TRANSCENDENTAL CONDITIONS OF HUMAN TECHNOLOGY. A HEIDEGGERIAN PROPOSAL

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ABSTRACT

Comparative Psychology and Anthropology generally try to explain human technology by focusing on the cognitive abilities that are necessary to use, manufacture and transmit tools. In this article, I will focus instead on an understudied aspect of human technology, namely its phenomenological conditions of existence. Based on Heidegger's phenomenology of everyday coping, I will defend three claims: (i) Human beings have a technological system to the extent that they are able to present intraworldly entities with the mode of being of equipment (*Zeug*). This presupposes an ability to perceive normatively the possibilities that are supported by technical items (what they are for) and a background familiarity with the social practices and system of functional references that these practices define. (ii) The ability to perceive equipment implies some sort of anticipation of the action possibilities that are supported by the object (what it offers to do). Yet this foreseeing (*Umsicht*) cannot be equated to the perception of what the object affords in a Gibsonian sense. At least four features distinguish Heidegger's equipment from Gibson's affordances: standardization of functions; holistic structure; modal status (i.e. type of possibilities); teleological reference to projected possibilities of oneself. (iii) The irreducibility of equipment to affordances offers to highlight what is specific to human beings' understanding of "tools" and what makes it so different from the kind of perceptual and cognitive ability that is implied in animal tool-use. While human beings tend to discover their surrounding world as an equipmental totality, non-human animals can only perceive it in terms of affordances. The possibilities that they perceive are not framed by some background knowledge about equipment assigned to functions, organized holistically, and connected to social practices and ultimately to social roles.

Key Words: Heidegger, Gibson, technology, affordance, equipment, tool.

INTRODUCTION[1]

What kind of mental abilities and mind architecture support the design and systematic organization of tools and technical devices that we find in human societies? To answer this question, works in Comparative Psychology and Anthropology generally focus on the cognitive abilities that are necessary to select, combine or build tools that will be appropriate for a given purpose (Wimpenny *et al*., 2009; Seed & Byrne, 2010), or on the learning abilities and social organizations enabling the diffusion, cultural transmission and accumulation[2] of tool-use and tool-manufacture behaviours (Galef,

1992; Heyes & Galef, 1996; Whiten *et al*., 1999; Aunger, 2009; Vaesen, 2012). This includes the ability to anticipate the actions or environmental modifications that the tool, once used, will enable and to sequence a chain of actions so as to reach a distant goal (anticipatory planning, executive control). Capacities such as prospective memory, delay of gratification, causal reasoning and naïve physics are also frequently put forth (Finn *et al*., 2009; Emery & Clayton, 2009; Seed & Byrne, 2010; Vaesen, 2012). In this line of thought, some authors have claimed that the uniqueness of human technology in its breadth and sophistication could originate in a

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quantitative change in working memory, that is, the ability to retain and manipulate more information and to hold in mind multiple representations or states of reality at one time (Coolidge & Wynn, 2005; Seed & Byrne, 2010, R1038)[3].

There are, however, several reasons to doubt that the abilities to use, manufacture and transmit tools –though certainly necessary– are sufficient conditions for the emergence and maintenance of what we might want to call, by contrast, a *technological system*. One of these reasons is that a technological system, in order to exist, must not only maintain itself as a set of concrete instruments, but also as an *Umwelt* enacted by the agents that come to appropriate this system. Following this insight, in this article, I will focus on an understudied aspect of human technology, namely its phenomenological conditions of existence. My grounding assumption is that the human technological system (HTS) presupposes –in order to exist and be what it is– some given modes of apparition (*Erscheinungsweise*): it exists only insofar as it manifests itself in some manner to some intentional agents.

The starting point of my argument is that the HTS cannot be reduced to a set of concrete objects, "a collection of tools or machinery", as Ihde (1983) says[4]. Certainly, in order to exist, it has to be physically instantiated with concrete tools and devices. But this condition is not enough. A car is what it is only in reference to practices and agents capable of seeing it and treating it as such (Searle, 1995; Faulkner & Runde, 2010). Otherwise, it is a meaningless assembly of parts, something like Jean Tinguely's useless machines. The technical object is characterized, in particular, by a referential character: it is *for* something, it fulfills a certain function, and this is how it gets its identity[5]. Locks can be part of a technological system only if integrated to the practices of a community, where they are used as utensils for locking and securing things, and refer through this very function to other utensils, for example keys, doors, dwellings, but also private property. Their existence as technical objects presupposes to this extent forms of intentionality, thus intentional agents, capable of giving them this very meaning.

My proposal is then as follows: the HTS is not reducible to a set of objects (tools, devices, instruments). But it is a type of world –or world-structure– that is enacted by a community: the ideal correlate, as Husserl says, of a (collective)

meaning-giving (*Sinngebung*) activity. Just as the world we live in –the world of which we are aware or that we make appear– is structured according to the dimensions of space and time, so too it is structured as a technological system: roughly speaking, a set of items with interarticulated assigned functions, referring to socially standardized practices and typical contexts of use. This is how it presents itself to our subjectivity. To that extent, the HTS has a relative reality: it constitutively refers to some transcendental agents capable of enacting a world presenting this very organization. "World", here, must be taken in the antirealist sense in which authors like Von Uexküll, Husserl and Heidegger take the term. As Vasterling (2015, 1146) explains: "World is not an aggregation of things and events, nor is it the habitat of the human animal. It is a holistic web of references, connecting things and human beings in practices […]. World and human beings are ontologically interdependent. Without human interactions and practices constituting a web of significance, there would be no world, without world a properly human existence is not possible".

Proceeding from this general assumption, in the following I will defend that Heidegger's phenomenology of everyday coping and mode of presentation of entities as equipment (*Zeug*) provides a suitable analysis of the transcendental conditions of existence of the HTS (see Sections I and II, below)[6]. In a nutshell, human beings *have* a technological system to the extent that they are able to present (perceive or apprehend) intraworldly entities with the mode of being of equipment. The most immediate consequence is that artifacts (*e.g.* cars and locks) come to participate in the HTS, thus come to have the actual meaning of *technical objects*, only insofar as they access the mode of being of equipment, that is to say, come to be integrated to the system of functional references a community of Dasein is familiar (acquainted, acculturated) with. A transcendental condition for enacting a technological system is consequently the existence of a community of individuals sharing a set of social practices and having the same kind of background familiarity with the system of functional references that these practices define.

This hypothesis has in my view at least three benefits: (i) It brings to the phenomenological domain the debates about the conditions of existence of human technology, by defending that these conditions are –at least in part– phenomenological in kind, *i.e.*

are related to the way we human beings perceive or understand entities, how they appear to us. (ii) It offers a strong hypothesis about what distinguishes the HTS from non-human forms of technique, without forbidding some forms of continuity. (iii) It enables to emancipate human technology from a merely instrumental view. Heidegger's analysis suggests, in particular, that there is an essential connection between the technological system (viz. the equipmental totality) and the construction of the self. "Tools" are not only things to *do* things, they are also that through which people can take a stand on themselves (self-interpret) and *be* who they are.

This claim about the HTS is not without difficulties, though. And it requires in any case some clarification. In particular, it is important, not to misunderstand the whole claim, to figure out clearly what equipment is and what it is not. That is why a major part of this article (Section III) will focus on whether equipment can be equated to *affordances* in J.J. Gibson's sense. In contrast to some interpretations (Kadar & Effken 1994; Dotov *et al*, 2012) I will defend that it cannot. Equipment and affordances refer to radically different ontological kinds and the perceptual or cognitive processes granting access to them are totally different. Especially, the ability to anticipate what equipment is *for*, though it amounts in a sense to anticipating what can be done with it (action possibilities), cannot be equated to the perception of what the object affords in a strict Gibsonian sense. As I will try to show (Section IV), grasping the difference between equipment and affordances also offers to see what is specific to human beings' understanding of "tools", and what makes it so different from the kind of perceptual and cognitive ability implied in animal tool-use.

I. HEIDEGGER'S ACCOUNT OF THE ORDINARY MODE OF ENGAGEMENT WITH THE WORLD. EQUIPMENT AS THE BASIC MODE OF PRESENTATION OF BEINGS

Heidegger's description of Dasein's everyday being-in-the-world is today a well known chapter of his philosophy that has been presented in detail, discussed and appropriated in various ways by numerous scholars. In the following I will only recall the main points and focus on the few elements that are the most relevant for my own inquiry. Note also that I will exclusively deal with the phenomenology developed in *Being and Time*

and other works of the same period (including *Basic Problems of Phenomenology* and *History of the Concept of Time: Prolegomena*). I will not be interested in the account of technology Heidegger has developed around the concept of *Gestell* in later writings, especially *The Question Concerning Technology* (Heidegger, 1977).

