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Reasons for pragmatism: affording epistemic contact in a shared environment

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Abstract

Theorizing about perception is often motivated by a belief that without a way of ensuring that our perceptual experience correctly reflects the external world we cannot be sure that we perceive the world at all. Historically, coming up with a way of securing such epistemic contact has been a foundational issue in psychology. Recent ecological and enactive approaches challenge the requirement for an individual's perception to attain epistemic contact. This article aims to explicate this pragmatic starting point and the new direction of inquiry that this opens up for psychology. It does so by detailing the development of James J. Gibson's ecological psychology. Securing epistemic contact has been a leitmotiv in Gibson's early work, but subsequent developments in Gibson's works can teach us what it takes to adopt a pragmatic approach to psychology. We propose a reading of the developments in Gibson's original works that shows that, since perception is a mode of acting, perception aims for pragmatic contact before allowing for epistemic contact. Amplifying these pragmatist lines of thought in Gibson's works we end by considering situations where an individual is adapted to the intricacies of specific social practices. These situations show how pragmatic contact can also afford attaining epistemic contact.

Keywords: Affordances, Ecological Psychology, Enactivism, Epistemic contact, Information, Pragmatism

1. Introduction

Perception gets us in touch with the world (Gibson 1959). The process of perceiving allows us to walk without bumping into anything, to make empirical observations of neuronal dynamics, or to talk about the world that we feel, hear and see. Traditionally, perception is taken to accomplish this because it is able to truly or accurately represent the external world. On the basis of correct representations of the world, an individual gets to know the world and can act successfully in it. In short, perception on this view is aimed at attaining *epistemic* contact (e.g. Devitt 1983; see Anderson 2006; Turvey & Shaw 1999), in which perceptual content reflects the external world in terms of correctness, accuracy or truth.

By contrast, recent ecological and enactive approaches share the commitment that what we shall call *pragmatic* contact suffices for perception to get an individual in touch with the world (e.g. Gibson 1979; Chemero 2009; Gallagher 2017; Heft 2001; Hutto & Myin 2013; Noë 2012). On this view, perception aims for unmediated contact with the world as it is useful for the perceiving organism.¹ In this paper we will argue that pragmatic contact doesn't amount to, but is rather a pre-requisite for, epistemic contact. Epistemic contact, according to this view, is however no longer an individual affair. We will build up our argument by focusing on the development of the pragmatist view in one of the most influential perceptual theories: James Gibson's ecological approach.

Requiring epistemic contact implies a need to address the question of how the content of perception is grounded. Just as what is being said in a linguistic statement is understood as the statement's meaning or content, so too perception is traditionally taken to have content, evaluable in terms of truth or falsity, veridicality or non-veridicality, accuracy or inaccuracy. Perceptual representations are the bearers of such content. They specify the world "as being thus and so—where, for all that, things need not be that way"

¹ Interestingly, modern ecological psychology also uses the term 'epistemic contact' to signal that perception is direct and unmediated by mental representations (Turvey and Shaw 1995; 1999). We agree that perception is direct, thus in part this is a mere terminological issue (e.g. Warren, 2005; Withagen, 2004). But in some cases there seems to be a tendency to equate unmediated contact with a pragmatic environment, with correctly, truthfully or accurately perceiving that environment. This paper argues we should give up on such formulations: direct perception can be of pragmatic relations, such as affordances, but those experienced relations do not need to correctly reflect any of their relata (i.e. the world).

(Travis 2004, p. 58). Thinking about perception in terms of truth, accuracy, or the kindred notions of correctness or veridicality, requires that one provide some account of how contentful representing, or the carrying of contents evaluable in terms of truth (accuracy, correctness, veridicality) is possible (Fodor 1990; Hutto & Myin 2013). Without an account of how perceptual content is grounded, the epistemic view of perception is vulnerable to worries about whether perception *ever* achieves its aim of accurate representation and therefore about ever getting perceivers in touch with the external world at all.

Epistemic views of perception are however not the only game in town. Historically, pragmatism has held that perception is not fundamentally aimed at true or accurate representation of the world (e.g. James 1912; Dewey 1958). Rather, perceiving is seen in terms of how organisms practically engage with their environment. What matters primarily is that we get about in our environment— that we do not bump into anything, that we are able to skillfully attach a patch-clamp to a dendrite, or that we talk about the world so that others listen, and can feel, hear or see it too— not that we do so by truthfully or accurately representing the world. Perceptual experience on this view is part of the direct practical relation one has to one's surrounds. Opting thus for functional or, as we shall call it, *pragmatic* contact, pragmatists hold that perception can allow us to adaptively interact with our environment, without representing that environment.

From a traditional epistemic/representational perspective, worries can be raised concerning whether mere pragmatic contact can deliver, on the one hand, truth and, on the other hand, objectivity. Regarding truth, it can be argued that if perception is ungrounded and does not yield a true representation of the world, then perception might be systematically untrustworthy, inaccurate and even false. Clearly however, such an argument doesn't fly against anyone who rejects the epistemic view of perception. Such a view denies that notions of truth and falsity apply to perception. On the pragmatic view, perception does not deliver truths, thus it does not deliver falsehoods either (Mace 2002; see Shaw, Turvey & Mace 1982, p. 161). In other words, *both* truth and falsehood are inappropriate categories to apply to pragmatic forms of perception.

On a pragmatist position, perception should be viewed in terms of usefulness, that is, in terms of being adapted or attuned. This however leads us to the second worry: with merely adaptive pragmatic contact, we may never be able to know the objective world. Here it is questioned whether either usefulness or adaptivity can yield objectivity. That is, there might be a gap between what is useful or adaptive to an organism and what is objectively the case. By adopting the pragmatic view of perception, so it is feared, we might have given up the possibility of ever reaching epistemic contact with the world as it objectively is, beyond our parochial concerns and situated activities.

In this paper we show what it takes for a pragmatist approach to move beyond the epistemic position and the objectivity concern it raises. Central to our discussion will be the thesis that aiming for epistemic contact pre-supposes a prior epistemic separation of organism and environment. Once that separation is made, it cannot be overcome. In particular, aiming for epistemic contact, and endorsing a notion of pre-determined objectivity, will lead to unduly exclude from theoretical consideration essential aspects of human involvement in perception. We will substantiate this argument by scrutinizing the theoretical development of one of the most important early opponents of epistemically driven representationalist views of perception: James J. Gibson. Gibson has played a foundational role in developing a non-representational approach to psychology. Gibson's tireless efforts to get away from the presuppositions of traditional psychology as he moved to a pragmatist understanding of it, and the intermediary positions he took up in doing so, are therefore as instructive today as they were in Gibson's time.

Gibson never thematized this pragmatist development in his theory (Rogers & Costall 1983). This has led to opposing interpretations of Gibson's legacy and, in some cases, to articulations vulnerable to much of the same criticism that other epistemic views of perception face (see below). Through Gibson we first of all aim to show the fruitfulness of making the epistemic/pragmatic distinction in perceptual theory. By detailing his conceptual developments as a move towards pragmatism, and subsequently developing the

view arrived at to account for situations of epistemic contact, we furthermore aim to argue in favour of a pragmatic view of perception.

