Understanding IT Artefacts with Language

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Every day we experience relationships with artefacts, which describe material objects made by humans in order to reach a goal and exploit the human feature to plan ahead. Artefacts bring together cognitive evolution and technical enhancement. Although artefacts are conceived as technical, we are now facing a relationship with Information Technology (IT) artefacts. IT artefacts include both hardware and software, as a two-sided entity. The definition of IT artefact corresponds with the Saussurean linguistic sign: a two-sided entity constituted by the signifier (hardware) and the signified (software). I claim that IT artefacts share this ontological trait with the linguistic sign. I will show that IT artefacts are the result of design and planning, while language—which is an institution—is not the fabrication of one human but linked to collective human activity.

Keywords: artefacts, IT artefacts, language, institution, linguistic sign, Saussure, Bréal

1. Everyday Life Experience with Artefacts

The world we live in is the result of a complex vortex of practices which human beings perform in order to do their jobs, to meet requirements, to satisfy a need or a desire. The practices are shaped by the relationships among human beings and with the objects that fill up the world. The most relevant relationship between human beings and objects is use in the sense in which Ludwig Wittgenstein (1953) outlined this relationship overlapping meaning. However, human practices involve not only material objects but also the languages we speak. Languages and material objects share at least one feature since their nature and development depend on human activity, including the material objects we refer to as artefacts. The word artefact includes all the material things made by human beings for a specific purpose, in order to meet a desire or solve a problem (e.g., points, knives, lamps, electric shavers, tablets, Bluetooth earphones).

Technological development has changed the nature of artefacts, extending the category to include those which may be called Information Technology (IT) artefacts. Although language and artefacts share at least one feature, their ontologies have been put into relation only in an indirect way, maintaining that social objects—or the institutions broadly speaking—need to cling to a physical object to exist (Searle, 1995; 2008). The physical object referred to by John Searle is often a material object made by humans.

I seek to philosophically reshape the relation among artefacts, social objects, and language, by trying to include the category of IT artefacts thanks to hints from the research in the Information System (IS) field. The main argument is that artefacts, including IT artefacts, which populate our lives have to be considered as tools to solve a problem, as they are a particular kind of artefact and they share with language the main feature of the linguistic sign (Saussure 1922/1983): Both are two-sided entities which recall each other. For this reason,
artefacts are the result of a complex evolution of social intelligence, which is responsible for the planning and making of objects that embody an intentional affordance in a particular cultural context.

2. The Definition of the Artefact

The word “artefact” derives from the Latin phrase *arte factum*, the idiomatic expression which refers to an object made by humans, sometimes by the means of a tool. In *The Sciences of the Artificial* (1969/1996), Herbert Simon claims that humans live in a world that is clearly artificial and modified by their intervention. All that is artificial and produced by human action starts from a project and is concerned with aims and functions:

> for those things, we call artefacts are not apart from nature. They have no dispensation to ignore or violate natural law. At the same time, they are adapted to man’s goals and purposes. They are what they are in order to satisfy man’s desire to fly or to eat well. As man’s aims change, so too do his artifacts—and vice versa. (Simon 1969/1996, 3)

In Simon’s perspective, within the classical Artificial Intelligence, an artificial object is produced by human intervention and it is developed through a project in order to reach a goal.

The main ontological trait of the artefact lies in the dichotomy between artificiality and naturalness: “The term ‘artifact’ applies to many different kind of things—tools, documents, jewellery, scientific instruments, machines, furniture, and so on. Artifacts are contrasted with natural objects like rocks, trees, dogs, that are not made by human beings (or by higher primates)” (Baker 2007, 49). It is not surprising to agree on rocks and trees as natural objects. Things like iron and copper belong to a natural kind, according to the direct reference theory (Putnam 1975): We can refer to this kind of things on the basis of the matter they are made of. Natural kinds are recognised by their molecular components and artefacts are recognised by their functional properties.

However, the ways in which natural kinds are employed define new kinds of hybrids, which are a bridge between natural kinds and artefacts (Oswalt 1973; Dickson 1996). For example, gold is a natural kind found in nuggets and tiny particles, which can be manipulated to become a gold ring.