Heidegger's basic claim can someway be phrased as follows: when absorbed in one's everyday activities –in what he calls average everydayness (*durchschnittliche Alltäglichkeit*)–, the intraworldly beings do not present themselves as objects with properties, but as equipment (*Zeug*)[7] for this or that, things to do things. What one "sees" (or foresees) first is *what they are for*, what can be done with them, what support or service they provide, or how they could help achieving one's goals (BPP, §.15, 163-164). Basically, we could say that we do not perceive objects or substances but functions or relations (BT, §18, 121-122 [88]; HCT, 200-201 [273-274]). In that respect, any being we encounter (*begegnen*) or discover (*entdecken*) in everyday coping –or skillful immersed coping (*gebrauchend-hantierende Umgang*), as Dreyfus (1991) says–, is already interpreted and referred to the context of activity, *e.g.* taken as something that can be useful, is relevant or appropriate for this or that performance we are currently implied in: repairing the roof, finding somewhere to sleep, getting the schedules of the next train, reading a book in the park[8]. Conversely, only those beings that are taken (discovered) as possibly relevant for this achievement come to the fore, are noticed or actually present for the comportment, which, in some way or other, reckons with them, takes them into account. The others remain undifferentiated in the background. Similarly, the so-called properties (*Eigenschaften*) that intraworldly beings possess (John Locke's primary and secondary qualities: their shape, color, material, weight) are foremost encountered and present to us (they appear) through their appropriateness (*Geeignetheit*) and inappropriateness (*Ungeeignetheit*) for this or that practical purpose (BT, §18, 115 [83]). I experience the chair as uncomfortable, too hard or too soft, and this is how I come to encounter its "physical" property of hardness or softness in practical coping (HCT, §5.α, 38-39 [50]). I find the hammer difficult to handle, too heavy, and this is how its heaviness property comes to appear to me first (BT, §33, 200 [157]).

Heidegger uses the concept of "concern" (*Besorgen*) or "being-concerned-about" (BT, §12, 83 [57]) to refer to this ordinary mode of engagement with the world and mode of presentation (*Gegenwärtigung*) of beings. And he coins the term "availableness" or "readiness-to-hand" (*Zuhandenheit*) for the mode of being of equipment. This kind of "practical" attitude or way of behaving towards beings is for Heidegger the basic form of intentionality or "transcendence", *i.e.* mode of relation to beings or openness to the world (HCT, §5.α, 37 [47-49])[9]. Other modes of intentionality are derived and always presuppose concerned coping as their ground. Especially, Heidegger repeatedly insists on the phenomenological priority of this way of relating or being-open to the environment over what he calls the knowledge attitude, viz. the subject-object mode of organization of experience, which is taken as a starting point in the Cartesian tradition.

Heidegger makes several additional claims that are worth mentioning:

(i) Equipment is characterized by an "in-order-to" (*um…zu*) reference (BT, 97 [68]): it constitutively refers to functions or uses, in a broad sense. Pens are for writing, toothbrushes are for brushing teeth, clocks are for telling time. And this functional reference is, for any item of equipment, what makes it the equipment it is (BPP, §.15, 163-164 [233-234]). Heidegger uses the term *Bewandtnis* to refer to the referential structure through which the equipment refers to what it is for, what he calls its *towards-which* (*Wozu* or sometimes *Wofür*). *Bewandtnis* is generally translated as "involvement" (of the equipment in this or that activity) (Macquarrie & Robinson, in BT; Dreyfus, 1991), but could also be rendered as "functional reference", "assignment-relation" (Mulhall, 2001), or, as suggested by Sheehan (2018) and Guignon (1983, 95-99), as "means-to-end relation".

(ii) Contrary to "objects" or "mere things" (cartesian or husserlian *res materialis*), the equipment one deals with in everyday coping is never apprehended in isolation, but "always belongs [to] an equipmental whole (*Zeugganzheit*), in which it can be this equipment that it is" (BT §15, 97 [68]). Any equipment refers to other equipment, *e.g.* the pen refers to ink, paper, table, furniture, etc. (Dreyfus, 1991, 62), with which it forms a coherent system that refers as a whole to a set of shared social practices (writing). This "specific functionality whole is *pre*-understood" before any

individual piece of equipment we come to meet (BPP, §.15, 164; BT, §15, 97-97 [68-69]).

(iii) The consequence is that a condition for discovering beings as equipment is to be already familiar (*Vertrauten*), accustomed or acquainted with the system of functional references (*Bewandtnisganzheit*) and the equipmental totality (*Zeugganzheit*) inside of which each equipment takes place and has its very meaning. Heidegger uses several expressions for this non-thematic acquaintance that precedes and conditions one's circumspective encountering with equipment, including "familiarity with significance" (BT, §18, 120 [87]), "having previously discovered the world", "Being-already-alongside-the-world" (*schon-bei-der-Welt-sein*) (BT, §13, 88 [61]) or "being-already-in-the-world" (*schon-in-der-Welt-sein*) (BT, §41, 236 [192]). Dasein must already be in the world –understand: already *be familiar* with the system of references the human world-of-meaning[10] consists of– in order to encounter meaningful individual beings, things that make sense to him/her (BT, §18, 118 [85]; Heidegger, 1976, §12.a, 124 [147-148])[11].

(iv) But Heidegger goes one step further in connecting or subordinating (in a typically transcendental anti-realist way) the world-structure to Dasein's modes of being and understanding. It is not sufficient for discovering beings as equipment to be familiar with the system of functional references that provide equipment with its very meaning. The whole system must also be organized teleogically by reference to *one's own being*. If we develop the functional relations by which beings make sense in ordinary dealings (the chains of in-order-to), we ultimately arrive to a term with which there is no further in-order-to reference, and that has to do with Dasein's modes of being, values and concerns, which are, so to say, self-referred: they are not *for* something else, they are their own end (BT, §18, 116-117 [84]). And this is because Dasein has an implicit (undeveloped, says Heidegger) understanding of the modes of beings that are ultimately at stake with equipment –the modes of beings equipment is ultimately dedicated to support or sustain or possibilize, such as "being home" or "having shelter", for a house, viz. "equipment for residing" (BT, §15, 98 [68])–, that he can make sense of the beings he is confronted with in day-to-day concern[12]. This is a strong claim, if we think about it, for it implies that there can be no meaning apart from Dasein's

modes of relation to its very own being. Heidegger uses the terms "for-the-sake-of" (*um... willen*) and the "for-the-sake-of-which" (das *worum-willen*) for this ultimate reference of the equipmental system to Dasein's possibilities (BT, §18, 116-117 [84]). And he uses the term "significance" (*Bedeutsamkeit*) (BT, §18, 120 [87]) to refer to the integrated system formed by these two kinds of referential structures: the in-order-to (*um… zu*) a towards-which (*Wozu*), on the one hand, and the for-the-sake-of (*um… willen*) some Dasein possibilities, on the other. Significance is what constitutes the phenomenological structure of the world in Heidegger's idiosyncratic use of the term, what makes it a world in the sense of *that in which* Dasein exists (BT, §69.c, 415 [364])[13].

Note finally that this claim about the phenomenological primacy of equipment derives ultimately from the essential role that Heidegger attributes to the as-structure (*als*) in the discovering of beings –which is chiefly related to his so-called hermeneutical approach to phenomenology. Heidegger defends a view that is close to a conceptualist (though not in a linguistic sense) account of perception: in order to have the experience of this or that being (encounter or discover it, in the terminology of the existential analytic), we need to apprehend or "make present" (*gegenwärtigen*) this being *as* some type of equipment for doing (and ultimately *being*) this or that. This apprehension, which constitutes for Heidegger the most basic form of interpretation (*Auslegung*), has a prepredicative and prelinguistic character and already takes place in mere absorbed coping and manipulation[14]. Making use of the ground when walking on the street, or simply heading to a bus stop across the street, already implies a non-thematic discovering of the ground *as* equipment-for-walking (BT §23 141 [107]). In *Being and Time*, this hermeneutical presentation of beings is supported by Dasein's capacity of circumspection (*Umsicht*). Circumspection is altogether a practical know-how (an ability to do things) and a presentative ability (BT, §15, 65 [69]): the ability to "see" (in a non perceptual sense) the functional references articulating equipment (understand intuitively what things are for) and connect them to the practical goals one is pursuing, what one is trying to do: preparing coffee, repairing the roof, trying to get hold of the car keys. Through circumspection, one knows immediately *what to do with what* and *when* in order to achieve a given practical purpose. One can adapt and react directly and fluently to the requirement

and opportunities of the situation (HCT, §29.b, 274 [378-379]). Heidegger speaks of "circumspective making-present" (*umsichtige Gegenwärtigung*) (BT, §69.b, 411 [359-360]) and sometimes uses the expression "direct understanding" for this basic form of as-presentation (see Heidegger, 1976, §12.a; see also the illuminating analysis and typology of modes of understanding proposed by Vasterling, 2015).

II. TO HAVE A TECHNOLOGICAL SYSTEM IS TO PRESENT BEINGS AS AN INTERCONNECTED SYSTEM OF EQUIPMENT

The claim that the HTS exists as a system of equipment structured by functional relations entails several important consequences when it comes to characterizing human technology, its very nature and the conditions of its emergence or existence.