2. Gibson's early period: from anatomical to ordinal stimulation

In order to argue for a pragmatic rather than epistemic view on perception, in the following three sections we will review the key developments in Gibson's three major works (Gibson 1950; 1966; 1979). In each case we will first examine to what extent Gibson should be read as aiming to account for epistemic or for pragmatic contact. Second, we will look closely at exactly how Gibson sought to secure this contact. Third, we will look at which problems he solved within his theory and which new problems emerged. Gibson himself never explicitly thematised the distinction between epistemic and pragmatic contact. By using the epistemic/pragmatic distinction, we can shed new light on the problems Gibson's concepts got him into (often by his own standards) and how his revisions to these concepts along pragmatic lines could get him out again. In section 5, we then amplify Gibson's pragmatic trajectory and indicate how epistemic contact is afforded by growing up amidst particular human practices.

2.1 Perceiving the visual world

“The suggestion is that *visual* space, unlike geometrical space, is perceived only by virtue of what fills it” (Gibson 1950, p. 5)

In the fifties many of the seeds for arriving at Gibson's later ecological approach were sown. As we shall show, these are visible in particular in Gibson's tendency towards increasingly inclusive concepts, such as the way he conceptualized the world to be perceived, and the concept of “ordinal” stimulation that allowed his theory to move beyond the narrow confines of the static retinal image. In the next section we'll show that nonetheless Gibson predominantly tried to accomplish epistemic contact between the environment and an individual perceiver. He did so through a chain of covariance-relations, accompanied by the metaphor of a retinal image (e.g. Gibson 1948; 1950). As we will see, his framework assumed an epistemic separation between environment and organism that created dichotomies at the roots of

perceptual theory that could not be resolved despite further elaboration. In particular, it left little place for human (social) involvement.

Gibson's early work accumulated in his 1950's book *The perception of the visual world* (henceforth *The Visual World*). In this book, Gibson's early commitment to get an organism into epistemic contact with the environment by means of perception is clearly voiced. Gibson explicated what we have called the objectivity concern: asserting a dilemma, that issued from the separation of the world and its perceiver, "that physical objects either did not exist or, if they did, were unknowable" (Gibson 1950, p. 13). This could however be overcome by a good psychophysical theory: "If a sensory basis for such properties [e.g. distance and solidity] could be discovered in the retinal image ... the dilemma might collapse and the whole intellectual superstructure would fall with it" (Gibson 1950, p. 13; see also Gibson 1948). Gibson therefore proceeded in his book to show that the structure of the retinal image (he only briefly mentioned other sensory structures) was rich enough for the observer to allow perception of our "natural environment," which Gibson called the *visual world*. That is, Gibson tried to get away from the idea of impoverished (or ambiguous) stimulation that required unconscious inference or representational supplements to recover a percept of the world out there.

To make sure retinal stimulation was rich enough to perceive the external world correctly, Gibson made two crucial moves. First, he conceptualized the external world in such a way that it could lead to richly structured stimulation. Thus, he asserted that the perceived world is not that of abstract space but rather that of a "*natural environment*" (Gibson 1950, p. 6, emphasis original). He hypothesized that "*there is literally no such thing as a perception of space without the perception of a continuous background surface*" (Gibson 1950, p. 6, emphasis original). Abstract space, that is, *followed* or was derived from visual space: it was "perceived only by virtue of what fills it" (Gibson 1950, p. 5). To accommodate this richer world for perceiving, Gibson's second change was to extend the concept of *stimulation*.

2.2. Securing contact: ordinal stimulation

The visual world is the natural world; stable, unbounded, and richly structured and textured. Composed of surfaces and edges, at each point in time this world can give rise to a (two-dimensional) projection on the retina of an observer called a “retinal image.” Now, while Gibson aimed to account for perceiving the visual world, he took most of traditional perceptual psychology to take a mere “correlate of the retinal image” (ibid., p. 44) as its explanandum. To show this, Gibson asked his readers to take a detached attitude and experience the world as a bounded field of patches of colours and contours. This “visual field” (ibid., p. 26 ff.), unlike the visual world we perceive, is bounded and unstable, it has no depth and changes and deforms as our eyes move relative to the environment – it is impoverished. It is a “strictly analytic phenomenon” (ibid., p. 27), and should not pre-occupy perceptual psychology.

Nonetheless, for Gibson all visual awareness did correlate with some aspect of stimulation (as indeed did the visual field) (Reed 1988, p. 142). Thus, the retinal images still served as the basis for perceiving the stable and rich visual world. Through transformations over time, these retinal images showed relatively stable relations between them and among their parts. For example, looking at a sloping surface, the specific retinal cells that are excited (i.e. the “anatomical pattern,” ibid., p. 55 ff.) may continuously change. Across anatomical patterns however the textural gradient of the images could persist. That is, both within and between retinal patterns a (dynamic) order, or succession, i.e. an “ordinal pattern,” arises (ibid.). Gibson hypothesized that this relational organization of the retina can serve as a stimulus for perceiving the visual world, as this “ordinal stimulation” (ibid., p. 63) corresponded (or correlated) with the slant of surfaces in the visual world.

With ordinal stimulation as the linchpin, a chain of correlations could then ground the perception of the visual world. The surfaces and edges of the environment projected (corresponded to) patterns of retinal excitation, which in turn correlated among each other to form a complex interconnected structure of (changing) ordinal stimulation. This stimulation then *corresponded* to the experience of seeing a stable and unbounded world, Gibson asserted (e.g. ibid., p. 76). This correspondence between ordinal stimulation and perception might be assured by the connection of the retina to the brain (ibid , p. 51).

Gibson nevertheless argued that the exact role of the nervous system remains indeterminate without a proper understanding of the stimulus for vision (i.e. ordinal stimulation) and that, from an empirical point of view, the contribution of the nervous system can be “by-passed” using correlational psychophysics (ibid.).

2.3. What *The Visual World* started and what it left out

The Visual World is both interesting for the steps that it started to make and for those that it left out. First and foremost, although still based on passive stimulation, Gibson started to activate the retina by distinguishing anatomical from ordinal patterns of stimulation. At the time, he seemed to feel this would allow his theory to provide the richness in stimulation needed to solve the objectivity concern (Gibson 1950, p. 13, see above). While, as we’ll soon argue, the move to ordinal stimulation failed in handling the objectivity issue, it nevertheless made it possible for Gibson to take an increasingly inclusive approach to perception in the years ahead. Through it he started to notice the richness that may exist in relational patterning – and how such richness can account for perception over time. It was in *The Visual World*, for example, that the idea of invariance under transformation was born. Relatedly, even in 1950 Gibson did not just propose innovative answers to the question how we perceive but also to the issue of what we perceive. Specifically, like in the later works, Gibson started the book with a description of the environment, and questioning what it is that we perceive, and what psychology needs to account for. This attitude and his “worldly” starting point would allow him to open his theory further and further, to ever more fully accommodate the environment.

Nonetheless, *The Visual World* had several problems that stemmed from the traditional epistemic aims Gibson appeared to have. Gibson offered two solutions to the grounding problem: first, he used the image metaphor and second, he appealed to a chain of correlations from world to experience. Let us consider both in turn. First, he used the metaphor of a retinal image which implied that the structure of the environment was projected inwardly. Gibson however tried to keep clear that the (ordinal) retinal image was not meant to carry content: it was not a copy or a picture to be looked at, or to be *compared to reality*

(Gibson 1950, p. 62). Indeed, in such a conception, the image reaching the mind would serve as a contentful representation; requiring the possibility of applying criteria of correctness to its content – to ascertain it as a true (or false) or accurate (or inaccurate) image of the world. Gibson himself would later admit that his commitment to the image metaphor was fundamentally mistaken because it did still suggest this “pictorial mode” of perceiving (see Gibson 1967a, p. 140 ff.). That is, because it was still representational at heart, and therefore smuggled in content where it did not belong (Hutto & Myin 2013).

