# Human–Technics Intra-Action

Don Ihde introduced the concept of multistability: the "same" thing can be experienced in multiple ways. He argued that human–technics relations are multistable: the "same" person can relate to the "same" technic in different ways. However, Ihde does not explain in detail how he understands *experience*. I suggest that *experience* be defined as *organism–environment intra-action*. This definition has anthropological consequences, which I will explain. In this article, I will argue that technics influence human nature, at least potentially, in two ways. First, our character consists in our habits, and each habit is a skill, or active means. Second, habits incorporate both the traits of persons and of their environment, and instruments external to the body, or passive means, are a possible part of the environment. I will also explain multistability by deriving it from the practice-ladenness of experience. I will rely on classical pragmatism in my argumentation.

**Keywords:** *intra-action, phenomenology, philosophical anthropology, philosophy of technics, postphenomenology, pragmatism*

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**Acknowledgements**

This study was supported by the Estonian Research Council (PRG 462) and the European Union's European Regional Development Fund (Centre of Excellence in Estonian Studies).

**How to cite this article:**
Lindholm, Juho. "Human–Technics Intra-Action".
*Információs Társadalom* XXIV, no. 3 (2024): 38–60.
*https://dx.doi.org/10.22503/inftars.XXIV.2024.3.3*

## 1. Introduction

In this article, I will argue that technics[1] influence human nature, at least potentially, in two ways: as *skills* and as *instruments* external to the body. My argument is based on two theses John Dewey proposed: that experience is *bidirectional organism–environment interaction;* and that technics can be divided into *actual* and *potential means,* of which habits constitute the former and bodily organs and instruments external to the body the latter. The pragmatist notion of *habit,* which is both "subjective" and "objective" at once,[2] is pivotal in the argumentation. I will explain the fundamentals of pragmatist philosophy at length to supply conceptual resources.

The notion that technics influence human nature is implicit in Don Ihde's instrumental phenomenology. I will make it explicit. I will begin by reviewing Ihde's philosophy as a whole to situate my thesis in a proper context.

Ihde ([1977] 2012) introduced the concept of *multistability* in the 1970s. Multistability means that the "same" person can experience the "same" object in multiple ways; "stability" refers to the agent and the object being the "same" in some sense. He illustrated the concept with examples of simplistic two-dimensional pictures that can be viewed as depicting different three-dimensional objects.

In the footsteps of Patrick Heelan (Ihde [1977] 2012, 100), Ihde applied the concept of multistability to the phenomenological analysis of *human–technics relations*. He argued that human–technics relations are multistable: the "same" person can be related to the "same" technic in different ways. For instance, the technic of bow and arrow can be realized in many ways: the English longbow, the Mongolian horse bow, and the Chinese "artillery bow" implement the same *modus operandi*—the transmission of the potential energy stored in the tension of the bow into the kinetic energy of the arrow—but they are used differently (Ihde 2009, 16–19). Ihde enumerated four kinds of human–technics relations: embodiment relations, hermeneutic relations, alterity relations, and background relations (see esp. Ihde 1990, ch. 5; 2009, 42–44). He called the phenomenology of human–technics relations *instrumental phenomenology* (Ihde 2009, 67, 79).

In embodiment relations, phenomenologically, the instrument becomes incorporated into our bodily experience. We engage the instrument actively as if it had become an extension of our body. Heidegger's ([1927] 1977, § 15) famous "tool

[1] I prefer "technics" to "technology." First, "technology" seems too "objectivistic": it seems to abstract instruments from their active use as if they were instruments in some sense without being actively used (cf. Dewey 1922, 25–26). I emphatically wish to take the *use* of technics into account. Second, "technics" seems a better translation for the Greek τέχνη, the Latin *ars,* the German *Technik,* the Dutch *techniek,* the Swedish *teknik,* the Russian техника, the Finnish *tekniikka,* and the Estonian *tehnika*.