(a) It means, first of all, that human tools form a technological system only in so far as human beings are capable of presenting entities with the mode of being of equipment. That is to say, they possess a configuration or architecture of "mind" –Heidegger would rather speak of existential structures– that makes that sort of presentation possible. Describing this transcendental infrastructure is not an easy task, however. The presentation of equipment is a many faces and ramified process that can be analyzed at multiple levels[15]. Describing this infrastructure in all its complexity would mean nothing else that repeating the whole enterprise of Heidegger's existential analytic, for in general *all* the structures of Dasein's being are transcendental conditions of possibility for presenting intraworldly beings with the mode of being of equipment.

(b) Secondly, this claim implies a significant shift compared to classical works in Comparative Psychology, for it means that some criteria such as the complexity of the tool, that are frequently put forth in this research area (Reynolds, 1993; Hunt *et al.*, 2006), are simply off topic. No matter how complex some tool design is, what matters for that tool to access the mode of being of human technical items is whether it is treated as equipment, that is to say, is integrated to the system of functional references (*Bewandtnisganzheit*) some community of Dasein is acculturated with. This does not mean that complexity is not an important parameter for understanding human technology as it has evolved. But this is not a distinctive trait. We could think of a technological system that would be composed of

rather rudimentary artifacts, provided these artifacts have the meaning of equipment.

(c) Another consequence is that the HTS is not to be thought as something *external* to human beings. It is rather an intrinsic moment or basic layer of their experience, a structure of the world as it spontaneously appears to their subjectivity, *i.e.* something which has to do with the sort of logic to which the manifestation of beings obeys. As Heidegger puts it, "Ontologically, 'world' is not a way of characterizing those entities which Dasein essentially is not; it is rather a characteristic of Dasein itself." (BT, §12, 72 [64]) For the kind of beings we are, beings present themselves as *intraworldly*, that is, as taking part to a world. And that world is always organized as a technological system, viz. a system of interrelated equipment totalities structured by referential functions connected to standardized practices. This is some sort of transcendental *a priori*.

(d) This claim suggests, finally, that there is an essential connection in human beings between the technological system (viz. the equipmental totality) and the construction of the self or identity. So-called tools or artifacts are not only things to do things, they are also that through which human beings can self-interpret and take a stand on themselves, that is to say, can be (or become) who they are (BT, §31, 186 [145]). As Dreyfus & Dreyfus (1999, 119) explain: "For Heidegger what sets human beings apart from all animals is that they are ultimately motivated by a need to take a stand on their being. In Heidegger's famous example one exercises the skill of hammering in order to fasten pieces of wood together towards building a house, but ultimately for the sake of being a carpenter. That is, what ultimately motives all learning and all action according to Heidegger is that only through action does one get an identity, and having an identity, a way to be, is what human being is all about." In terms of Comparative Psychology and from an evolutionary perspective, reaching that kind of organization for the self could presuppose a cognitive ability that Heidegger calls "understanding one's own being" (BT, §31), that is, the ability to relate to one's own being through the mediation of projected possibilities of oneself. A key point is, however, as we will see below (section III.4), that these possibilities are not invented from scratch by a self that would be the creator of itself, but are prescribed socionormatively and depend on the social and cultural background that we have appropriated through enculturation (see Dreyfus, 1991, 16-19, 23-25 and 94-95)[16].

Now, this whole proposal about the HTS is not without difficulties, and several issues need to be clarified before it can be taken as a coherent hypothesis. In the following I will deal with two questions that, in my opinion, are especially important: the first is related to the status of manufactured objects; the second is related to whether equipment is equivalent to some sort of affordance in Gibson's sense.

A first issue that may require some clarification is that equipment does not overlap with manufactured objects: artifacts, products, tools. Dasein can present as equipment something that has not been produced by men, for instance present a forest as a place for walking or hunting, or the wind as indicating what the weather will be like (HCT, §23.γ, 206-207 [282-283])[17]. On the other hand, a manufactured object may well not be equipment if it does not fit into the system of functional references with which some Dasein is familiar. Some member of a primitive tribe who has never seen sneakers will be unable to discover a pair of Nike left on the beach by the tide as equipment. The sneakers will not participate, by virtue of an in-order-to, in the referential system with which he or she is familiar. What matters in order to access the mode of being of equipment is not the historical provenance of the object, but the hermeneutic perspective through which it is encountered, *as what* it is apprehended. As Harman (2002, 4) explains, "readiness-to-hand has everything to do with a mode of being, of entities, and *nothing* to do with the circumstances under which they were produced. […] Whatever Heidegger's intentions may have been, his theory of equipment applies to all entities: chisels, nuclear warheads, and sunflowers." Now, this consequence may be judged unacceptable, for if natural objects can be part of the HTS, this simply blurs the distinction that we might want to draw between what is technical and what is not.

I think that there are basically two ways to deal with this issue. We can simply hold a deflationist position and claim that the HTS is only *a subpart* of the equipmental whole the world consists of, which includes natural objects as well as technical artifacts. But we can also claim that abandoning the distinction between manufactured and natural objects as a relevant criterion for defining technical objects is a price

to pay for a phenomenological characterization of technology. Human beings do not seem to care much about the provenance of the objects when coping with their environment. When it comes to reaching our practical goals, anything that can help, no matter if it is a dedicated tool or not, is worth taking. Conversely, what provides artifacts with their constitutively technical character and identity *qua* technical objects (what sort of tool they are) is manifestly their disposition to become equipment and join the system of functional references one is acculturated with. It is with the aim of becoming equipment that these artifacts are designed, not to be museum pieces. That is, technical artifacts are really what they are –"tools"– when they access the mode of being of equipment.

A second potential challenge for the claim that equipment is a suitable characterization of the mode of being of the HTS is the view that Heidegger's concept of equipment is more or less equivalent to affordances, as defined by Gibson. Kadar & Effken (1994, 310-311) are paradigmatic of this view and argue characteristically that "Heidegger's equipment concept can be understood as synonymous with Gibson's affordance structure", or that "the notion of equipment and the interrelationship of tool functions that make up the equipment context are synonymous with Gibson's notion of affordance structure of the environment". If this is right, the ability to perceive affordances would be sufficient to possess a technological system, and any agent capable of perceiving affordances (that is, an important part of the animal kingdom) could be said to have a technological system.

As several scholars have stressed (Kadar & Effken, 1994; Zahorik & Jenison, 1998; Dreyfus, 2005; Turner, 2005; Dotov *et al*, 2012; Blok, 2014), Heidegger's description of Dasein's ordinary engagement with the world and Gibson's theory of perception converge on several points: (a) Both Heidegger and Gibson reject the subject-object dichotomy as a relevant model to account for our ordinary experience and focus instead on a type of relation to the world where the subject-object divide hasn't been operated yet and which is, they claim, more original (Gibson, 1986, 129). (b) Both defend that perception, in its most ordinary form, is not of substances ("things") with properties, but that what we first and foremost perceive is already interpreted and meaningful for the kind of activity we are engaged in or, more broadly, with respect

to our modes of life. Especially, both defend that we perceive possibilities for action: we see beings through the lens of what can be done with them, what they offer to do; and the same is true for properties. In that respect, both take perception as having a fundamentally prospective or anticipative structure (Gibson, 1986, 134). (c) Both reject projective models of values or meanings, viz., the idea that the meaning that the environment presents to the perceiving agent (what makes it intelligible to us) is the result of a mental projection of representations (functions or values) on an initially neutral exteriority (bare spatial objects) (Gibson 1982, 410; 1986, 138-139). (d) Finally, and in line with the latter point, both reject sense-data models of perception, *i.e*. the idea that the perceptual access to worldly objects is mediated by contents of sensation that are informed by some interpretative act of the mind (Gibson, 1986, 238-250). In particular, Gibson famously claims that affordance perception has a *direct* character: one does not have to "think", *i.e*. proceed to inferences or any other reasoning process, to perceive that an object affords doing something. The detection of affordances is solely based on the –generally merely automatic– extraction or "pickup" of informational invariants (Gibson, 1986, chap. 14, 238 sqq.). No top-down processing (involving, typically, semantic memory content) of incoming sensory data has to intervene.

These convergences or compatibilities are undeniable, but in my opinion they do not justify equating equipment to affordances. If we take a closer look, we can point out some decisive differences. I will examine this issue in the next section[18]. It is my contention that grasping these differences offers to highlight some of the most striking peculiarities of the HTS and see what makes it so different from the type of tool-use we find in non-human animals.

III. WHY EQUIPMENT IS NOT SOME SORT OF AFFORDANCES

There are at least four elements that we can put forward in favor of a strong distinction between equipment and affordances: (i) standardization of functions; (ii) holistic structure; (iii) modal status (*i.e*. type of possibilities); (iv) Teleological reference to Dasein's projected possibilities.