Second, in as much as Gibson did not rely on the metaphor of a retinal image, he needed to have the chain of correlations do the work of establishing epistemic contact with the world. However, this chain of correlations that aimed to save perception from requiring mental operations (that inferred the world from the images it received) turned the process into a (causal) mechanism (see also Reed 1988, p. 145 ff.). By starting with stimulation imposed on the retina, Gibson gave a one-way causal story of how stimulation should ground epistemic contact with the visual world. In modern prose: such a chain of covariance however falls short of fixing any content to the outcome of the process (see Hutto & Myin 2013; Ramsey 2007). In short, starting from an epistemic separation between organism and environment, Gibson’s early theory was unable to overcome it.

Indeed, the *a-priori* separation between organism and environment also popped up in another part of the theory. The world that the organism aimed to get into contact with was very static and devoid of life – it was a world outside human involvement. In fact, the notion of a visual world that Gibson assumed was the theoretical basis of visual perception was of such limited applicability that it was unable to capture seeing in our “everyday life” (Gibson 1950, p. 211). To account for everyday seeing Gibson thus suggested that perception of the “literal” visual world was *supplemented* by the “schematic meaning” that human perceivers could acquire through our interests and culture (ibid., p. 210). The *a-priori* separation of organism and environment was thus not overcome but duplicated, now as an objective natural world and a subjective cultural one, with their own dedicated (mental) mechanisms (see Costall 1995; Costall & Still 1989 for a critique).

3. Gibson's middle period: from ordinal to potential stimulation

“Instead of making the nervous system carry the whole burden of explaining perception, I wish to assign part of this burden to light itself.” - James Gibson 1966, p. 222

Gibson's middle period (e.g. Gibson 1958; 1961; 1966) resulted in *The senses considered as perceptual systems* (1966; henceforth *The Senses Considered*). This period in Gibson's thought has had an enormous impact on the ecological community (Covarrubias et al. 2017). In this complex but highly original work, Gibson was striving to include much of the richness of everyday life that *The Visual World* excluded, including the social and the cultural. Looking for ways to express his novel views on perceiving, he was moreover reworking key concepts, as we shall see. The *Senses Considered* thus contained many innovative ideas and changes that catalyzed subsequent developments.

Nonetheless, the middle period was a transitional period in Gibson's theorizing. Although transitioning to a more pragmatic view, Gibson did not give up his earlier epistemic conception of visual perception. Indeed, it is very hard to evaluate whether Gibson aimed for either an epistemic or a pragmatic conception of visual perception and there are good reasons for either interpretation. For instance, when discussing successful and deficient perception, Gibson equated these pragmatic categories with epistemic ones by asserting that his theory was “primarily a theory of correct perception” which allowed for “incorrect perception” as well (Gibson 1966, p. 287). Rather than choosing one interpretation over the other, we can suffice with showing the consequences of not distinguishing the two positions. We aim to do so while also introducing the important advances *The Senses Considered* presented and further enabled.

3.1. The environment as source of stimulation

In comparison to the 1950s, Gibson now took a much more inclusive approach to the environment. In order to get into contact with the environment, perceiving had become richer and now notably included practical, social and cultural aspects. It encompassed the surfaced bodies of other organisms, their

spontaneous “animate” movements and social interactions. He also took into account many opportunities for action afforded by the environment (Gibson 1966, p. 24 ff.), such as using tools, cooperating, and communicating. All these environmental aspects were “source[s] of stimulation” (ibid., p. 6).

Despite reconceiving the environment in practical terms, Gibson’s perceptual theory was still strongly influenced by the idea that perception needs to be correct, that is, it needs to supply epistemic contact to that environment (see Costall 1984). More neutrally perhaps, his primary concern was a theory of direct “acquaintance with the world” in order to secure “knowledge *about* the world” (ibid., p. 28), the latter of which could be voiced through language or pictorial representation. In a paper from the same period explicitly devoted to realism (Gibson 1967b), Gibson makes clear however that he still endorsed a view very close to that in 1950 (see section 2.1), namely that a good psychophysical theory could alleviate the objectivity concern:

If invariants of the energy flux at the receptors of an organism exist, and if these invariants correspond to the permanent properties of the environment, and if they are the basis of the organism’s perception of the environment instead of the sensory data on which we have thought it based, then I think there is new support for realism in epistemology (Gibson 1967b, p. 162)

To obtain acquaintance with the world, Gibson was looking for new laws of physics and biology that pertained to the world “common to man and animals,” i.e. that held at the ecological scale of interaction (Gibson 1966, p. 22). Acquaintance with the world, he believed, could be grounded in the ways in which the richly texturized environment, the source of stimulation, was related to the stimulation itself. Note that while he was arguing for realism through correct perception, he was also changing what the world to be real about consists in – and this world is increasingly conceived of in pragmatic terms. Nonetheless, as we shall detail in section 3.3, Gibson’s concern for objectivity ultimately led him to objectify the practical world. Let us first consider some of the innovative developments in Gibson’s theory.

3.2. Securing contact: the role of information

To accommodate his richer conception of the environment, Gibson extended his notion of stimulation. To this end, he introduced the concept of an *ambient array* and he included in his environment a *medium*.

The medium that surrounds an organism, typically air, allows unhindered movement and “permits the flux of light, it transmits vibration, and it mediates the diffusion of volatile substances” (Gibson 1966, p 14).

Permitting the flow of energy without deformation, the medium ensures that ambient energy, such as light, retains the structure it gets from the way it reflects from surrounding surfaces. Throughout the medium the ambient energy is therefore textured and at any point in the medium, and at any path through it, this texture is specific to the layout of the surfaces from which it emanated. In this way, each position in the medium has a slightly differently textured ambient array and moving along a trajectory of such positions yields a transforming array that is “unique to a possible path of locomotion” through the environment (Gibson 1966, p. 192).

Because the ambient energy in the medium is highly structured— at each point in the medium the ambient energy has a particular arrangement—Gibson called it the *ambient array*. So while in 1950 the retinal image had a rich texture that, despite changes in anatomical patterns, remained invariant across transformations, by 1966 both structure at a stationary point of observation and invariance under transformation were already available in the flux of ambient energy— as potential stimulation. For example, when rotating an object, despite the fact that all texture relating to the object has changed its “position” in the array, the relation between the edges of the object remains unchanged. Likewise, when an observer moves forward, the optical arrangement “flows” backwards from out of one (invariant) point in the changing array (and by turning the head the observer can find it flows into one invariant point as well) (see Gibson 1958).

Re-conceptualizing the patterning of the retina as external structure – that is, the replacement of ordinal patterning of the retinal image by invariance in the ambient array – was crucial to Gibson. It allowed him

to move beyond the “image” metaphor, noting that the texture of ambient energy corresponded to its source without functioning like an image or a copy. The ambient array is nonetheless “univocally related to a property of the object by virtue of physical law” (Gibson 1966, p. 187; see Gibson 1961). That is, the structure of ambient energy, either static or generated under transformation, corresponded to its source: it was *specific to* the structure of the world. Gibson considered this structure of the ambient array *potential stimulation*, which he called “information” (see e.g. Gibson 1958, p. 185), and this information resided in the environment independent of any organism using it. Because it was environmental, moreover, it was equally available to everyone who looked.