[2] I reject the traditional subject–object dichotomy because everything important is at once both "subjective" and "objective." Whatever is important could not possibly be *important* without being both: without being "subjective," it could not appeal to us; and without being "objective," it could not be effective in nature and society. In particular, the classical pragmatists use the term *habit* in a technical sense that cuts across the very subject–object dichotomy: a habit is at once both "subjective" and "objective." A number of methodological concepts cut thus across the dichotomy, including *practice, meaning, experience, phenomenon,* and *situation*. Thus, I write "subjective," "objective," and the related terms in scare quotes to indicate noncommitment.

analysis" is an important example of an embodiment relation: when hammering, the user directs their attention at the activity of driving a nail into wood rather than at the hammer itself. Maurice Merleau-Ponty ([1945] 2002, 165–66) provided three more examples: a lady with a feather in her hat is able to dodge obstacles above her as if the feather was part of her body; when driving a car into a garage, the driver can estimate the dimensions of the car and of the garage; and a blind person can feel the surfaces of objects by touching them with a cane. Ihde's own example is eyeglasses. In such ways, the instrument used becomes quasi-transparent and is not thematized as an object at all. The relation can be formalized as (human–technic) → environment, where the arrow denotes intentionality. (Ihde 1974, 271–73; [1977] 2012, 100–3; 1979, 6–11; 1990, 31–34, 39–40, 47, 72–80, 86, 89; 1991, 29; 2009, 42.)

In hermeneutic relations, the process of the use of an instrument remains active, but now, rather than being incorporated into our body, we are oriented toward the meaning of the reading of an instrument. Therefore, the user must be able to "interpret" the behavior of the technic to understand the accessed object. In this sense, the instrument is quasi-opaque: we access the world through using it. Obviously, writing itself is a technic to which we relate hermeneutically, but one can go beyond language and relate hermeneutically also to dials and gauges. The relation can be formalized as human → (technic–world). Embodiment relations and hermeneutic relations form the two opposite ends of a continuum along the transparency of the instrument. (Ihde 1974, 275–76; [1977] 2012, 103–4; 1979, 11–13; 1990, 80–97; 2009, 43.)

In alterity relations, the user relates to a technic as a quasi-object or even a quasi-other. We can actively engage toys, robots, and artificial intelligence. The relation can be formalized as human → technic (the environment remains background). (Ihde 1990, 97–108; 2009, 43.)

In background relations, the instrument becomes part of the environment. We engage such technics passively and take them largely for granted. Examples of technics thus related to us include lighting, heating, and clothes. (Ihde 1979, 13–14; 1990, 108–12; 2009, 43–44.)

Ihde's later studies in scientific imaging continue and deepen the analysis of hermeneutic relations. He called it *visualism* or, alternatively, *material hermeneutics*. Material hermeneutics studies the ways in which meaning emerges from scientific imaging and thereby "overcomes or even reverses the linguistic turn" (Ihde 2020, 7): it extends the notion of meaning beyond language. He continues Joseph Rouse's (1987, chs. 2–3) *practical hermeneutics,* which interprets practices, including the environment in which they are engaged, potentially including instruments external to the body. He also applies Bruno Latour's (1987, 67–68) definition of *scientific instrument: inscription-producing device*. Because we can access certain scientific objects (including "unobservables" like electrons and genes) only by using certain technics, our relation to these technics is hermeneutic: to access the object, we must be able to understand the behavior of the instrument. The inscriptions that scientific instruments produce are visual and therefore go beyond language in its ordinary sense. (Ihde 1998, chs. 11–14; 2009, ch. 4.) I have argued that both Rouse's practical hermeneutics and Ihde's visualism can be founded upon the pragmatist theory of meaning instituted by Charles S. Peirce and developed further by John Dewey (Lindholm 2022; 2023c).

Ihde called his research program *postphenomenology*. It draws from classical phenomenology, classical pragmatism, and the empirical philosophy of technics. Its theoretical background is the history of the 20th century philosophy of science.