III.1. Standardization of functions and reference to a lambda user

A first important difference between equipment and affordances is related to the nature

of their functional reference. Equipment is always equipment for something, it is constituted by an in-order-to reference to a *for-which* (*Wozu*), that corresponds basically to the possible uses one can make of it. In a seemingly similar way, affordances are constituted by a reference to some behaviour that the affording structure potentiates. It refers to something that the agent could do with –or based on– that structure: reach it, grasp it, lift it, walk on it, climb it, pass through it, avoid it, bump into it. In Gibson, the concept of affordance designates basically the behavioural opportunities offered by some element –some object or structure– of the environment[19]. Something possesses a given affordance, is A-able, means that it affords some behaviour A to some agent S. That is, it makes it possible to realize this behaviour[20]. In that respect, affordances can be interpreted as dispositional properties (Heft, 1989; Turvey, 1992). Just as fragility is the disposition of an object to break when struck, graspability is the disposition of an object to be grasped (*i.e.*, be in this transitory state) when subjected to given conditions (someone is actually grasping it).

Beyond these surface similarities, however, it is obvious that the functional references implied in each case are different. A fundamental difference is that the for-which of equipment –what it is serviceable or usable for (BT, §31, 184 [144])– has a normative and standardized character: equipment refers to the way it is used *by people in general*, the way it is used *normally* (Haugeland, 1982; Dreyfus, 1991; Carman, 1994; Malpas, 2008; Slama, 2018)[21]. As Haugeland explains, "Hammers, nails, boards, and drills, screwdrivers, screws, and glue are all bound together in a (large) nexus of intertwined roles, instituted by the norms of carpentry practice; and that's what makes them what they are." (Haugeland, 1982, 17) A knife is not only something people can use to cut things. It must be used that way in order to access its very meaning of knife. If I use it to unscrew a screw, I do not use it *as a knife* but as a screwdriver.

The functional references characterizing equipment are consequently only indirectly about what *I* can do right now in the situation of my activity. The in-order-to of equipment is foremost a *what-it-is-used-for* (in general), and only secondarily a *what-I-can-do* with it now. The difference may seem subtle but it is essential. What I can do with equipment (*e.g.* the circumspective presentation of that chair as something on which I can actually sit and

rest) is a secondary hermeneutic achievement, which builds on its what-it-is-for: it is the appropriation in the context of my situated activity of possibilities that belong intrinsically to it and are the same for all, that is, have an essentially public or anonymous character (Malpas, 2008, 85)[22]. The equipment I deal with is for anybody and not for me in particular.

The situation is opposite with affordances, which constitutively refer to a *particular* agent that is capable of taking advantage of the affording structure. Contrary to dispositional properties such as liquidity or solidity, affordances are properties of the environment *taken by reference to an agent* and having a *behavioural significance* for that agent. In particular, something will afford some action –will be A-able– to some agent only with respect to the so-called "effectivities" of that agent: its skills and body properties, its biomechanical structure, its dimensions and weight, the kind of material it is made of, and so on (Gibson, 1977, 67; Gibson, 1986, 157; Turvey & Shaw, 1979; Turvey, 1992). This reference is embedded in the very functioning of the informational process underlying affordance perception: in order to extract the informational invariants specifying a given affordance (*i.e.* specifying that the afforded behaviour can be realized with the affording structure, is supported *qua* possibility by that structure), the extraction process must be calibrated on the effectivities of a particular target agent, the one to whom the object might afford the behaviour (see *e.g.* Warren, 1984; Mark, 1987; Warren & Whang, 1987). *I am* generally the one to whom the affordance being perceived affords what it does. That is, the information pickup process is generally calibrated on my own effectivities. But even when the affordance to be detected –*e.g.* the graspability of an object– is referred to someone else, it remains centered on a particular agent (Gibson, 1986, 128; Valenti & Gold, 1991; Rochat, 1995; Stoffregen *et al.*, 1999). What the structure affords is something that an identified someone can do, not something *one generally does* with that sort of thing, and *have to do* for this something to be and remain what it is.

This difference between equipment and affordance has an important consequence, for it means that the ability to see what a given structure affords is not sufficient (and maybe not even *necessary*) to present it as equipment. Imagine someone living in a community that does not use chairs. Putatively, if seeing a chair, he will be able to detect its affordance of sittability (Lanamäki *et al*, 2015). The chair can

be used to sit and rest just as the floor, a rock or a tree trunk. Yet, this condition is not enough for the chair to access the ontological status of equipment-for-sitting, *i.e*. chair in the normal sense. As Dreyfus (1991, 64) explains, "a piece of equipment like a chair is defined by what it is *normally* used for by a normal user in a culture where such objects have an established function". To be a chair, the sitting and resting opportunities that it offers must be referred to a set of anonymous users that are used to take chairs that way: they must gain the status of assigned functions. This seems to imply a radical consequence, namely that in order to present something as a chair (equipment-for-sitting), what one sees must precisely emancipate itself from a sitting affordance. This does not mean that human beings do not perceive (or, more precisely, detect) affordances when dealing with their environment. For sure, like many animals, we are able to extract informational invariants specifying if this or that action can be realized with this or that structure, is *feasible* given our position, our skills and body characteristics. But this is a different operation from relating to beings as equipment for this or that. In the latter case, the social dimension of Dasein's perceptual relation to its world is constitutively implied. Not in the former case[23].

III.2. Holistic structure

A second important difference between equipment and affordance, which is closely related to the previous point, has to do with the holistic nature of equipment. As we have seen, the functional references in virtue of which equipment makes sense (counts as the equipment it is in the situation of activity) have a holistic character. An item of equipment is what it is only as a node in a huge system of references, where it is connected to other equipment that point as a whole towards a set of normalized practices and contexts of use. This means, as Heidegger repeatedly explains, that Dasein cannot present a being as equipment –take it as something *for* this or that– in isolation (BPP, §.15, 164; BT, §15, 97 [68-69]). The circumspective presentation of equipment always takes place within an equipmental whole (*Zeugganzheit*) and system of references (*Bewandtnisganzheit*) one is familiar with, and which is already disclosed as an available totality before we encounter any *particular* being. "Taken strictly, there 'is' no such thing as *an* equipment. To the Being of any equipment there always belongs a totality of

equipment, in which it can be this equipment that it is." (BT, §15, 97 [68])[24]

Now, this very idea is obviously absent from the concept of affordance and the ecological theory of perception. Take the reachability of a graspable object (a glass, an apple, a pen) or the passability of an aperture (a door, a tunnel, the space between several people in a crowd). There is nothing, in Gibson's description of affordances, that suggests that graspability or passability should be integrated, in order to be perceived, to an encompassing system of affordances referring to each other and against the background of which every particular affordance, when perceived, would stand out. Graspability (graspable objects) and passability (passable apertures) can in principle be perceived *in isolation*, and outside the meaningful context of normalized practices or uses. The only prerequisite to affordance perception is the information processing ability to extract informational invariants specifying the affordance. In principle, a machine can perceive if an aperture is passable[25]. Certainly we could further argue that there are sometimes conditional relations between affordances (*e.g.* in order to be graspable, an object must be tangible, *i.e*. affords resistance and contact to one's body) and that some affordances have a so-called nested character (Gaver, 1991, 82). But this is different from the kind of holistic structure equipmental totalities consist of and the kind of referential relations articulating equipment, that have to do primarily with normalized practice –how one makes use of that sort of things–, not with physical possibilities. I will return to this point immediately.

III.3. Modal status: existentially possible vs. physically possible

Another critical issue that separates Heidegger and Gibson is their respective understanding of *what is possible* for a given agent, which has to do with the question of the modal status of the possibilities that we access through ordinary perception.

Equipment and affordances are both constituted by a reference to some possibilities that they support. Seeing circumspectively what some item of equipment is for and detecting affordances both amount to anticipating *possibilities* –something which is not yet the case but can be. Both amount to some sort of foreseeing. Heidegger says that Dasein's understanding (*Verstehen*) has a projective character –through understanding, Dasein projects itself on some possibilities of its being– and he

speaks of being-ahead-of-oneself (*sich-vorweg-sein*). Gibson and ecological psychologists say, in a seemingly similar way, that perception has a prospective or anticipative character (Turvey, 1992; Gibson & Pick, 2000, 164 sqq.; Stoffregen, 2003). "To perceive an affordance is to perceive a possibility, something that *could be*, rather than something that currently *is*." (Stoffregen, 2003, 118) Affordances concern "what might happen in the future" (Stoffregen, 2003, 124).

Yet, while Heidegger defends what could be termed an existential approach to possibility, Gibson promotes a realistic account of what is possible and what is not. For Heidegger, if you haven't been raised in a culture where some artifact is used for this or that purpose, this artifact simply *does not offer* the possibility of doing that thing, even if absolutely speaking (*i.e.* in merely "physical" terms) it does (Dreyfus, 1991, 189). On the contrary, for Gibson, affordances exist from the moment their physical basis exists, and independently of whether the agent is able or used to detect them (Gibson 1982, 410; 1986, 138-139; Turvey, 1992). Behaviours have physical conditions of possibility: in order to be grasped by someone, an object must meet certain conditions, *e.g.* with respect to its size, tridimensional structure, material. And the same is true on the side of the agent: the object is only graspable for agents having a suitable body structure and related skills, *e.g.* a prehensile organ and the ability to use it to grasp objects. The concept of affordances refers to such conditions. An object affords a behaviour provided it possesses physical and functional properties that are appropriate –considering the body structure and skills of the agent– for the enactment of this behaviour (Gibson, 1986, 127).