The ambient array was said to carry, or convey, information because it corresponded to, or co-varied with, its environmental source. As such the array had the potential to bring the receptors also into correspondence with the environmental sources. However, it was now up to the organism to act in such a way as to make the receptors do so. That is, by introducing an ambient array that contained information, the stimulus was no longer passively imposed. Rather, it needed to be obtained actively. The organism needed to coordinate its receptors so that they can resonate with, or pick up, the invariant flux of information in the environment. Gibson called this process the “pick up” of information to signal an active process of anchoring to the ambient patterning – much like picking up a rope and following its movements only to let it go again. To do this however, the five traditional senses needed to be reworked and considered in terms of their function, rather than uniquely in terms of their anatomical structure: they needed to be considered as perceptual systems.

3.2.1. *Epistemic contact through functional systems*

While activity was largely left out of the theory of *The Visual World*, in *The Senses Considered* it became crucial (Heft 2017). An acting organism can make potential stimulation become “effective” by using it (Gibson 1966, p. 194). Gibson thus applied the notion of ordinality, once assigned to the retina, to the body as a whole. It now encompassed bodily movements, and extended across receptor types both in time and space. Thereby the “senses” that could be stimulated defied modalities, these senses extended across

the whole body, they were enabled by actively positioning and timing the relationships across receptors, that is, by coordinating body-parts. In this way, the perceptual systems allowed an organism to pick up the ordinal structure of potential stimulation and make it effective stimulation – it could have the organism resonate with or attune to information. The old ordinality of the retina, via the ordinality of coordinated bodily receptors, thus became *functional*. By moving through the medium, the senses aimed to pick up the ordinal environmental structure contained in the ambient array.

The senses therefore were conceived of as functional (i.e. pragmatic), as opposed to anatomical, systems.

That is, they:

do not have exclusive possession of certain organs. The same organ may be employed for different uses at different times; the nose can either sniff the air or smell the content of the mouth; the hand can be a sense organ or a motor organ. [...] This equivalence in function in different settings must also hold true for the neurons of the nervous system. A nerve cell is not the same thing in different combinations of nerve cells [...]. (Gibson 1966, p. 264)

Gibson devoted quite some time to explaining the physiology and anatomy involved in classes of perceptual systems that helped him to re-conceptualize the five classical senses in functional terms. Tentatively, he distinguished a basic orienting system (which has no traditional counterpart), an auditory and a visual system, a haptic-somatic system and a system for tasting and smelling. He explained the function each of these systems had, how they continuously rely and coordinate with each other and what type of potential stimulation they each resonated to.

3.2.2. *Returning to the environment: affordances*

With *The Senses Considered*, Gibson, for the first time, had a theory of perception that did not rely on images, on imposed stimulation or on sensations:

I now assume that perception does not depend on sensory impressions at all, but instead only on the pickup of stimulus information. Sense-data are incidental symptoms of experience, not its foundation [...]. (Gibson 1967a, p 142).

By extending the idea of ordinality to the spatiotemporal structure of potential stimulation on the one hand and to the senses on the other, much more of the environmental richness became available for perceiving than in Gibson's earlier work. The environment was ready to be perceived by an active organism that got its perceptual system to resonate to, and pick up, the multitude of lawful patterning that the environment imposed on the ambient array.

Before we evaluate these claims, Gibson's theory had an important implication that he introduced only briefly but that would have a lasting effect on his subsequent work and on the psychology of perception in general. Because the stimulation that could be obtained by an active organism was constrained by the *activity* that the organism is able to perform, there are also aspects of the environment that are available only because of the actions performed to obtain it – and that are therefore specific to the possibility to perform those actions. This consideration led Gibson to propose a novel idea about aspects of the environment that became available to the organism as it learned to perceive: *affordances* (Gibson 1966, p. 285). Gibson proposed that after having learned about the constant properties of objects (e.g. shape, color, texture, movement) observers endowed with functionally geared, perceptual systems, can “go on to detect their *affordances*”. That is, “what things furnish, for good or ill” (ibid.), what things can be manipulated, are edible or hurtful. Gibson notes that he introduced this *pragmatic* concept in order to bring “value” or “meaning” into his theory (which he largely left out in 1950).

Notice that here Gibson was “building on” epistemic contact with the objective and physical world in order to obtain these practically meaningful aspects: by first learning about elementary properties that were unrelated to action and available in a static array, such as shapes and textures, the affordance of

objects could come to be perceived. These action related aspects were however not determined by the organism. They are explicitly part of the objective environment: “what [the objects] *afford* the observer, after all, depends on their properties”. And, “wonderful to say”, the perception of affordances, “has to be based entirely on ... the subtleties of invariant stimulus information” (Gibson 1966, p. 285). Gibson thus activated the perceiver and brought the active perceiver into a relation with a practical environment.

Rather than reconsidering the need for prior epistemic contact with objective properties upon achieving this pragmatic contact, Gibson however went on to reify the activity of attaining a practical relationship as an objective aspect of the environment as we shall show next.

3.3. It's not the middle period for nothing

By 1966 Gibson considered the environment to be much more than simply a structure of surfaces and edges: it was also a practical environment of affordances, it was moreover moving and changing and included other people and their various interactions. Moreover, by introducing the concept of *information*, Gibson applied the concept of ordinality not to the retina but to the environment itself (the ambient array). However, Gibson was also still largely aiming for an epistemic relation with the world by means of this concept of information. Information consisted in a correspondence between the environment and the patterning of the ambient array and was ensured by natural law. The lawful relation made information “about” the environment (see also van Dijk, et al. 2015):

[I]nformation about something means only specificity to something. Hence, when we say that information is conveyed by light, or by sound, odor, or mechanical energy, we do not mean that the source is literally conveyed as a copy or replica. ... Nevertheless, in all these cases a property of the stimulus is univocally related to a property of the object by virtue of physical laws. (Gibson 1966, p. 187)

By subsequently actively coordinating to obtain this potential stimulation the organism could also be brought into this correspondence relation. In other words, Gibson again resorted to a chain of

correspondence relations to ground perceptual experience of the environment. The chain however now arose from two sides. From one side the environment lawfully corresponded to the ambient array. From the other side, the organism actively achieved correspondence to that array. Together the chain of correspondences then ensured that the organism reached all the way to the environment.

3.3.1. *Pragmatic contact objectified*

As we saw above, in an effort to allow an individual organism unmediated epistemic contact with the external world that was nonetheless meaningful, Gibson considered how some of this information could have meaning to an observer in so far as it corresponded with *useful* aspects of the environment – i.e. with its *affordances*. Gibson thus hit upon the possibility for an organism to get in contact with an action-relevant environment. Gibson, however, did not discern between such pragmatic contact and the epistemic variety that he started from. The mix up between epistemic contact that required a percept that correctly or incorrectly reflected a state of affairs, and pragmatic contact that required being more or less useful to the perceiver, can be seen in Gibson's hybrid attempt to ground the perception of affordances.

First, and from the environmental side, the “meaning” of affordances was available in the array by virtue of physical laws of correspondence, these could “specify all [...] kind of physical fact” (ibid., p. 221).

That is, Gibson believed that these laws would ensure that the ambient array would be specific to properties of the environment and therefore reflect these properties correctly. Conversely, without such lawful correspondence, structure in the array would be non-specific and could relate to environmental properties incorrectly, “[specifying] a fact that is false” (ibid., p. 288) (together with failure to pick up information, this allows Gibson to account for error and misperception). Gibson's position did not require epistemic talk of ‘specified facts’ and ‘correctness.’ Indeed, he could have held that, although such correspondences are useful and factual, these correspondences do not specify that themselves hold too. However, Gibson seems to take the existence of correspondences to imply *contentful* structure in the array (i.e. being true or false of the world), and he attributed this feat to physical laws. These laws then were the first step in establishing epistemic contact (see e.g. Gibson 1961; 1966, p. 187; p. 260; p. 286).