The practical ends, which generally define a genuine artefact, depend on the intentional affordances of the object. Genuine artefacts show specific affordances (Gibson 1979), or the “disposal of an object to:” A bottle has the affordance to be filled up, to be empty, to be moved, and so on. The affordances mentioned above are dispositional features of a large number of objects like a glass or a container. This means that affordances cannot be used to strictly categorise an object but they activate only in relation to the human being perceiving it. In that way, an active affordance shows the possible relationships between an object and a subject. The Gibsonian ecological perspective does not focus on the world and its objects but on the environment and its surfaces. Then, human beings manipulate surfaces and their intervention does not affect objects directly but rather their affordances.

An artefact could simply be defined as the product of the work of a human being. This definition fits with the definition of technological artefact given by Verbeek and Vermaas (2012). A chair is the result of a design project, is made by humans, and over the centuries has been developed by the intervention of human beings. A first conclusion is that the chair has a story shaped by the intentional affordances given to it by its creator. Artefacts always reveal a story in the course of time and show technical features, which depend on a series of practical gestures, the creator’s intention and the reasons why they have been created in order to perform a function. But the recent technological developments in Information and Communication Technology (ICT) call
for an explanation about a new kind of artefact: Is a Bluetooth earphone simply an artefact like a chair? This question opens up a debate in the IS research field (Orlikowski & Iacono 2001; 2006; Matook & Brown 2016; Alter 2014; 2015), where scholars are still trying to define whether the concept of an IT artefact is useful for their studies. A brief survey of IS researchers shows that an IT artefact could be an application, a design tool, a model, a method, or a combination of hardware and software.

Despite the lack of agreement on the definition of IT artefacts, two proposals are philosophically relevant:

1. “The IT artefact is a distinctive element of our field, binding together multiple heterogeneous elements of hardware, software, humans, and institutions” (Orlikowski & Iacono 2006, 288).

2. “An IT artefact is a physical artefact based on technology… The software and hardware can be seen as an integrated whole. Without the software, the hardware is just an empty shell. Without hardware, the software is just symbolic expressions. But together they are machines with the power to execute intentionally designed information-processing tasks” (Goldkuhl 2013, 93).

The first definition focuses on the relevance of items like humans and institutions, which means the interplay between IT artefacts and human beings, the influence of humans on technological development, the ethical issues about IT artefacts. Moreover, calling into question institutions, this definition opens to a more complex ontological status of the IT artefact which involves the concept of social object.

The second definition of IT artefact as a whole of hardware and software which depend on each other recalls one of the most relevant definition of the linguistic sign given by Saussure (1922). Nevertheless, linguistic sign is not a machine also if it is intentionally produced. This means that the notion of intentionality could shed light on the definition of IT artefacts and its relationship with philosophy.

3. Planning and the Artefact Making

The hallmark of an artefact is that it is made by a human being. The making of objects—especially tools—is an ancient practice. From a paleontological perspective, the research by Leroi-Gourhan shows a phylogeny of the artefact, in which the planning factor and the fulfilment of a need (or desire) play a crucial role, adding a social dimension to this kind of object.

Technical development has been strongly influenced by two biological factors: the acquisition of the standing position and freeing of the hands; these two acquisitions allow for instrumental practices and, moreover, free up facial organs in order to develop communicative practices. Starting from Homo Habilis, Homo Erectus and Homo Ergaster, our ancestors could be tool makers and signal makers, but did not have a complete communication system, which appears only with the supralaryngeal vocal tract. Tool making and language are not abrupt events but gradual ones (Lieberman 2007).

Even though Leroi-Gourhan’s research is dated, it has been confirmed that starting from the Neanderthal, the production of material objects with exploitable traits occurred on the basis of a project. In these cases, the project provides a purpose to be achieved (for example, the manufacture of an object to cut something), the choice of the material to employ and the putting into practice of a series of actions: “the extraction of the point requires almost at least six series of operations performed in strict sequence, each series being conditional upon the others and presupposing a rigorous plan” (Leroi-Gourhan 1993, 100). Tool making becomes a sophisticated practice which combines satisfying a need or a desire with the planning of a series of gestures to realise a project: “Homo habilis, or whichever Pliocene hominin first made stone tools, was clearly able to replicate the
process consistently. This does probably represent a significant change in the process of cultural evolution” (Foley & Mirazón Lahr 2003, 119).

The result of the project is an artefact which, over the course of time, undergoes slight transformations by the community which uses it. Recognising the function of an artefact and its planning comprise the social dimension of artefacts. This follows from the idea that planning (and planning ahead), “is often presented as the cognitive basis for increased complexity in technical and subsistence systems” (Wynn & Coolidge 2016, 208).