The difference, ultimately, comes down to the methodological perspective that each adopts. Heidegger defines what is possible for the agent on the basis of a phenomenological analysis, that is, from the point of view of what *appears possible* to that agent, what belongs to the field of concrete possibilities open to his behaviour (*Verhalten*) in each situation. There is no sense from the perspective of the existential analytic to say that a piece of equipment makes it possible to do this or that if the Dasein is not already familiar with this functional reference, *i.e.* does not "know" (has the background knowledge) that this equipment can be used to do that, or if the related action makes no sense in the current context of activity. The same is true if considering what is authorized or prohibited from a socionormative point of view: what Dasein *can* do is always narrowed by what he *may* do, *i.e. is allowed* to do (BT, §41, 239 [195-196]; Dreyfus, 1991, 189 sqq). "This interpretation has already restricted the possible options of choice to what lies within the range of the familiar, the attainable, the respectable – that which is fitting and proper. This levelling off of Dasein's possibilities […] results in a dimming down of the possible as such." (BT, §41, 239 [195-196])

At another level, the fact that equipment, contrary to affordances, refers to socially standardized possibilities, namely *what one generally does* with that sort of things –the range of functions the object has been culturally assigned to (see section III.1)–, also implies a different modal status. The in-order-to (*um… zu*) of equipment refers to a kind of possibility that is much more virtual and possesses a stronger form of counterfactuality compared to affordances[26]. We can make mistakes when detecting affordances, that is, the structure may in fact not support the action that was anticipated. But perceiving an affordance always means perceiving that this or that can be realized by the agent. On the contrary, perceiving equipment (*i.e.* taking it circumspectively as equipment for this or that) means perceiving something that is for some use *in general*: this is how it is used, this is what it is for. As a result, it may happen that I *cannot* use some item of equipment and yet present it circumspectively as equipment for this particular use. That I cannot use this chair to sit and rest for this or that reason (I am paralyzed, this is someone else's place, the chair does not have the right dimensions) does not deprive it of its in-order-to and involvement in the web of functional references I am familiar with. Whether *I* can or cannot use equipment is of no concern for its presentation as equipment-for-this-or-that: the in-order-to references in virtue of which intraworldly beings make sense entail no direct commitment with respect to my current field of behavioural possibilities.

More radically, the way Heidegger analyses the functional references that are constitutive of equipment allows a gap between, on the one hand, what we can do in terms of know-how –the skills that we have acquired trough experience–, and, on the other, our familiarity with equipment and contexts of use. *Theoretically*, we do not have to

know-how to use an item of equipment in order to be able to present circumspectively this item as equipment for that use. Think of car driving. I can be familiar (acculturated) with the world of car driving and have a standard understanding of the equipmental wholes and system of references cars belong to, and yet not have my driver's license, *i.e.* be incapable of driving a car (Dreyfus, 1991, 64).

These two claims may seem contradictory at first sight. How can Heidegger defend an existentialist and situated account of the possibilities available to Dasein and claim at the same time that the possibilities in virtue of which equipment makes sense are not specifically mine, but are in some manner abstract possibilities, possibilities for a virtual lambda user?

Heidegger's account of equipment might of course contain some ambiguities. I think, however, that this apparent contradiction can be overcome if we distinguish between the "behavioural" possibilities that are open to Dasein in each particular situation –what he/she can actually do considering his/her background knowledge, the socionormative pressure and his/her conformist tendencies (Haugeland, 1982, 16)–, and, on the other hand, the possibilities that are –in principle– made available by equipment given what it is. What is actually (existentially) possible for me now is only *a subset* of the standardized possibilities made available by the equipment available around. And the standardized possibilities that the equipment makes available (the functions it is culturally assigned to) serve as a formatting frame (and, as such, it altogether structures and constrains) for the projective delimitation of the field of situated possibilities onto which my behaviour is circumspectively open at each instant. I will come back to this issue in section IV.

Another element is that Heidegger's apparent insistence on activity or coping (*Umgang*) is also justified by the fact that *in general* this is through direct practice, and through the actual acquisition of skills, that one comes to get familiarized with the equipment and system of references equipment belongs to (Vasterling, 2015). How did I come to know (became acculturated with) what forks are for? By becoming a fork user myself. As a result, it turns out that *usually* one possesses the know-how that makes it possible to use the equipment (as it is normally used in the community of practices to which one belongs). But this is a contingent, not a necessary association. There are other ways to get familiar with the equipment's towards-which (*Wozu*)

and contexts of use than the mere acquisition of skills. Acculturation is not only about direct use. Note that this is less true if we adopt a more liberal understanding of what it means to "make use" of (and being skilled at using) equipment. Certainly, I cannot drive cars, but I am used to deal with cars in several other ways. I know what they look like and why people use them. I know that they need gas to run, that you must have insurance to drive them, that you must regularly bring them to the garage, and that all that takes money. I know how they move and how to avoid them when crossing the street. I know how to be a car passenger and be driven somewhere by somebody else. I know that most people could not live without a car. And I am acculturated with the whole equipmental nexus to which cars belongs: roads, road signs, gas stations, garages, car dealers, etc. Even though I cannot drive myself, I have already practiced cars many times and in many different ways. And we could doubt that someone that would be incapable of "using" cars in any of these senses could have any understanding of what sort of equipment they are.

III.4 Teleological reference to Dasein's projected possibilities and top-down prescription of the functional references according to which equipment makes sense

Last but not least, an essential character of the discovering of equipment is its subordination to the possibilities of its being that the Dasein projects, what Heidegger calls the for-the-sake-of-which (*Worumwillen*). As we have seen, Dasein is always the ultimate reference in virtue of which intraworldly beings make sense. Everything that makes sense draws its meaning from a –most of the time implicit– reference to some possibility of oneself that one has projected, possibilities that one cares about, that is, through which one implicitly understands –and relates to– one's own being.

Basically, any item of equipment is articulated through a complex set of functional references and can be put into perspective according to one or another depending on the situation. The totality of functional references each Dasein is familiar with (through always to a different extent) constitutes a huge repertoire of available ways to make sense of equipment, a set of standardized and ready-made meaning-giving relations that can be used to connect equipment to situations and activities and to connect

several items of equipment together (articulate them as a coherent functional system)[27]. What decides of the functional references that come to be selected or highlighted in a particular situation is their relevancy for the task one is currently undertaking: *what* one is doing. But Heidegger claims that *the reasons why* one does what one does always have to do with some possibilities of ourselves that we project and that we care about. That is, *why* one does what one does refers ultimately to some projected possibilities of our being that justify teleologically these activities. In more technical terms, the for-the-sake-of-which (*das Worum-willen*) ascribe concerns (or reasons why) to Dasein's everyday coping (BT §24 [111]). These concerns specify to-be-achieved subgoals, which in turn specify the functional references through which beings come to be encountered. The possibilities that we project –the modes of being to which we implicitly assign ourselves to understand who we are– thus operate in a kind of top-down manner in the referencing process governing the presentation of beings. As Guignon explains, our self-understanding "lays […] out conditions of relevance for the equipment we encounter": it "determines how entities will punctuate the environment" and "whether things will stand out as significant or recede into insignificance." (Guignon, 1983, 97)