Ihde (2009, 6–8) begins the history of postphenomenology at the early instrumentalism of Pierre Duhem, Ernst Mach, and Henri Poincaré in the first decade of the century, as well as Husserl's contemporaneous attempt to found mathematics and logic on transcendental phenomenology. In the following decades, the philosophy of science developed into logical positivism and empiricism, fostered by Rudolf Carnap, Carl Hempel, Eino Kaila, Otto Neurath, Hans Reichenbach, and Moritz Schlick. Logical positivism and empiricism conceived science as an abstract, ahistorical, asocial theory-producing algorithm. W. V. O. Quine, N. R. Hanson, and Karl Popper shook the fundamentals of logical positivism and empiricism. Thomas S. Kuhn ([1962] 1996) and his colleagues introduced a historical turn: now science was understood historically and socially. That may be considered the origin of the *science wars* in which the alleged rationality of science has come under attack—with or without justification. Imre Lakatos and Larry Laudan continued Kuhn's historical work. In the 1970s, social constructivists like Barry Barnes and David Bloor began to deepen the analysis of the social dimensions of science. In the 1980s, a technological turn took place: now science was also understood as technologically embedded. Ihde himself anticipated this development in his early works. Other theorists of the period include Nancy Cartwright, Ian Hacking, Karin Knorr-Cetina, Bruno Latour, Joseph Rouse, Simon Schaffer, Steven Shapin, and Steve Woolgar. In the late 1980s and 1990s, feminist philosophers of science like Donna Haraway, Sandra Harding, Evelyn Fox Keller, and Helen E. Longino began to question gender biases in science and the philosophy of science. Writing in the early 2000s, Ihde believes that phenomenology must respond to this change in philosophical milieu in general: phenomenology needs an *update*. That motivates postphenomenology.

Both pragmatism and phenomenology foreground *experience*. Yet they are different. Pragmatism "deconstructed" early modern epistemology, which Husserl failed to do, at least terminologically. Deweyan pragmatism models experience after the organism–environment model rather than that of "subject" and "object." It also considers "consciousness" as an abstraction. Thus, the "grafting of pragmatism to phenomenology constitutes a first step in a postphenomenological trajectory" (Ihde 2009, 11). For the converse, the second step reverses the process: "phenomenology historically developed a style of rigorous analysis of experience that was potentially *experimental* and thus relevant to pragmatism" (Ihde 2009, 11). This step involves the introduction of *variational theory,* the theory of *embodiment,* and *lifeworld analysis* to pragmatism. These provide *rigor* to the philosophy of experience. The third step is the empirical philosophy of technology. Early philosophers of technology like Martin Heidegger and Jacques Ellul analyzed *technology überhaupt* as if it had an essence. They were often pessimistic about technical development. Later philosophers have rejected the essentialist method and studied particular technologies in the actual contexts of their use. Essences absent, there is no room for *a priori* armchair philosophizing: each technology must be studied empirically. Later philosophers also do not share the pessimism of their predecessors. Dutch philosophers of technology call

this "the empirical turn." The new generation of students of science and technology often scrutinize *technoscience* rather than technology or science in isolation from each other. However, Ihde claims that Dewey did not make technology thematic in his philosophy; Larry Hickman ([1990] 1992) would probably disagree: he believes that technology was Dewey's very *method* of philosophizing.

Poststructuralism, a tradition in Continental philosophy heralded by figures like Roland Barthes, Jacques Derrida, Michel Foucault, Gilles Deleuze, and Jean Baudrillard, emerged as a criticism of structuralism. In a sense, it developed into *anti*-structuralism. The same does not apply to postphenomenology: it is a *continuation* of Husserl's, Heidegger's, and Merleau-Ponty's classical phenomenology.[3]