Second, looking at perception from the side of the organism, Gibson took a pragmatic approach.

Perception of affordances was assured by bringing and keeping the organism in a correspondence relation with the ambient array by acting in the medium thereby making potential stimulation effective. As the ambient patterns available were limited by the organism's activity, moreover, the organism resonated to a particular subset of the specifying patterns contained in the array. The correspondence relations thus achieved by the perceptual system ensured that the system reached right through the array and thus also corresponded with parts of the (objective) environment that were therefore useful to the organism. That is, the effective stimulation was the potential stimulation that was useful for particular activity. The epistemic status of what this potential stimulation specified then *coincided* with practical significance.

Together however, the worry is that Gibson took the *pragmatic* relation, actively achieved as correspondence across environment, array and organism, to imply a prior *contentful* structure contained in the array. Pragmatic contact between the environment and the organism was constituted *in acting* by seeking and transforming useful ambient patterns. In walking, for example, the generated optical flow was useful for getting about. Nonetheless, it is unclear whether the activity itself contributed to the content of such patterns, since the patterns seem to "exist as permanent possibilities of vision" (ibid., p. 192) and specify paths through the environment. In other words, activity (e.g. walking) was merely of instrumental use, making *a-priori* specifying patterns "effective" (ibid., p. 194). Activity did not contribute constitutionally to the existence of these patterns, nor to the "facts" that they specify. These facts, including the possibility of acting (i.e. the affordance of walking), were attributed to environmental properties that were already lawfully structuring the ambient array and therefore available to be made effective.

Hitting on pragmatic contact, but concerned with attaining objectivity, Gibson thus appeared to have reified the pragmatic relationship: the actively established relations that constituted pragmatic contact turned into prior environmental properties, and became the source of epistemic contact. Even if the

environment is physically altered by the individual, conceptually this possibility will have been there all along waiting to be found. All the affordances forming *in action* were reified as objective, prior existing properties in the *environment* (Costall 2004; Costall & Still 1989; Ingold 2011; Shotter 1983; Van Dijk 2016).

The environment as a *virtus dormativa* in which all action is explained by the prior existence of the possibility for action waiting to be discovered is explanatorily unsatisfying. It not only takes physical possibility to pre-exist its realization but takes any new or creative sociomaterial possibility to exist prior to its development as well. In the human case, most if not all affordances are socially situated (Costall 1995; Heft 2001), normative and are determined not only by our own actions but also by those of others (see e.g. Hodges 2007; 2009; Ingold 2011; Mauss 1977; Rietveld 2008; Schatzki 1996; Van Dijk & Withagen 2016). Human actions, and the possibilities for action we perceive, are continuously adapted to our typical ways of doing things. These actions, such as using the words “*virtus dormativa*” appropriately cannot be specified by physical laws. Gibson too saw that specifying affordances such as these through laws of physics was unrealistic – they were instead specified to different degrees through, what he called, “relation[s] of *convention*” (Gibson 1966, p. 235).

3.3.2. *Pragmatic contact to engage the social*

Clearly, in the *Senses Considered*, Gibson aimed for a place for the animate, the social and the cultural environment of humans. Unable to attribute these “man-made” aspects of the human environment to the objective world available to correspond to – that is, unable to secure epistemic contact with these aspects – Gibson worked towards a *pragmatic* account of perceiving the social. In the “discovery” of affordances, the individual’s activity was instrumental (but not constitutive; see Hurley 2001). Nonetheless, people’s activities contributed to the existence of many intricate patterns in the environment over time. Public activity lead to intricate “behavioural loops” that can lead to “extremely diversified” patterns of interactions (Gibson 1966, p. 24). Such conventional patterns were available for perceiving to people that learned to be sensitive to them, and they could aid the goal of epistemic contact. For instance, after

learning the conventions of language and depiction, saying “look over there” can help the perceptual system to pick up lawful invariants (e.g. *ibid.*, p. 280 ff.; see also Heft 2017).

Gibson thus distinguished “second-hand” (mediated) from first-hand (direct) perception (Gibson 1966, p. 28). In this vein, he stated that “symbols and images are surrogates for things, but the former must specify by the relation of *convention*, while the latter can specify by the relation of *projection*” (Gibson 1966, p. 235). That is, he argued that second-hand perception, such as required for language use, was not added by the mind but was equally available in the environment and grounded in use (i.e. in conventions shared by a community). Gibson found a way of dealing, in principle, with the intricacies of the social life of animals, specifically human animals, by partnering his epistemic theory of first-hand perception with a second-hand pragmatic one.

This recognition of the social dimensions of human engagement is nonetheless only partial. Here, the objectivity concern surfaces as the threat of subjectivism: of an individual trapped in social fictions, unable to perceive objective reality. In order for second-hand perception not to threaten epistemic aims, the relation between first- and second hand must be one-way: picking up on relations of convention, such as language or pictorial representation, might help to educate attention to invariants, but they should not reciprocally *interfere* with the availability of these invariants (but see Withagen 2004 and Withagen & Van der Kamp 2010 for a pragmatic twist). Indeed, the patterns of activity used to educate attention are in the end merely instrumental too – they are discarded as contact is reached with the objective parts of the environment that are lawfully specified. As in the fifties, the tension between natural and social forms of meaning resurfaced – and the priority laid with the former. Although acknowledging that there was “no sharp division” (Gibson 1966, p. 26), Gibson still felt the need to separate both conceptually (see also Costall 1995).

In sum, opening up the environment further, Gibson slowly transitioned towards a pragmatic account of perception. The move from retinal to ambient patterning, the introduction of perceptual systems and of

affordances, as well as an account of social coordination opened up a new and promising approach to psychology. As we shall see next, in his later work Gibson was less prone to subsequently reifying the pragmatic relation with the environment. We shall then show that embracing a relational and pragmatic approach, can elevate Gibson's (1966) problems and quench the objectivity concern.

4. The later period: towards a relational environment

“Perceiving is an achievement of the individual ... It is a keeping-in-touch with the world, an experiencing of things rather than of having experiences. It involves awareness- of instead of just awareness. It may be awareness of something in the environment or something in the observer or both at once, but there is no content of awareness independent of that of which one is aware” (Gibson, 1979, p. 239)

Gibson's final book *The Ecological Approach to visual perception* (1979; henceforth, *The Ecological Approach*) was meant as a sequel to *The Visual World* (see Gibson, 1979, p. 1). Gibson's first stab at accounting for visual perception needed updating as he now took the “problems of perception” to require an “ecological approach” (ibid.). This is not to say that *The Ecological Approach* is a mere application of the theory of perceptual systems (1966) to the problems of vision. Indeed, Costall and other ecological theorists with a pragmatist bend have noted (e.g. Heft 1989; 2001; Noble 1981; Shotter 1983) that the conceptual changes in *The Ecological Approach* are small but significant. Like in the fifties and sixties, Gibson again expounded on the environment to be perceived, which was now first and foremost an animal-relative, affording, environment (see section 4.1). The theory of information changed only slightly, but information was more explicitly in the service of achieving perception of this pragmatic environment, implying a mutualist, relational conception of information (section 4.2). Before amplifying the pragmatism in Gibson's theory further in section 5, we will take stock on Gibson's later views in section 4.3.