Thus, the notion of purpose is essential for the definition of the artefact’s nature: It not only forces humans to plan and build new artefacts but it is also responsible for their transformation over time. An artefact created to achieve some functions, can change over time and give rise, thanks to human activity, to other artefacts too. This is what happened, for example, to the phonograph invented by T. A. Edison in 1877, of which the inventor could not imagine the function of reproducing music melodies, which is the function performed by juke boxes a number of decades later. The inventions of the phonograph and the juke box are in fact attributed to two different persons. However, in these cases where an invention is attributed to one person, the creation actually depends on “a process ‘shared by more than one mind’” and it is “a multiple discovering” (Legrenzi & Vianello 2002, 290).

The origin of artefacts is to be found in the sharing of human practices and in the co-operation (Tomasello 2009; 2014) which makes them possible. Starting from performed actions like hunting, humans develop the cognitive ability of intentionality, which first appears in dual structure relationships as joint intentionality. Even among the first hominids, the manufacture of an object is a socially shared practice. Human behaviours and practices co-evolve with intentionality which develops in collective intentionality. An artefact is the expression of a human story—which means its biological, technical and cognitive evolution, including the point at which someone makes an innovation and changes the original artefact. For this reason, at any time, there is a specific version of the artefact in use, and it is replaced by newer versions, creating a ratchet effect (Tomasello 1999), which also affects communication systems—including the sophisticated natural languages we speak. The shared practices we are involved in not only affect artefacts (which in a neoculturalist approach means artefacts and behavioural practices), but also the creation of institutions governed by recognised rules.

4. Social Objects, Artefacts, and Language

The social dimension of artefacts could lead us to understand them as social objects (Searle 1995), as they are the result of social interactions. Searle (1995; 2008) claims that social objects are objects like a $20 note or the University of California and they are “social facts” that is they deal with objects which need human institutions to exist, based on group intentionality, the sharing of intentional states, or co-operation acts. Also manufacturing an object for a common aim is a “social fact,” where we admit that an object is not only social in its use but also because it is the combination of the development of practices. So the artefact as a “social fact” becomes an “institutional fact” as a 20€ note or the national flag of a Country if it is part of an institution. Searle explains that institutional facts need special human institutions for their existence. Language is an institution of this kind, or better is a whole institution of this kind: It is the foundation for all other institutions.

The artefact’s typical characteristics we have described so far because of collective intentionality (Searle 1995; 2010) lead us to include it in the class of “social facts.” For a “social fact” to be recognised as an “institutional fact,” it is necessary to assign it a collective function, so, what apparently is a physical object has to be recognised symbolically. One of the examples used by Searle to explain the shift from “social fact” to
“institutional fact” is a wall—thus, an artefact: It is used as a physical barrier and then symbolically recognised as border. Since the wall is recognised as a border, it is an “institutional fact.” An “institutional fact” always needs language. And what happens to language which is an institution in itself? Searle states that: “Language is itself an institutional structure because it involves the imposition of a special kind of function on brute physical entities that have no natural relation to that function” (Searle 1995, 255).

In Language and Social Ontology (2008), Searle restates some crucial points of the theory of institutions expressed in The Construction of Social Reality (1995) centring on the way language is an institution, or better yet the main institution making all others possible. All the facts that give rise to an institution need a linguistic representation called Status Function Declaration. It is in this way that to a 20€ note can be assigned a function through a declaration. But, the Status Function Declaration also has the function to certify the existence of those 20 euros. The case of language is different:

The language is enough to determine that it is a sentence. The status functions of language, sentences for example, are self-identifying for anyone who knows the language. But other status functions require language not only for their identification but for their very existence. Language itself does not require some further representation in order to be language. (Searle 2008, 458)