This referencing process is not unidirectional, though, for the possibilities that we project (the modes of being having a self-interpretating function, *i.e.* telling us who we are) are themselves specified in a 'bottom-up' manner by the system of functional references the world consists of and our tendency to be and behave as others do (social normativity). When taking a stand on oneself (*i.e.* projecting one's own being on a possibility), we "make our choice" among a limited field of possibilities that is specified in advance by the world we live in: the world provides a sort of costume gallery that altogether opens and limits the field of possibilities of self-interpretations, *i.e.* ways of being-open-to (interpreting) oneself[28]. We reuse –so to say– the common stock of social *personae* (standardized ways of behaving and self-understandings) with which we are acculturated. That is why Heidegger says that the possibilities of our being that we project are not *really* our own (BT, §27, 165 [128]). We are not truly ourselves when we take ourselves as a carpenter or a family man (HCT, §26.b). As a result, the possibilities to which equipment ultimately refers are not our own private possibilities: they belong to everyone. Roofs are made to protect people *in general*, and it is because I am "one of them" (BT, §27, 164 [126]) that roofs are also to protect my
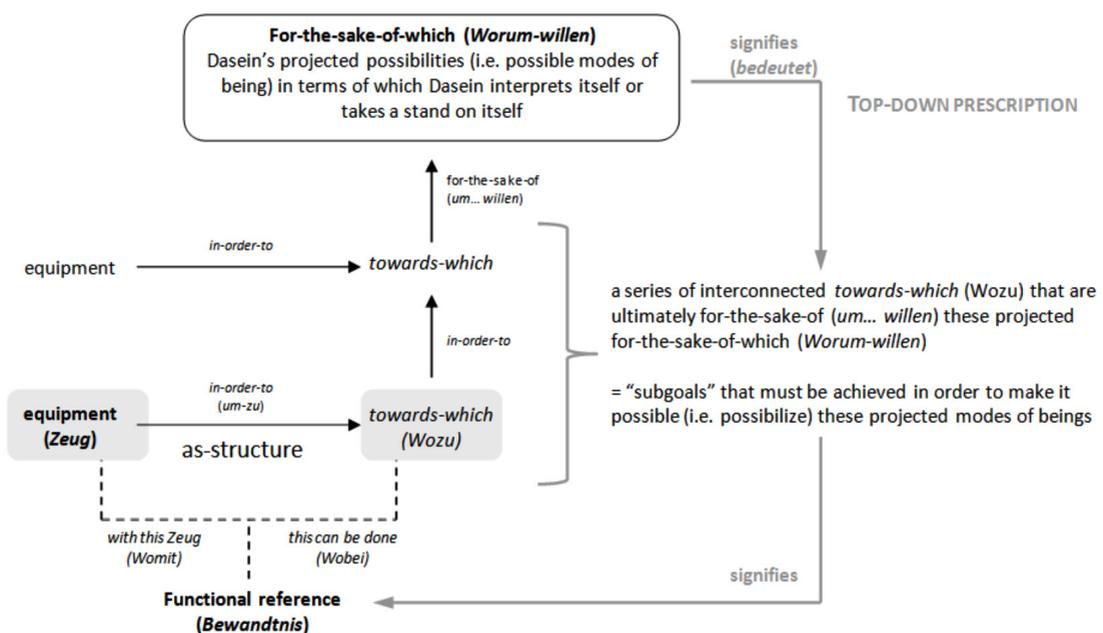
own Dasein. In addition, the possibilities that we project are always conditioned *qua* possible modes of being by the availability of specific systems of equipment and norms (BT, §41, 238 [194]; 69.c, 416 [364]). I could not be a locksmith –play this role and self-interpret in that way– in a world where doors, locks, keys, private property would not exist. As Dreyfus explains: "Dasein needs 'for-the-sake-of-whichs' and the whole involvement structure in order to take a stand on itself, *i.e.*, in order to *be* itself." (Dreyfus, 1991, 95-96)

The result is that, ultimately, no equipment can be perceived apart from the process through which Dasein takes a stand on itself, by appropriating the field of standardized *personae* made available by the world. It is always *to be a particular someone* (for-the-sake-of a projected possibility of itself) that Dasein's circumspection selects (or focuses on) some subset of functional references within which the equipment around makes sense (Dreyfus, 1996). Once again, such claim is clearly absent from Gibson's theory of affordances. Like most theories of perception, the ecological approach tends to isolate perception from cognitive processes related to what psychologists usually call self-knowledge (Neisser, 1988) and to limit it to some epistemic function. Whatever the explanatory load Gibson puts on activity and modes of life, perception remains taken as a process of extracting information about the world (even if it is a world related-to and significant-for the agent, an *Umwelt* in Von Uexküll's paradigmatic sense), that is, a process of acquisition of knowledge.

In the same way, the process through which long-term goals and, to put it roughly, our self-concept (the for-the-sake-of-which) prescribe or control the selection of subgoals, and subsets of equipment relevant for their achievement, has no real counterpart in Gibson's account. This prescription process can be related, in the Gibsonian framework, to the general issue of what parameters control the detection of affordances, considering that only a few affordances –amongst all affordances that are in principle made available by the environment– come to be detected at each instant by the agent. This issue is generally addressed in Psychology under the label of selective attention, action planning and executive control. As far as I know, it has been little studied by Gibson and his followers (Noble, 1981; Heft, 1989)[29]. And ultimately, the only thing Gibson has to say about that matter is that *needs* ultimately control the detection of affordances. "Needs control

the perception of affordances (selective attention) and also initiate acts." (Gibson, 1975, 411) Obviously, Gibson's perspective on this issue remains largely "biological" (needs, survival, food, danger).

IV. SOME PROVISORY CONCLUSIONS AND CONSIDERATIONS ABOUT ANIMAL TOOL-USE

Returning to the question of human technology, several conclusions can be drawn from the previous analysis. I insist that these conclusions are only provisory for several additional issues would need to be clarified[30] before they could serve as coherent working hypotheses for investigating how human technology can emerge, develop and maintain.

First, with respect to what could be termed the perceptual and cognitive conditions of the HTS, we must say that it is not sufficient –and perhaps not even necessary– to be capable of detecting the affordances that something offers (sticking food for a fork, sitting and resting for a chair) for this something to count as a technical item. To that extent, to be a "tool", in the narrow sense of something that can be used to reach a given purpose, is not a sufficient condition. To belong to the HTS, what the object offers to do must be integrated to a network of functional references framed by the shared practices of a whole community. This entails the following consequence that *I* am not the only and exclusive point of reference of the for-doing-what that is attached to the object, which tacitly refers to an ideal community of users to which I myself belong. Affordances refer by definition to an identified agent, which is generally me. As a result, the detection of affordances has a constitutively egocentered character. On the contrary, to present beings as equipment presupposes that one emancipates oneself from an egocentric perspective on the environment and puts oneself in the position of a normalized lambda user, a switch from *what I can do with that* to *what this is for*[31]. What forks are for (namely, forking food, *i.e.* sticking food and bringing it into one's mouth) is basically what they are for *for anybody*. And when I come to perceive (present circumspectively) or use that something as a fork, I just perceive it and make use of it as anybody does.

Now, this does not imply that the presentation of equipment has *nothing to do* with the detection of the affordances associated with its use. How these two processes articulate is a complex issue

that would require an in-depth analysis, but we can presume that the detection of affordances is someway *framed* or *regulated* by the presentation of equipment. Each time one makes use of some equipment (or, more broadly, equipmental totality, say, a kitchen, an office or a supermarket), one's background knowledge about what the item is for (its towards-which) serves as a basic frame that altogether orients and constrains the affordances that we come to detect amongst all the affordances that are in principle made available by the environment. When I am about to use a fork, I immediately focus on the affordances that are related to its status of equipment-for-sticking-food: be it the actions that must be performed to actually make use of it, for instance its reachability and graspability, or the actions that the fork, once grasped, makes available, such as the stick-ability of the food in my plate. That sort of knowledge is embedded –so to say– in one's circumspective ability to deal with forks; it is a part of it. This is a key element to understand the specificity of our perceptual relation to the environment as human beings. The affordances we are attuned to, the affordances we are preferentially oriented onto when going around our business in our day-to-day environment, are always already filtered by our familiarity with significance (*Bedeutsamkeit*), that is to say, with the system of meaningful references that is constitutive of the world we inhabit.

Another reason why the concepts of equipment and affordances must be kept apart is that they can help us understand what separates human beings from animals with respect to tool-use. In a nutshell, while human beings tend to discover their surrounding world in terms of equipment (and detect affordances on this very basis), non-human animals can only perceive it in terms of affordances. The possibilities that they perceive are not framed by some background knowledge about equipment assigned to functions, organized holistically, and connected to social practices and ultimately to social roles. Their ability to perceive affordance –together with additional abilities such as causal reasoning and the possession of some sort of naïve physics– is a constitutive part of their ability to use or manufacture tools (Vaesen, 2012)[32]. But this is not sufficient to possess a technological system, if with this term we refer to the sort of organization of artifacts that we typically find in humans. What animal tools afford remain centered on themselves as a pole of action. It is not referred to a set of anonymous users, a "they" (*Man*) in Heidegger's terms.

Note that this is not only a question of modes of transmission and learning, for cultural transmission, accumulation and social learning of tool behaviour have been documented in animals (Hunt & Gray, 2003; Whiten *et al*., 2004, 2005). The point is rather about the kind of perceptual relation we human beings have with equipment –namely, circumspection– and the ability to use it in conformity with the function that it has been assigned in the equipmental totality (*Zeugganzheit*) to which it belongs[33]. The way we deal with tools is always framed and constrained by some background knowledge about what the tool *is* –what it is dedicated to do, in what context it is normally used, to do what–, which presupposes some form of acquaintance with the type of social practices the tool fits in. As Carman (1994, 211-212) explains, "I can keep my balance riding a bicycle […], and so can a chimpanzee. The crucial difference, though, is that I know what a bicycle *is* […]. Knowing what a bicycle is means knowing something about its normal use, being competent to manage not just the thing itself, but also the normative context which in fact constitutes genuinely knowing how to ride a bicycle."