4.1. A practical environment

From the start of *The Ecological Approach*, the description of the environment that was to be perceived was pragmatic, and relative to the behavior of an organism (in *The Ecological Approach* frequently called “animal”):

[T]he words *animal* and *environment* make an inseparable pair. Each term implies the other. No animal could exist without an environment surrounding it. Equally although not so obvious, an environment implies an animal (or at least an organism) to be surrounded. (Gibson 1979, p. 8)

Against the background of *The Senses Considered*, this is a small but radical change. Recall that in *The Senses Considered*, the environment turned out to have practical significance but remained a mere source of stimulation and largely took the place of an objective “external world.” Now however Gibson primarily and explicitly distinguished surfaces, medium and substances in relation to each other and for their importance to *action*. Practical significance took *primacy*: the medium “affords locomotion” and a “homogeneous medium [...] affords vision” (ibid., p. 16). Substances do not permit unhindered movement and come in a variety of forms: “rock, soil, mud clay [...] tissues of plants and animals [...]” (ibid., p. 19), all of which animals “must distinguish [...] in order to live” (ibid., p. 20). The interacting “triad of medium, substances, and surfaces” (Gibson 1979, p. 22) were the ingredients for describing the environment in the most general sense. However, Gibson subsequently aimed for a “more particular description” that captured the environment as it persisted for particular species and organisms (Gibson 1979, p. 36).

Gibson was thus no longer *building up* from objective features towards a practical environment (cf. Gibson, 1966, p. 285; see section 3.2.2): “Color, form, location, space time and motion [...] these are not what is perceived” (ibid. p. 240). Rather, he is *differentiating* the already practical environment further. Thus he gave a taxonomy, and examples such as paths, steps and slopes that afforded walking, obstacles that afford collision or injury, but also shelters that afford protection, and water and fire with their

multiple affordances. Gibson fluidly moved into discussing tools and discussing other animals that afford social interaction and to the affordances of writing and depiction of all sorts. In short, the environment was a practical environment that existed in relation to an animal's behavior. As Gibson put it:

My description of the environment (Chapters 1-3) and of the changes that can occur in it (Chapter 6) implies that places, attached objects, and substances are what are mainly perceived, together with events, which are changes of these things. To see these things is to see what they afford. (Gibson, 1979, p. 240)

That is, even when talking about substances or objects, which used to be “sources of stimulation,” Gibson now had a pragmatic conception of them: to see them is to see “what they afford.” Perception was of a pragmatic world from the get-go.

4.1.1. Beyond the objectivity concern: affordances redux

Affordances were, seemingly similar to 1966: “what [the environment] *offers* the animal, what it *provides* or *furnishes*, either for good or ill” (Gibson 1979, p. 127). But now that the environment to be perceived is a practical one from its inception, these affordances do not need to be self-contained and objectified as “external” entities (e.g. Costall 2004; Heft, 2003; Shotter, 1983). Rather, affordances can remain open-ended, capturing the relationship between the environment and the behavior of the organism itself: an “affordance points both ways, to the environment and to the observer” (Gibson 1979, p. 129).

The attempt to switch to a relational account of the environment is paramount to understanding *The Ecological Approach* (Costall, 2004; 2011). If an animal experiences a direct pragmatic relation it has to its environment, then there is no reason for the relation to additionally reflect any of its relata “correctly.”²

² That is not to say that Gibson wasn't a realist about the environment, but this only requires that the environment is objectively there for theorists and scientists to scrutinize given the species or “kind of animal” under consideration (Gibson, 1979, p. 128). We develop a story about this in section 5, but note that such a position does not entail that an animal perceiving such an environment implies that the animal's perceptual system aims to “get it right” relative to its species.

Thus this relational view on affordances allowed Gibson to see that the objectivity concern that inspired traditional grounding attempts was a moot one that should be overcome:

[A]n affordance is neither an objective property, nor a subjective property; or it is both if you like. An affordance cuts across the dichotomy of subjective-objective and helps us to understand its inadequacy. It is equally a fact of the environment and a fact of behavior. It is both physical and psychical, yet neither. An affordance points both ways, to the environment and to the observer. (Gibson 1979, p. 129)

Gibson's theory moved beyond the *a-priori* separation of a reified and objective world and a perceiver who therefore was in need of regaining epistemic contact. Instead of trying to end up with a relational structure from a prior objective world and subjective organism, it worked by *starting from* a directly perceived reciprocal relation, defined in terms of function, in which there is no environment without an organism and no organism without the environment.³ This is not to say that Gibson denied either an objective world or subjective experience, but rather that these two take shape in the pragmatic relation rather than prior to it. They are phenomena to account for through pragmatic contact, not pre-supposed by such pragmatics in the first place. Gibson's approach thus showed the contours of a "constitutional" reciprocity of the organism and its environment (Heft 2007; Ingold 2011; Shotter 1983). We will return to this point in section 4.3. Taking the relational structure seriously however, the need to achieve epistemic contact in perception could be dropped in favor of perceiving as a direct pragmatic relationship that is actively being maintained.

³ We here suggest a reading in which the relata of a relation take shape as the relation forms over time. That is, there are not first two separate entities that interact to form a relation, but both relation and relata are incomplete and take shape in process together (see e.g. Shotter, 1983; Van Dijk & Rietveld 2018). Gibson alluded to a non-interactionist view of the organism-environment relation himself in response to a question at a conference in 1977. Gibson is quoted to have said: "The relation between the animal and its environment is not one of *interaction* [...] it's one of, well, reciprocity's not too bad. There are several terms in the ecological approach to psychology that bridge the gap between animal and environment. But such a term that bridges the gap points both ways, like the concept of affordance. Another one is the ambient optic array. [...] So with such concepts, I don't have to ask a question about the relation between the animal and its environment. I've defined it out of existence in your own way" (Weimer & Palermo, 1982, p. 234). The constitutional reciprocity we are after indeed implies no prior divide, and implies no (epistemic) bridge to cross it.

4.2. Maintaining contact: a new role for a new kind of information

Gibson began to reorient his theory and started to prioritize pragmatic contact established in activity. His discussion of the ambient array and the information is largely similar to 1966. Specifically, he maintained a realist conception of information: information was available merely if ambient energy is structured (Gibson, 1979, p. 64). Understood in this minimal sense, information did not rely on an (individual) organism to be available. Rather, like in 1966, the covariance holding between surfaces and ambient energy was sufficient for such structure to exist. However, information also “refers to specification of the observer’s environment” (Gibson, 1979, p. 242). Now a tension arises between a notion of information where ambient patterns (structured by a covariance relation holding between surfaces and array) is enough, and a fully relational notion in which specification of the environment *relative to an observer* is required to make such patterns informational (i.e. useful) (see section 3.3.1).

Both views can be supported by Gibson’s writing (e.g. *ibid.* p., 140). In light of the changes in his theory in favor of relationalism, we explore Gibson as developing the concept along pragmatic lines. Without the need to account for perceiving an objective, purely “external,” world, there is little need for the old concept of information to ground the content of perception, let alone for doing so from the environmental side only. Indeed, in 1966, Gibson objectified affordances in order to make them specified in the correspondence between the environment and the ambient array. Now that affordances were practical organism-environment relations, however, this reification to one side was neither warranted nor necessary.

This is not to say that structured environmental patterns were not necessary for perceiving. But Gibson began to emphasize how for those patterns to be information implied not only a particular environment structuring ambient energy, but equally a particular and active observer. What Gibson called “egoreception” and “exteroception” were inseparable:

The supposedly separate realms of the subjective and the objective are actually only poles of attention. The dualism of observer and environment are unnecessary. The information for the perception of “here” is the same kind as the information for the perception of “there”. (Gibson 1979, p. 116)

Information, in our reading of Gibson, followed the affordance concept and became relational and functional: “An affordance, as I said points both ways, to the environment and to the observer. So does the information to specify an affordance” (ibid., p. 141). On such an interpretation, information isn’t just related to a particular environment, but to a particular, active organism. Although some structured ambient patterning might simply be there irrespective of an animal, for it to be specifying a useful environment requires an animal actively differentiating it from other variants. Indeed, criticizing his earlier conception, Gibson noted that “[i]nvariants in structure do not exist except in relation to variants” (Gibson 1979, p. 87). In other words, it is in “ceaseless and unbroken” activity, in the “continuous act of perceiving” that invariants are differentiated and information is picked up (ibid., p. 240).

