present in its multiple instantiations—and in relation to other entities—by observing the case of the human computer interfaces.

Introduction
The interface is a system or a device through which non-related entities can interact [1]. From this definition, we conclude that the interface has some features of the entities it relates, since it must communicate with each of them. Still, it is more than the relational space that inherits properties from the systems it connects: it is itself an entity with its own features that emerge from the interaction occurring through and by itself. Finally, the interface has features that are its own; those are the ones producing or shaping experience [2]. On another level, this definition also encompasses the ubiquity and variability of the interface: it is present between diverse entities so it takes virtually any form and function—a graphic user interface or a public transportation hub, for instance.

The main objective of this work is to define what the interface is, and how it relates to other entities, thus moving forward in the construction of its ontology. Section 2 defines the interface and its mode of existence abstractly—i.e., valid for any of the interface’s multiple instances. Section 3 discusses how it relates to other entities by concentrating on a particular instance: Human Computer Interface.

Interface is defined within the theoretic framework of mediation and experience [3]. According to Kittler [4], from Aristotle onwards, the ontology studies have been dealing only with things, their matter and form, but not with the relations between things in time and space, therefore leaving media out of the study. Since we study the interface as a mediation entity, it is mandatory to define it and describe its relations in space-time (and matter, which can no longer be separated from the previous).

What Is an Interface?
Interface definitions often consider its space and actions (time), thus contemplating its relational and emerged characteristics. Most of them, though, ignore its substance (matter), therefore its own characteristics. [5] In this section, we study the interface as a complex [6], acknowledging its space-time-matter.

Interface and Space: Between, Discontinuous, Adjacent
Space has been defined in distinct ways throughout history. Some of these definitions became important conceptual tools to work the interface [7]: Plato’s work on space provides clues for defining the interface’s “in between” mode of existence; Quantum Physics demonstrates the pervasiveness and fundamental role of the interface in sustaining the discontinuous complex of reality; and Foucault’s experiential work on space exposes adjacency as fundamental for relational occurrences.

Space, for Plato [8], is in between Being and Becoming. It operates as a receptacle for things and beings [9]. Interface is also between ontologically different realities, distinguishable by their conception, genesis and apprehensibility. It is a receptacle for beings: beings in formation and transformation, passing from one to the other world (entity).
To apprehend Plato’s space one needs a “kind of spurious reason” [9], which is also the case for the interface as will be discussed in section 3.1. Plato describes space as a portal: “which we behold as in a dream” [9]. The interface is also a provocative agent, a space that invites us to move to another reality. Moreover, dreams as emotional landscapes put the interface within the realm of fantasy and desire. By going beyond the fulfillment of a need, the concept of interface is connected to the Lacanian concept of object petit a: facilitating and promoting access to other reality by means of continuous satisfaction [10]. In short, the interface is a space of perception, action and desire—a space of agency in Hookway’s terms: “the will and means to action” [11].

Since Einstein, understanding space-time implies considering the masses, the particles and their behavior, namely through their relationship with light. Quantum theory [16] asserts that all entities, though apparently continuous, are really made of particles. Reality is a non-continuous heterogeneous woven, but with such a fine texture that it suggests continuity to our perception. Reality depends on the actions between its elements to maintain its unity—to exist. The idea of an interface goes through all this discontinuous continuum of reality, since its presence is fundamental as an element of dynamic liaison: granting the existence, multiplicity and mutability of the fabric of reality.

Foucault [13] proposes another important vision about space, stating that our experience of the world is network-like: the experiential relation of space-time is of connection and weaving. The position of experience in space and its distribution in time does not obey conventional geography or the successive linearity of history. Events are represented by neighborhood and connection more than position or date. Adjacency becomes the basic condition for a relational occurrence mediated by an interface: “Inter- encompasses relations that may occur between, among, or amid elements insofar as they are given as bounded within the space of their relating, or of the events insofar as they are bounded in time.” [14]

Interface and Time—Speed, Iteration, Harmonization

Speed is a relational concept, since it considers the distance (space) covered in time by a mass. Paul Virilio studies speed through telepresence and uses light exposure as an alternative measure of time [15]. Time becomes chronoscopic instead of chronologic. Just like objects in a photograph, an event in time may be underexposed, exposed or overexposed [16]. The time of interface is also of exposure: something only exists to the other system if “exposed” in the interface. If something or an event is underexposed the other system cannot acknowledge it; if, on the contrary, it is overexposed then loses its novelty and interest (it is saturated).

Another aspect to consider is the iterative nature of interface time. According to Pierre Robert [17] the interface is built around two rhetoric axes: the first one is developed at the moment of its conceptualization; the other unfolds through interaction. Interface is reconceived by each action, in an iterative process, not in a cyclic one.