Certainly, we could further argue that some tool-users animals are, to some extent, capable of such normative perception. Some cases of tool reuses have for instance been observed. Chimpanzees sometimes reuse termite-fishing or ant-nest-perforating tools manufactured by conspecifics (Sanz *et al*., 2004, 2010) and hammer and anvil stones for nutcracking are typically used multiple times (Carvalho *et al*., 2009). Conformist tool-use behaviours (Whiten *et al*., 2005)[34] and cases of functional fixedness (Hanus *et al*., 2011; Gruber, 2016) have also been reported. These observations, however, remain undoubtedly marginal. The vast majority of tool-user animals, even in primates, do not seem to attach lasting functions to their tools. "After production and a one-time usage, chimpanzees typically discard their tools. So instead of creating more permanent function-bearers, primates always manufacture tools anew and on the fly." (Vaesen, 2012, 206) Even when trained in captivity to use a particular tool for a particular function, say, a rake for retrieving food, the animal will prefer to switch opportunistically to other means when alternatives are available (Cummins-Sebree & Fragaszy, 2005).

In addition, we could argue that the above criteria are not sufficient for demonstrating a normative perception in animals. A chimpanzee might be able to perceive some termite-fishing tool left by a conspecific as something that can be used to fish termites. But this would still not demonstrate that (s)he perceives the tool as *a termite-fishing tool*, in the sense of something dedicated culturally to this function. An additional criterion for that sort of perception is typically the capacity to detect nonconforming or deviant uses, say, using a termite-fishing tool for scratching oneself or checking the depth of the water. Similarly, even if a cultural standardization of tools has been documented in animals, this standardization seems to intervene only at the level of tool-manufacturing and tool-use, and –as far as I know– has not been demonstrated at the level of perception or tool identification. More radically, it can hardly be claimed that there are inter-articulated equipmental totalities in animal cultures. Most of the time, the tools are functionally isolated (Reynolds, 1993). They do not refer to other tools that are typically used together in the general context of activity. There are exceptions, such as the hammer-anvil complex for nutcracking and toolsets for termite-fishing (a stout stick used as a perforatory tool and a brush stick used as a fishing probe). But once again there is a gap when contrasting this with the holistic character of human equipment: in human beings, not a single tool works alone. Lastly, it seems that the tools used by animals count as tools only when the animal *needs them* to reach some objective. By contrast, in humans the tools remain the tools they are even when one does not need them or cannot make use of them.

Another important insight that can be drawn from the existential analytic for characterizing human technology has to do with the relation between the discovering of equipment and the process by which people self-interpret, assign to themselves a determinate identity for the sake of which they do all the things they do. As we have seen, for Heidegger an essential condition for presenting beings as equipment is to project one's own being on possibilities selected from a common stock of socially informed modes of beings. And this process cannot take place unless one is familiar or acquainted with the equipment totalities and systems of functional references that go with (and condition) these modes of being. This again can be used as a criterion to

distinguish the HTS and animal tools. The HTS is not only a set of artifacts and devices people *use* in order to do things. It also provides a hermeneutical framework enabling to self-interpret: take a stand on oneself, understand who one is. Even if social organizations and socially standardized roles are quite widespread in non-human animals, especially in primates (Badrian & Badrian, 1984; McGrew *et al*., 1996; Wrangham *et al*., 1996; Boesch & Tomasello, 1998), we can hardly see how the social roles animal subjects come to assume could depend on artifacts and their (normalized) function or to what extent some top-down referencing process controlled by projected possibilities of their being (see Section III.4) might intervene in the selection of the functional references through which equipment is discovered.

Finally, although it is maybe a less important point, Heidegger's claim about the non-thematic character of our ordinary dealings with equipment also provides some interesting insights. Part of the debates in Comparative Psychology about animal and human tool behaviours focus on whether animals are capable of goal-directedness, namely the "ability to plan a complex sequence of actions to achieve a distal goal" (Seed & Byrne, 2010). An instrumental activity will be considered goal-directed in that very sense if the agent "has an internal representation of the goal [that it pursues] 'in mind'" and performs these actions *in order to* reach this goal, which implies that it "knows that its actions will cause it to follow" (Seed & Byrne, 2010). Most psychologists tend to agree that goal-directedness, though maybe present to some extent in some animal tool-use or tool-manufacture behaviours (Dickinson & Balleine, 2000; Hunt, 2008; Sanz & Morgan, 2009; Seed & Byrne, 2010), is a chief characteristic of humans[35]. Only humans are capable of the sophisticated forms of causal reasoning, naïve physics, and executive control –including the inhibitory capacity for delay of gratification and the ability to build hierarchically organized action sequences to attain higher-order goals (Vaesen, 2012)– that are necessary for such highly organized forms of behaviour. Now, a leading claim of Heidegger, which is characteristic of his anti-intellectualist account of intentionality, and which, in my opinion, makes him of chief interest for these debates, is that goal-directedness, as it is understood by psychologists, is precisely *not* a characteristic of our normal "technical" coping with the environment, which is not analytical

but *circumspective*. As Dreyfus explains: "It is a mistake to think of the toward-which as the goal of the activity, if one thinks of this goal intentionalistically as something that Dasein has in mind. […] According to Heidegger, to explain everyday transparent coping we do not need to introduce a mental representation of a goal at all. Activity can be *purposive* without the actor having in mind a *purpose*." (Dreyfus, 1991, 92-93)[36] Dasein's coping with equipmental totalities only comes to planning goals and explicit sequencing of actions in (comparatively) rare situations, for instance when something unexpected happens or something goes wrong (Wheeler, 2017). To claim that human forms of technical behaviour are goal-directed, in the sense given above, is consequently to over-intellectualize the way human beings ordinarily deal with their "tools". Most of the time, the practical objectives that we pursue when dealing with equipment (that for which we make use of it) are only implicitly present: they are not something we are aware of and consciously strive to achieve. They differ in that respect from projects that we plan, like going on holidays to Spain, or writing a shopping list before going to the supermarket. And the same is true for the projected possibilities or long-standing "goals" for the sake of which we perform our various day-to-day tasks. Our ordinary understanding of the totality of functional references and interconnection to for-the-sake-of-which has, Heidegger says, an undeveloped (*unabgehobene*) character. Which is not to say that they cannot take an explicit form. Undoubtedly, when a group of engineers is planning to build a new microprocessor, it enters a complex form of collective goal-directed behaviour. But still, this group of engineers will need to cope in an absorbed not goal-directed manner with its technical environment to attain this planned goal. And this is what it will do the biggest part of the time. As Heidegger puts it, even if the referential connections inter-articulating the equipmental totality have been grasped explicitly by a thematic interpretation, they quickly "[recede] into an understanding which does not stand out from the background" (BT, §32, 191 [150]).

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NOTES

1   I am grateful to the anonymous reviewers of *Límite* for their insightful comments and suggestions on earlier versions of this article.

2   As Aunger (2009) explains, the ability to accumulate is generally taken as a distinctive trait of human culture compared to the forms of culture demonstrated by other species, which comparatively appear extremely limited. The ability to engage in rapid social learning (*e.g.* learn how to use a tool from one single observation of others) might be a cognitive requirement for such disposition to accumulate (Dugatkin, 2001; Tomasello *et al*., 1993).

3   Note that the cognitive abilities required for the mere *use* of tools are still different and include basically conceptual representations of tools functions (semantic knowledge) and motor skills (Johnson-Frey, 2004). Motor skills rely on the possession of suitable motor programs, but also on anticipatory planning (Johnson-Frey, 2003), that is, the ability to anticipate the demands of forthcoming actions. This includes the spatial and dynamical constraints associated with the actual use of the tool – *e.g.* anticipate that one's non-dominant left hand is better suited for grasping a spoon whose handle is oriented to the left (McCarty *et al*., 1999).

4   Idle rejects the term "technology" and prefers instead to make use of the word "technics". See Ihde (1983), 1.

5   As Faulkner & Runde (2010, 4) explain, "technological objects, usually but not always artefacts, are, roughly, objects to which members of some community of human beings have assigned one or more uses [or functions] in pursuit of their practical interests." "Function refers to the use to which members of the relevant community put an object […]. The key idea is that such functions, for example of a watch to tell the time or a camera to capture still images, are collectively assigned to objects by members of social groups. Rather than being intrinsic to an object, therefore, the function assigned to it (and so its technical identity) is necessarily community-relative." (*Ibid.*, 12)

6   See De Preester (2012) for a similar approach, but focused on tools as prosthesis and body enhancement.

7   "Zeug" could also be translated as "stuff", as suggested by Mulhall (2001, 226).