Consequently, in *The Ecological Approach*, ‘specification’ need no longer be thought of as an epistemic notion, secured by the relation between environment and ambient energy alone. Rather, specification happens *in action*: when one coordinates skillfully to pick up information, when one actively achieves perception, one “sees oneself in the world” (ibid. 225). In this pragmatic *relational* context the invariant structure that is actively made available is able to direct attention to the relata that are forming: the organism and the environment. It points to, or specifies, the possibilities for action the environment offers the organism. As a relational notion, information then accommodated Gibson’s redefinition of perceiving in which there is no experience of relations, “no content of awareness,” either in the organism or in the ambient array “independent of that of which one is aware” (Gibson, 1979, p. 239). Perceiving is *in and of* relations. Changes across the pragmatic unity of environment and behavior could now be as much picked up as forming in an organism’s behavior without that open-endedness undermining direct perception.

4.3. An open-ended environment

Prioritizing the pragmatic unity of environment and behavior (Gibson 1979, p. 129), in *The Ecological Approach* Gibson was working towards a radically different theory of perception as compared to the traditional view. In principle, any aspect of the “animal-environment system” (Gibson 1979, p. 225) that was of practical significance, either on the part of the environment or of the animal, could make a difference to behavior and could enter into their pragmatic relation – it should in fact enter into the relation if the animal is to remain adapted to its surrounds (from forests to stock-markets) (Withagen 2004). In acting and refining one’s actions in novel situations, new potential stimulation (“information”) thus forms that allowed for adaptively coordinating with the environment, and therefore for perceiving new possibilities for keeping the pragmatic unity going. Considering perception to be of such an ongoing pragmatic relation ensures that the need for that relation, real as it may be, to reflect the world correctly is in fact superfluous.

Actively contributing to perceiving, the environment thus became open-ended rather than based on notions of the pre-determined objective fabric of the world. In this way, for example, affordances provided by other people, i.e. the “richest and most elaborate affordances of the environment” (Gibson 1979, p. 135) could enter into the mix as equals, as could for instance their practices of depiction (ibid, Chapter 15). Through learning the practice of writing and using pictures or through talking with others (second hand perception) one could *know* as opposed to see for oneself (e.g. Gibson 1979, p. 42; p. 63; p. 220; p. 258 ff.; see Reed 1996). Although Gibson’s earlier epistemic motivations still shine through in these chapters (see Rogers & Costall, 1983), it implied knowing as “an *extension* of perceiving” (Gibson 1979, p. 258, emphasis original).⁴ Situations of epistemic contact started to become a continuation of pragmatic life, of which we can develop an account, rather than a feature of all perceiving that we need to pre-suppose.

⁴ In a Jamesian vein, the perceptual process might be called a process of “knowing” (James 2000). Although we do not apply the terms “knowing” and “knowledge” to perception to avoid misunderstandings, note that our view is deeply consonant with James’: perception as a process of knowing should not be confused with an epistemic notion of perception that would yield representational states of knowledge.

Finally, we argued that Gibson's insistence that affordances are neither objective nor subjective (or both) does not imply a dismissal of the very notions of objectivity and subjectivity but a reversal of the traditional order. They are phenomena to be accounted for rather than concepts to be assumed. Indeed, in Gibson they were accounted for as "two poles of attention," as Gibson said. We believe this reversal to be a crucial change in Gibson's work and a revolutionary move in scientific psychology. As we shall see next however, we would want to refine the view of objectivity that it implies. Gibson's formulations still seem to suggest that attaining objectivity is a perceptual and strictly individual affair. Making objectivity out to be one pole of a pragmatic relation is right, but it's not a pole of all pragmatic relations. Typically, objectivity is available in the context of specific shared and social practices of the *human* way of life. Making (correct or incorrect) assertions about the world comes with normative standards that belong to such practices. Minimally, one needs sensitivity to these practices to be able to see the world in terms of correctness.

5. Sharing an environment

Starting from within a traditional epistemic framework, Gibson's theory continuously evolved based on the local problems it solved and the new problems that subsequently surfaced. Concurrently, we believe Gibson was changing what he was a realist *about*: perception increasingly aimed for a pragmatic environment. This change started in 1950, took flight in 1966 and continued until, in 1979, he broke several of the remaining shackles that objectified affordances. In the following and final section we will amplify Gibson's pragmatist move and take the tenor we discerned one step further still.

Accounting for the perception of a *practical* environment is not a surrender to subjectivism, and the practical environment is not a private world. However, in as much as these thoughts remain haunting, the objectivity concern, that the objective world is forever out of reach, will be raised. Clearly then, what was crucial to Gibson in the concept of affordances – that it shows the inadequacy of the traditional subject-object divide – has not done its work. What needs to be seen is that perception of a pragmatic and, in that

sense, meaningful world is not a threat to epistemic contact but is in fact a prerequisite for it. In this final section, we will sketch a way in which Gibsonian theory might establish this idea of pragmatic contact affording epistemic contact.

5.1. The objectivity concern revisited

Taking the pragmatic perspective that we find in the later Gibson as a starting point, the objectivity concern can be seen in a different light. From a pragmatic point of view, the objectivity concern leads to begging the question. Either because it presupposes the objective world that a pragmatist theory of perception is out to explain. Or it requires *a-priori* criteria for assessing the correctness of the perception of the objective world, criteria that, if supplied, will inevitably rely on the pragmatics of scientific inquiry. Indeed, such circularity became conspicuous in our discussion of Gibson's middle period, where he took the pragmatic affordance-relations that were forming in action to imply that these relations were the prior existing elements of the objective world that allowed for these relations to be discovered. The achieved *outcome* of maintaining pragmatic contact turned into the *source* of epistemic contact (see also Costall 1984; Van Dijk 2016).

By taking the objective world as pre-given, the job of psychological science is to show how our perceptual system gets us to this world. Achieving such epistemic contact requires the existence of prior criteria of correctness for asserting that a representation is a true or correct representation of the world (Hutto & Myin 2013). In everyday life, such criteria come with the practice in which they are used. For instance, the criteria for a depicting a person correctly, for a subway map correctly reflecting how stations are connected, or for the rings of a tree to correctly represent the tree's age all depend on specific practices (of depicting, traveling and dendrology respectively). Epistemic accounts of perception, which typically take the world of physics as their model, will however exclude from the objective world the parts of the practices that are not subject to criteria for correctness but allow for them – i.e. phenomena like values, meaning or norms.

We saw the difficulty of re-introducing human norms and meaningfulness in Gibson's early work, in which the epistemic separation of the organism and environment reared its head each time Gibson tried to overcome it. In the fifties, it surfaced as a mechanization of perceptual experience and as a distinction between natural and schematic meaning (section 2.2); in the sixties, as a distinction between first- and second-hand perception (section 3.3). Inevitably, because they threaten the possibility of attaining epistemic contact, these organism-involving aspects were excluded from the world of perception and located at the "subjective" pole of psychological science.