5. Language Is Neither a Social Object Nor an Artefact according to Searle

Searle’s position on the idea of language as an institution goes against a long tradition which had considered language as an instrument, that is included in the category of artefact. It is a rather widespread belief that the term “artefact” can also denote linguistic signals or symbols, as recent research in the field of Cognitive Sciences (Kriiperndorf 2006), Evolutionary Psychology (Tomasello 1999) and Semiotics has shown (Rossi-Landi 1968; 1972). In this case, we can assert that language is an instrument. The linguist Émile Benveniste (1966/1971) distances himself from this position, and in his writings he attributes this understanding of language to the behavioural paradigm. In Benveniste’s opinion, language is not an instrument because this condition would imply making it an object: “The pick, the arrow, and the wheel are not in nature. They are fabrications. Language is in the nature of man, and he did not fabricate it” (Benveniste 1971, 223-4). Humans, in fact, have never been grappling with the moment of the inception, but only with the one of the replication of linguistic practice. Anticipating Benveniste in the critical essays on the idea of language as an instrument, Wilhelm von Humboldt placed language as a go-between the single individual and the world around. Following the philosophical tradition spread between the end of the XVIII Century and the beginning of the XIX, Humboldt considers language as the place in which the heritage of a community becomes fixed, and the heritage of a nation too, so that it is not the product of a single human but of the whole nation.

The essence of language does not reveal itself being a completed task, that is a material object (ergon), but it is energheia, that is an activity, a never-ending work of the spirit. Language is an organic knowledge but not Spracheorganismus as August Schleicher stated, although some changes inside it and the death of some languages are recognised.

6. Language: Another Kind of Institution

Other thinkers were against the idea of language as an organism and some of them claim language is an institution, from John Locke to Friedrich Carl von Savigny and Michel Bréal. In the Essai de sémantique (1897) and in different articles prior to this volume being published, Bréal opposes the dominant paradigm of the
period which supports the idea of language as an organism as Schleicher intended. On that point, Bréal admits that “illustres philologues” affirmed that humans do not interfere in the facts of language. Bréal claims that, broadly speaking, nature understands human facts, so does language; but he also claims that the history of practices, houses, customs, arts, social and political history as well as language, would all belong to natural sciences. However, if there is a difference between historical and natural sciences, and if humans are considered part of biology and natural sciences, language and linguistics, which are the result of human activity, both belong to historical sciences.

Consequently, language is not presented as a “fourth reign” and linguistics is not a natural science because it is impossible to find its object in nature. Bréal claims that because language is the work of humans through cooperation, words are in danger of changing their meaning when, passing from mouth to mouth, they arrive to all people. The history of religions, the history of science, and the history of institutions are proof of this danger.

Language is a human act and the aim of its use is comprehension. The evolution of language, like all the other human institutions, according to Bréal, depends firstly on human will. However, we cannot consider the will as a conscious force but as half-conscious and collective. Among the acts made by a conscious will, there is a distance that gives rise to intermediate stages.

As Desmet and Swiggers (1995) suggested, Bréal does not clearly define the concepts of “volonté humanine,” “volonté intelligente,” “intelligence humaine.” The will is the first cause of language changes controlled by laws that Bréal takes into consideration in the first part of the *Essai de sémantique*.

The attention directed towards these mechanisms regulating the linguistic variations and use shows the unavoidable contribution from society in language evolution. The society’s contribution (indicated also by the terms people and nation) is evident in the cases in which Bréal describes the mechanism of metaphor and polysemy. In this last case, the same mechanism of the polysemy is indicative of the civilisation of the people of a nation. If a word accumulates many senses, we have to suppose that it represents different kinds of intellectual and social activity.

Also in the cases in which people create new words, these ones, in reality, are always based on some material that is not new or fresh but inherited by their ancestors: The different social environments are not the only cause for the growth and the renewal of the lexicon. Another reason is our desire to represent all that we think and feel through images.

In describing the concrete mechanisms that comprise the laws of linguistic changes, Bréal uses a series of examples that put language in relation with other social institutions, politics, and law. In reality, even before publishing *Essai de sémantique*, for example in the article *La science du langage* (1879), we can notice that language is considered to be similar to an institution (money) and besides having a communicative function, it also has a cognitive one: “The greatest part of the times, when the operations of the intelligence present some difficulties, our mind does not conceive, suppose, or expect things; we imitate the bankers who handle titles and treat them as if they were the same cash, because the bankers know that they can exchange titles with cash” (Bréal 1879, 1009-10).

7. IT Artefacts, Institutions, and Language

Apart from investigating linguistic institutionalism, Bréal, recalling Étienne Bonnot de Condillac and the *idéologues*, states that the words of a language are signs. The signs Bréal refers to coincide with the
phonological part—the expression or the signifier—of Ferdinand de Saussure’s (1922) linguistic sign, which is a two-sided entity constituted by a signifier and a signified. According to Bréal, signs are conceived on the basis of their form, which is an individual and collective production at the same time. In fact, a human being can produce a sign intentionally, and this becomes a kind of artefact. Moreover, the sign has to be recognised by everybody in the reference group and it is subject to intellectual laws that modify it without a single person being able to intervene directly in such mechanisms. The sign, in this way, seems to be an artefact dominated by a type of half-conscious intentionality, determined by a sort of will already explained by Bréal.