8   "That which is ready-to-hand is discovered as such in its service*ability*, its us*ability*, and its detriment*ality*." (BT, §31, 184 [144]) "All concern is as such discovery and interpretation, inasmuch as it apresents its disclosed environing world, the work-world, in its references." (HCT, §29.b, 274 [378-379])

9   "By intentionality we do not mean an objective relation which occasionally and subsequently takes place between a physical thing and a psychic process, but the structure of a comportment as comporting to, directing itself toward." (HCT, §5. , 37 [47-49])

10   See Sheehan (2018) for this translation of *Welt*.

11   "Whenever we encounter anything, the world has already been previously discovered" (BT, §18, 114 [83]). "If Dasein is to be able to have any dealings with a context of equipment, it must understand something like an involvement […]: a world must have been disclosed to it." (BT, §69.c, 415 [364])

12   See especially Guignon (1983), 96-99.

13   "These relationships are bound up with one another as a primordial totality […] we call 'significance'. This is what makes up the structure of the world – the structure of that wherein Dasein as such already is." (BT, §18, 120 [87])

14   "The as-structure belongs, roughly put, to our 'comportment' […] making sense of something is an act that always has the as-structure, but this as-structure is primarily enacted in dealing with something." (Heidegger, 1976, §12.a, 123 [146])

15   As Heidegger puts it: "Circumspective making-present (*gegenwärtigen*) […] is a phenomenon with more than one kind of foundation." (BT, §69.b, 411 [359])

16   Dreyfus (1991, 23-24) typically explains: "Dasein is what, in its social activity, it interprets itself to be. […] Human being is essentially simply self-interpreting. […] Each Dasein must understand itself within some culture that has already decided on specific possible ways to be human".

17   More profoundly, nature itself can be discovered as something available for use and exploitation, that is, as a standing-reserve (*Bestand*) (Heidegger, 1977, 17).

18   I want to clarify that the characterization of affordances and the account of affordances perception that I propose in the next section would probably not be accepted unanimously by researchers within the contemporary Ecological Psychology community. This analysis mostly corresponds to the position expressed by Gibson himself in his most important works (Gibson, 1977, 1986) and to the accounts that have been developed by Gibsonians such as Turvey, Shaw, Reed, Mace, Warren, Whang, Stoffregen, and Michaels. See especially Turvey & Shaw (1979); Turvey, Shaw, Reed, & Mace (1981); Warren & Whang (1987); Turvey (1992); Stoffregen (2003); Michaels (2003). Similarly, the line I draw in the following sections between equipment and affordances applies foremost to so-called "transcultural" views of affordances (what the environment affords is independent of the social practices and cultural conventions). And it could be discussed whether my account and arguments also apply to "sociocultural" views of affordance (what the environment affords depends on – or includes behaviours related to – the social practices and cultural conventions). See Heras-Escribano & Pinedo-García (2018) for discussing the pros and cons of these two competing approaches. Lobo *et al*. (2018) also propose a good overview of the historical developments of the Ecological theory that highlights some of the controversies that have divided the researchers.

19   This also includes other intentional agents, especially with respect to so-called social affordances (Valenti & Gold, 1991; Richardson *et al*., 2008, 181-182; Rietveld, 2012).

20   Psychologists and Gibson himself generally use the term affordances to refer to *actions* that are supported by the affording something, *i.e.* what could be *done* with that something: chairs (sittable structures) afford sitting; food (edible things) affords being-eaten and assimilated; graspable objects afford grasping, etc. In that regard, being able to perceive affordances generally equates to being able to anticipate what the object offers in terms of behavioural performances. But the initial scope of Gibson's concept was obviously broader, including especially the possibility of *suffering* the action of other agents (Gibson, 1986, 127):

predators afford being hurt and killed; rain affords being wet; fire affords being burned; other people afford being seen and judged. On this issue, see especially Michaels (2003).

21   This –say, "socionormative"– analysis of the functional reference of equipment is not always explicit in BT, which may sometimes give the impression that equipment is very close to affordances. But it is directly supported by Heidegger's analysis of the "they" (das *Man*) –or, as Haugeland (1982, 17) suggests, "*the anyone*"– as the true "subject" of everyday concern or, to put it more exactly, as the "the 'who' of everyday Dasein" (BT, §25, 150 [115]): the one who the Dasein is when dealing with its day-to-day environment. Without going into too much detail, Heidegger claims that the Dasein, "as it is proximally and for the most part – in its average everydayness" (BT, §5, 37-38 [16]), is not "really" him/herself –"is *not* the 'I myself'" (BT, §25, 150 [115])– but an anonymous or impersonal subject who –this is one of its chief characteristics– "concerns itself as such with averageness" (BT, §27, 164 [126]). This tendency to be and behave like the others determines how the Dasein spontaneously interprets the intraworldly beings he deals with and limits the possibilities that he projects to a set of (so to say) socially authorized roles, attitudes and behaviors. "The 'they' itself articulates the referential context of significance, [...] within the limits which have been established with the 'they's' averageness" (BT, §27, 167 [129]) and determines, to that extent, the meaning (*i.e.* functional references) with which entities (viz. equipment) are encountered. "The 'they', which is nothing definite, and which all are, though not as the sum, prescribes the kind of Being of everydayness. [...] Publicness [*die Offentlichkeit*] proximally controls every way in which the world and Dasein get interpreted" (BT, §27, 164-165 [126])

22   Malpas (2008, 85-86) explains: "Although items of equipment can be crafted to individual needs and preferences, still even the most personalized item fits within a larger equipmental structure that is, at least in principle, accessible to all. Indeed, although Heidegger does not even allude to such an argument, it seems likely that the very possibility of something functioning equipmentally presupposes its being publicly accessible in its equipmental character. [...] The equipmental structure of the world is [...] a necessarily public structure both in virtue of its systematic ordering and in virtue of the need for items of equipment to be geared to particular equipmental tasks."

23   As explained in an earlier footnote, some attempts have however been made to take into account the social and normative character of the affordances we human beings tend to perceive in our everyday world. See in particular Costall (1995), Chemero (2009), Rietveld & Kiverstein (2014), Heras-Escribano & Pinedo-García (2018).

24   "Equipment [...] always is in terms of its belonging to other equipment: ink-stand, pen, ink, paper, blotting pad, table, lamp, furniture, windows, doors, room." (BT, §15, 97 [68]) "It is precisely out of this totality that, for example, the individual piece of furniture in a room appears. [...] I primarily see a referential totality as closed, from which the individual piece of furniture and what is in the room stand out." (HCT, §23.a, 187) "What we encounter as closest to us [...] is the room [...] as equipment for residing. Out of this the 'arrangement' emerges, and it is in this that any 'individual' item of equipment shows itself. Before it does so, a totality of equipment has already been discovered." (BT, §15, 98 [68-69])

25   It is my contention that Gibson's claim about the direct character of affordance perception is not a claim about what we are *aware of* when we perceive affordances or, at the very least, does not imply any specific statement about the phenomenology of perception. To put it in a nutshell, the detection of affordances based on the extraction of information patterns does not require *as such* any conscious vehicle (and in any case Gibson gives no argument in support of this claim) and affordances can in principle be detected without awareness. For additional elements about this possibly controversial claim, see Declerck (2015), 13-15.

26   That is to say, in the case of equipment, the possible worlds in which this possibility is realized are "at a greater distance" from the actual world. See Declerck (2017, 2018), for additional elements about the issue of counterfactuality and the modal status of possibilities in perception.

27   "The totality of involvements is revealed as the categorical whole of a *possible* interconnection of the ready-to-hand." (BT, §31, 184 [144])

28   In BT, it is difficult to see exactly how these anonymous and collective possibilities that the world makes available and my own projected possibilities (the possibilities for the sake of which I am) articulate. But Heidegger seems to hold basically that we simply appropriate or reuse them when projecting one's own self.

29   See however the recent and promising account of Ding (2017) about what parameters determine whether a particular affordance solicits to act or not. Ding defends, based on the work of authors like Slors & Jongepier (2014), that self-narrativity or self-theory (which story we tell ourselves about our life, who we are, what we do and why, etc.) is an essential parameter in this process.

30   Amongst these, there is the issue, quickly addressed above, of the status of equipment corresponding to natural (*i.e.* non manufactured) objects, and the general issue of why phenomenological properties shall be taken into account when considering how human technology has emerged and evolved. How the presentation of equipment and the perception of affordances articulate is also an important issue that shall be addressed thoroughly. I will only briefly address this point in the following.

31   In Merleau-Ponty's terms, that kind of perception implies a switch to anonymity. See Merleau-Ponty (1962, 82).

32   I assume that something comes to count as a tool for some animal when it is apprehended as possessing affordances (*i.e.* is taken as a means) for the task that this animal is currently undertaking, *e.g.* reaching something, removing something, protecting from something, etc.

33   In Heidegger's terms, our "dealings with equipment subordinate themselves to the manifold assignments of the 'in-order-to'" (BT, §15, 98 [69]).

34   Whiten *et al.* (2005) define conformist bias as the "tendency to discount personal experience in favour of adopting perceived community norms". See Jacobs & Campbell (1961).

35   Note in passing that this is an old idea that can be traced back at least to Marx. See Marx (1867/1965), part III, chap. 7, section 1.

36   See also L.A. Suchman for the same sort of critique against the rationalist assumption "that purposeful action is determined by plans" and "that representations of action such as plans [are] the basis for an account of actions in particular situations" (Suchman, 2007, 27).