A central tenet in pragmatism (James 1912; 2000; Dewey 1958; see Costall 2004; Shotter 1983), philosophy of science (Hacking 1983; Law & Mol 2002; Pickering 1992), and enactivism (Di Paolo, Buhrmann & Barandiaran 2016; Varela, et al. 1991) is to reject a notion of objectivity in which the objective is equated with what is completely divorced from organismic, human or culturally shared activities, i.e. objectivity as the view from nowhere. Against such an ideal of objectivity, pragmatically inspired theorists argue that one can admit of a role for practice and still retain a notion of objectivity, indeed a more viable and fertile one. A pragmatic environment, such as the one we saw in Gibson's (1979) later work, is such an inclusive and, fundamentally, an open-ended environment. Without the abstraction of a self-contained *a-priori* external world, *any* regularity that might make a difference to behavior can then be included in the pragmatic environment.

5.2. Adapting to the world of epistemics

Growing up to be a functioning human being means growing receptivity to the many (social) circumstances and to the changes in them encountered across one's lifetime (see Heft 2007; Hodges 2007; 2009; Myin 2016; Rietveld 2008; Dewey 1958). To give a famous example, one has to learn the appropriate distance to keep from one another as people crowd into elevators (Dreyfus 2002). Or consider how our linguistic practices adapt and evolve in subtle ways and allow us to make distinctions between distinctions (Varela et al. 1991; Van Dijk 2016). These too need to change from place to place and over time so that the speaker fits in with the crowd and makes his- or herself intelligible. What counts in each

case is appropriateness, that is, “situated normativity” (Rietveld 2008), the ability to stay adapted to the demands of evolving situations. The way our practices have taken shape so far, and continue to take shape, supplies the norms of such appropriateness. That is, normativity does not come from mere agreement in opinion (in “conventions”), but “agreement in a form of life” (Wittgenstein 1953, §241).

The practices in which we are situated supply the norms of appropriateness (Rietveld 2008). Within many (linguistic) contexts, an important activity to master are “truth telling practices” (Hutto & Myin 2017; Zahidi & Myin 2016). These are practices of saying, writing and thus doing things that can be (normatively) evaluated within the practices in which they are used as correctly or incorrectly describing a state of affairs. For example, in an everyday situation, such as aiming to take a train that will depart at eight, a judgement that the train will in fact depart at eight is pragmatically relevant (especially when coordinating your plans with others). But making this claim is moreover bound up with practices of giving reasons for and arguing about the assertion, in which the claim can be judged as true or false (accurate or inaccurate).

As we learn and gain new skills, one of the differentiated practices that we can grow into is the academic form of life – the practices in which we paradigmatically meet an even more elaborate world of epistemics. Consider the years of training it took for a student to cultivate the sensitivity to have a philosophical argument, to see a flaw in scientific figures, to compile a data set, or more generally, to be able to successfully quantify an aspect of our environment for the scientific community. In all such cases, highly specialized situations and “behavior settings” (Heft 2007) have developed to which a responsive individual needs to adjust its behavior to accommodate the practices of scientific inquiry. In this form of life, practices of truth telling get connected with the ways materials, instruments, figures (representations), language and other shared affordances are used. The norms then don’t pre-exist such practices, but belong to the enactment of those practices, they are available to articulate when making (epistemic) judgements. For instance, patch-clamps as instruments for measuring neural dynamics, come

with norms for appropriate use. These align with criteria for the correct identification of neural activity rather than background noise, which can then be defended or argued against.

Adjustment to the *practical* requirements of such *epistemic* situations then does not require overcoming any “cultural biases” so as to become more objective, but, on the contrary, it requires immersing in, and sensitivity to, the shared practices that make up such situations (see Van Dijk & Withagen 2016; Van Dijk 2016). Perceiving a pragmatic environment enables perceivers to keep adapting to the demands of a highly differentiated niche and to sustain practical agreement (for instance by disagreeing in opinion). To be sure, it is within these practices that specific criteria of correctness develop, and in which such criteria afford to be applied and evoked explicitly in giving reasons, in having arguments and claiming truth or falsity.

Again, such situational epistemics does not threaten objectivity: it is possible, and in our own case actual, that the norms of objectivity stipulated within one practice (e.g. in arguing about train schedules) can then be applied to *other* practices (e.g. in arguing what an action potential signifies). Careful analysis of and comparison across practices can allow a criterion for factual truth to travel back and forth and apply to many possible methods of observation – leading even to claims of universal truth (themselves parts of a philosophical practice). Epistemic contact, as a special case of pragmatic contact, does not aim for a view from nowhere, but for the view available to everyone.

What this brief sketch of epistemic practices aims to show is that a pragmatic view on perception can retain a viable notion of objectivity and allow for epistemic contact on the basis of that. In our view, epistemic contact is a communal affair, enabled by each individual perceivers’ attunement to shared practices and their contribution to maintaining those practices through such attunement. That is, epistemic contact, achievable in the practices that allow one to make claims about the world, is a special case of pragmatic contact. As Gibson put it: “knowing is an *extension* of perceiving” (Gibson 1979, p. 258, emphasis original). It does not need to underlie pragmatic contact (as Gibson thought in the sixties), nor

does the situational achievement of epistemic contact need to be idealized and reified as an individual's internal state that every act of perception aims for – as the representational view of perception would have it (see Ramsey 2007). Rather, epistemic contact is achieved only by being open to the affordances of “richly vascularized societies of bodies, instruments, scientists, and institutions” (Latour 1999, p. 296) – that is, by resonating with and being open to the many possibilities for (joint) action that our human ecology affords.

6. Concluding remarks

We have discussed an important distinction in philosophical psychology between epistemic and pragmatic commitments and the assumptions that belong to them. The conflation of epistemic and pragmatic issues is widespread in cognitive science (Hutto & Myin 2013; 2017; see also Bruineberg et al. 2016 eluding to it in contemporary neuroscience). The epistemic/pragmatic distinction seems to be overlooked frequently in attempts to expand Gibson's work too (cf. Hufendiek 2016; Millikan 1995). In as much as the ecological tradition is still occupied by the objectivity concern that troubled Gibson's middle period, cross-fertilization with pragmatist fields such as enactivism moreover remains difficult (e.g. Di Paolo, Buhrmann & Barandiaran 2016, p. 18; Varela et al. 1991, p. 204; see Van Dijk et al. 2015). By following Gibson along pragmatic lines however, we hope to have contributed to opening up Gibsonian theory to further develop fruitful exchange with like-minded fields.

Over the course of more than thirty years of theoretical development, Gibson's concepts continuously evolved based on the problems they solved and the new problems that subsequently surfaced. His theory thus moved from stimulus-based perception by a passive organism that aimed for perceiving a “literal” environment, via information-based perception by an active organism that aimed for perceiving an ordinally structured environment, to affordance-based perception by an active organism that aimed for perceiving a relational environment. Concurrently, we argued, Gibson moved from attempts at grounding epistemic contact to elevate the objectivity concern, to an approach that took the actively established pragmatic relation between organism and environment as a starting point.

We have suggested a direction to develop Gibson's terms and concepts further still (Gibson 1979, p. 311). Amplifying his pragmatic lines of thought allows for epistemic contact as a special case of pragmatic contact and thus need not raise the objectivity concern. This view refrains from reifying the outcomes of scientific practices (i.e. objectivity and truth conditions) as a prior constraint on perceiving. By centralizing the role of shared human skills and perceptual experience in scientific practices we hope to have put some pragmatic weight behind Gibson's "reasons for realism" (Gibson, 1967b) – allowing for realism about *the* world by being realist about *our* world, the one we actively inhabit, change and experience.

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