Finally, the time of interface depends on rhythmic harmonization, which is related to cybernetics [18] through feedback. The entities that are interacting might operate in different time units or in different rhythms; it is on the interface to make them compatible.
Interface and Matter—transmission, plasticity

Interface has a matter whose presence depends on action (it becomes in interaction), it is formed while transmitting. It becomes “visible” when transmission occurs; its matter is concretized at each moment of interaction. Therefore, interface’s matter is dynamic, both in composition and in shape, making it comparable to plastic material [19]:

- Malleable: interface gets its form from the gap between entities, it is molded dynamically by them and molds them back [20].
- Superficial/coating [21]: interface sticks to the entities, covering them, laminating them, sometimes becoming indistinguishable from them. This coating is what makes it possible for entities to see each other, although through a mediation layer.
- Artificial [22]: there is always something artificial about the interface, precisely what is natural to the other entity.
- Synthetic [23]: interface synthetizes something new every time it promotes the encounter between two entities: the Hegelian part of plasticity.

Composite materials [24] are made from two or more constituent materials that, when combined, produce a material with characteristics different from the individual components. The interface is made of different original materials combined, not fused, into a heterogeneous complex. This heterogeneity does not compromise its unity, on the contrary, it is its very foundation [29].

Simultaneous creation [26] occurs in composite plastics since they gain form and define their composition at the same moment: in action—just like the interface.

Char Davies’ Osmose (Fig.1 and frontispiece) exemplifies what is meant by the plasticity of the interface [27].
How Does the Interface Relate to Other Entities?
In this section, we analyze the relational mode of the interface with its bounding entities. We leave the abstract sphere and work the instance of human computer interfaces and how they relate to their bounding entities: humans and computers.

We work on how humans perceive the interface. (3.1) How does that perception relate to the passage between actual and virtual? (3.2) How does that perception affect the meaning of transparency in the present digital culture? Both these questions are analyzed in the light of aesthetic computing—“the application of art practice and theory to computing” [28], while consequences to interface design are noted.

Articulating Intelligible with Sensible While Actualizing the Virtual
Human Computer Interfaces respond to two observations made by Paul Fishwick in justifying a move towards aesthetic computing:

“(1) aesthetics in computing are broader than the purely cognitive dimension; and (2) the art-science confluence embedded within the discipline of interaction design is broader than the primary ‘desktop’ interface.” [29]

(1) To know and recognize the interface itself we need to use a hybrid reason. In the case of human computer interfaces that reason must be simultaneously mathematic and sensible, for those are the modes of “perceiving” on both ends. Alain Renaud considers this to be the central operation of the interface: a process of intellectualizing the sensible and one of embodying the intelligent, by actualizing the virtual [30]. Human computer interfaces congregate cognitive and material aesthetics by articulating intelligible with sensible and actualizing the virtual all in the same movement. In human computer interfaces the cognitive dimension is no longer pure at the interface layer: cognitive behavior is simultaneously sensible, for such is the translation and transmission (the operation) the interface guarantees. This congregation is also present on the actual/virtual translation if we consider the quantum physics principle that there are no measurable continuities in physics. There is no abrupt passage between actual and virtual, there isn’t a moment or a point of discontinuity in the interface itself where magic happens and the analogic (continuous) becomes digital (discontinuous). Both realities are discontinuous, just in different levels. Aesthetics in computing are hybrid (material/virtual and cognitive/sensible) at the interface layer.

(2) The art-science confluence and the very diverse ways in which it is revealed on human computer interfaces can serve as model for other dimensions of interaction design, proving that it is broadly embedded on this discipline. Moreover, since Foucault, network vocabulary defines experience. There is a relational mode of experience or an interface experiential mode that is pervasive in our digital culture. This is important in terms of experience and consequentially in terms of possibilities for experience design. Again, interface concept and design can be the model to replicate when considering experience design.

Trans-Appearance Through Bio-Digital Rhythmic Harmonization
The chronoscopic measure of time reinforces the idea of interface as a receptacle of objects, not only in space (such as Plato’s formulation) but also in time. Interface is the space-time structure that supports Virilio’s real time perspective [35]. In terms of human computer interfaces this means it is on the interface to control exposure, becoming a window in time, a special window, though, since its matter is plastic. It is the plasticity of the interface,
combined with the fact that the interface gains matter intermittently through transmission, that guarantees its trans-apparent mode of existing (transparent and opaque, commutatively).

Interfaces are transparent since there is a need to see through them; and are apparent since there is a need to operate them and identify with them (interface as mirror). If well accomplished, both these characteristics are experienced simultaneously. Being trans-apparent is being beyond apparent, it means being apparent yet traversable like Alice’s mirror. That is how transparency is experienced nowadays in digital culture: seeing through and being visible in apparent simultaneity. Rhythm becomes fundamental to achieve trans-appearance. In human computer interfaces the rhythmic harmonization is bio-digital [32].

Trans-appearance proves that time and matter are key to develop a well-balanced interface space in terms of transparency/opacity in perfect commuting rhythm. There should be equal effort on conceiving spatially interesting interfaces and on controlling its elements’ time of exposure. The temporal aspect of digital artifacts is considered by interaction design [33], having pliability as an aesthetic quality in their use. The interface has that quality through its plasticity. Interface’s matter is the operational answer to conceive an effective spatial-temporal interface.