Taking into account the relation between signs and languages, let us reconsider the language institutionalism in Searle. The circularity Searle is accused of in explaining language as an institution which renders all others possible, can be overcome assuming that languages hold on a material object that is the linguistic signal. Then, signs and artefacts both have a material side. In the case of IT artefacts, the material side is the so-called hardware (e.g., cables, wires, metal parts, silicon parts, etc.). While artefacts depend on the evolution of the technique, IT artefacts are defined through technological development in the field of Information and Communication Technology. Regarding the material side, linguistic signs and language are not the result of fabrication but the result of collective human activity. Even if the early artefacts (e.g., Mousterian points) might be the result of the work of one of our solitary ancestors, during subsequent hunts the artefact was used by the group to achieve a common goal. Subsequent hunts also provided the opportunity to improve the artefact in relation to the goals to be achieved. Instead, IT artefacts are not the result of a solitary human being as they depend on the work of a group of people who have different abilities to make a bundle of hardware and software (e.g., cloud computing platforms). In general, the design and planning of an IT artefact requires previous artefacts and inventions (e.g., smartphones and tablets; earphones, and Bluetooth earphones). Therefore, the social dimension of artefacts and IT artefacts is an essential feature, which they share with language.

The evolution of artefacts, IT artefacts, and language deserve clarification. They share technical and cognitive evolution. While changes in artefacts and IT artefacts are strictly connected to achieving a goal and to the intentions of the creator(s) which may vary over time giving rise to the transformation of these artefacts, linguistic changes are not the result of planning. Following Benveniste, Humboldt and Bréal, language, namely linguistic sign, is not a creation of the speakers because of its nature, which is not made of matter and does not need tools or projects to be realised. Saussure offers the best chance to explain the difference mentioned above: “Language exist in the form of a sum of impressions deposited in the brain of each member of a community… language exist in each individual, yet is common to all. Nor is affected by the will of the depositaries” (Saussure 1922/1983, 19). In fact, “Language is no longer free for time will allow the social forces at work on it to carry out their effects. This brings us back to the principle of continuity which cancels freedom” (Saussure 1922/1983, 78). Planning, intentions, and changes are strictly connected highlighting the difference between artefacts, IT artefacts, and language. However, there are some elements to reflect upon regarding IT artefacts and language. In particular, if we think about the IT artefact as a bundle of hardware and software which cannot be divided to be a meaningful and purposeful object, the sign in Saussurean linguistics is likewise a two-sided entity in which signified and signifier recall each other comprising an intimate relationship.

Despite the analogy, the role of planning is a crucial difference, which leads to an open question about creativity. The way language has been considered an institution by Saussure does not deny linguistic creativity and the creation of new words, the use of barbarisms and the disposal of certain words. Although IT artefacts,
like machines, belong to the domain of rules and algorithms, this does not exclude the power of creative ideas of designers and creators but it makes possible the question about the new frontier of creativity and machine learning: What if an IT artefact would be creative?

Notes

1. The concept of object is one of the most general but complex in philosophy. Common-sense and different languages have a number of entries for the term objects. Here I am interested in a particular kind of material object, precisely artefacts. However, the relationship between humans and objects obviously cannot be reduced to the material ones since our world is the one we experience together with abstract objects (Jacquette 1996), fictional objects (Inwagen 1977; Voltolini 2003), the class of nonexistent or possible objects.

2. See Veerback and Veermaas (2012) for a review on technological artefacts from a philosophical and technological point of view.

3. This is generally true, but we have to consider that, for example, the recognition of a disputed border is not sufficient since others may not share the same recognition.

4. Original text: La plupart du temps, dans les opérations de l'intelligence quelque peu compliquées, ce ne sont pas les choses que notre esprit conçoit, associe ou suppose; nous imitons les banquiers qui ont des vaux entre les mains et qui les traitent comme si elles étaient le numéraire lui-même, parce qu’ils savent qu’à un moment donné ils pourront les changer contre le numéraire.

Works Cited