Conclusions and Future Work
An ontological work on the interface implies defining what an interface is: how it exists. The interface’s inscription in space-time-matter provides a definition: the interface is a complex, it is an intricate of qualities and processes that agencies the interaction between two or more systems. The interface exists in the discontinuities of reality. Its space is one of passage, its time is of exposure, and its matter is dynamically heterogeneous: both in shape and composition.

Another important ontological aspect to consider is how the interface relates to other entities. The operations performed on the interface and how interaction occurs through it provide another fundamental element to understand the interface: mediation. The interface is a mediation complex dynamically and iteratively constituting itself both as a plastic window and as a traversable mirror.

To complete this ontological work there are two fundamental steps still to take: Study other relational aspects of the interface, approaching key concepts of digital culture such as: subjectivity, image and art. Create a classification system for interfaces—a taxonomy preferably—which will distinguish intrinsic from contextual characteristics of the interface.

Glossary
Interface: a mediation complex through which non-related entities can interact.

Entity: something that exists by itself, separately, and has its own communication capacities and limitations.

Relation: connection between entities.

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References and Notes

[1] On the online supplemental text file (OSTF) we analyse this definition and the characteristics of the interface through an example.

[2] In Hookway’s terms, this study on the interface follows both the “between faces” and the “faces between” approach. Branden Hookway, Interface (Cambridge: The MIT Press, 2014) pp. 9–11.

[3] The OSTF contains a detailed justification for choosing this framework.

[4] Friedrich Kittler, “Towards an Ontology of Media.” Theory, Culture & Society 26 (2–3): 23–31. (2009) pp.23—24.

[5] The OSTF contains interface definitions from different authors and fields.

[6] “Complex” comprises space-time-matter and therefore respects the three types of characteristics of the interface: inherited, emerged and constitutive. The OSTF explains the standing point to study this complex.

[7] The OSTF presents these definitions and concepts of space in detail.

[8] Plato, Timaeus (NA: Project Gutenberg, 2008) 27 Jul. 2016 http://www.gutenberg.org/etext/1572

[9] Plato [8] p.300

[10] André Nusselder, Interface Fantasy: A Lacanian Cyborg Ontology. (Cambridge, MA: The MIT Press, 2009). p.13.

[11] Hookway [2] p.5. See also Brenda Laurel, The Art of Human-Computer Interface Design. (Boston, MA: Addison-Wesley, 1990) p.xii , where the doorknob example of a human/door interface exposes this agency.

[12] David Deutsch, The Fabric of Reality (England: Penguin Books, 1998). pp.35–36.

[13] Michel Foucault, Of Other Spaces: Utopias and Heterotopias. Architecture, Mouvement, Continuité 1984. 5: p. 46–49. 27 Jul. 2016 http://foucault.info/doc/documents/heterotopia/foucault-heterotopia-en-html p. NA

[14] Hookway [2] p. 7

[15] Paul Virilio, Open sky. (London: Verso 2003) Reprint. ed. p.3.

[16] Virilio [15] pp. 27–28 An object underexposed to light is not captured on film; an object overexposed to light becomes saturated and impossible to read. The OSTF discusses the consequences of chronoscopic time.

[17] Pierre Robert, “L'interface: le bien de la communication”, in Louise Poissant, Ed. Interfaces et Sensorialité: Esthétique des Arts Mediatiques, (Saint-Foy Québec: Presses de l'Université du Québec 2003) pp. 115–122. p.116

[18] Norbert Wiener, Cybernetics; or, Control and communication in the animal and the machine. 2d ed. (New York: M.I.T. Press. 1961) xvi, 212 p. pp.35–38

[19] We follow Malabou’s multidisciplinary work on the concept of plasticity: Catherine Malabou, Ed. Plasticité (Paris: Léo Scheer 2000)

[20] Bernadette Bensaude-Vincent, La plasticité des matériaux nouveaux, in [19] p. 170–185. p. 171
[21] Jeffrey L. Meikle, De l'immaterialité virtuelle: plastiques et plasticité au XXe siècle, in [19]. p. 146–169. p.150.
[22] Meikle [21] p.148
[23] Catherine Malabou, Le voeu de plasticité, in [19] p. 6–25. p.10
[24] Bensaude-Vincent [20] p.174
[25] The OSTF contains a discussion on this subject.
[26] Bensaude-Vincent, [20] p.173 ("la prise en masse" and "la mise en forme")
[27] On the OSTF this artwork’s interface is discussed, both in its concept and on its plasticity. See Char Davies, 17 March 2017 http://www.immersence.com/osmose/.
[28] Paul Fishwick, et al., Perspectives on Aesthetic Computing. Leonardo, 2005. 38(2): p. 133—141. p.133 The supplemental text file details the framework.
[29] Fishwick et al [328] p.134
[30] The OSTF details the author’s idea. Alain Renaud, “L’interface informationnelle ou le sensible au sens de l’intelligible” in Interfaces et Sensorialité: Esthétique des Arts Mediatiques, L. Poissant, Editor. Saint-Foy Québec: Presses de l'Université du Québec 2003. p.69
[31] Virilio [15] p. 31—33. The OSTF details the author’s theory.
[32] The OSTF presents examples of this harmonization.
[33] Fishwick et al. [29] p.138

Biographical Information

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