I find Ihde's postphenomenology attractive for many reasons—in particular, its empiricist method, which takes both first- and third-person points of view into account. But I will suggest a modest improvement. To my knowledge, Ihde does not explain how he understands the crucial concept of *experience*. By implication, that problematizes the empiricism, according to which all knowledge stems from experience, which I have attributed to him. But given that postphenomenology draws from classical pragmatism, arguably, one can apply John Dewey's definition of *experience: organism–environment interaction*.[4]

But Dewey's definition itself may need revision. Karen Barad (1996) coined the term *intra-action* to describe a process in which the mutual relations between the actants—rather than the actants themselves—render the actants determinate and numerically identical. Thus, she intends to allow for the possibility that relations can be more basic than objects (cf. Llored 2024: 76–83). By applying this notion, Dewey's definition becomes *organism–environment intra-action*. I am sure Dewey would have approved this revision.

A bit of contextualization might be necessary to appreciate Barad's terminology. Barad (1996) examines the opposition of scientific realism and social constructivism by studying measurement processes. Committed to social constructivism but tending toward realism, she carefully tries to strike a balance between nature and culture as determinants of scientific knowledge. Her intention is similar to Evelyn Fox Keller's (1985) dynamic objectivity, Donna Haraway's (1988) theory of situated knowledges, Helen E. Longino's (1990) contextual empiricism, and Sandra Harding's (1991) strong objectivity, which attempt to make a case for nonrelativist constructivism. Barad interrogates the notions of identity and science. She emphasizes ontology but does not downplay epistemology. She points out that science does not necessarily discover nature as it really is even if it works, and that it can work even if it is socially constructed. Thus, empirical adequacy falls short of the proof of realism. But she also maintains that social constructivists need to explain *why* science works if

[3] I thank Robert Rosenberger (private communication) for this comparison.

[4] This notion appears implicitly in Dewey's classic article "The Reflex Arc Concept in Psychology" (1896). He developed it in his middle and later works (1916a, 163–78; 1916b, 136n1, 270–78, 388; [1925] 1929a, 3a, 246–47, 279–80, 283, 314, 344–46; 1929b, 172–73, 234; [1934] 1980, 22, 53, 56, 132, 246, 251; 1938, chs. I–V). He makes it explicit in another classic article, "Propositions, Warranted Assertibility, and Truth" (1941, 183–84). Sometimes he uses the term "transaction" instead of "interaction."

not because of mind-independent laws. Her focus is on the embodiment of culture within *theory* in the sense that theory *involves* practice and *is embodied in* practice. She rejects Newtonianism and the determinism and transparent notion of measurement it seems to involve. She calls her position "agential realism" and argues that it serves as a framework that ties together the epistemological and ontological issues. It draws on Niels Bohr's philosophy–physics, which involves a critical examination of observation/measurement processes where matter and meaning meet in a very literal sense (cf. Pickering 1984; Galison 1987; Traweek 1988). According to Bohr, the indeterminable discontinuity of measurement interactions undermines the separability of the "object" and the "agencies of observation" posited by Descartes. For instance, "position" is definable in the context of an apparatus with a fixed photographic plate, and "momentum" is definable in the context of a photographic plate on a movable platform; thus, both variables cannot be unambiguously defined using one particular choice of measuring apparatus. Therefore, the observation entails an indeterminable interaction between objects and agencies of observation; measurements refer to phenomena to the (re)production in which agents participate with all their practical and conceptual skills (which corroborates Dewey's definition of *experience*, which I will explain below). That seems to entail that observations do not refer to objects of an independent reality. Yet quantum mechanical observations are "objective" in the sense that they do not involve reference to a particular observer; they are reproducible and unambiguously communicable because they leave permanent marks on bodies that define the experimental conditions. For Bohr, meaning is tied to the experiential world (which corroborates Peirce's *pragmatic maxim*, which I will explain below). In the form of the physical configuration, the material and semiotic apparatuses form a nondualistic whole. The traditional subject–object dichotomy is relative to the experimental configuration. These reflections problematize scientific realism, as I will briefly point out in the Conclusion.

However, postphenomenology does not *entail* Dewey's definition of experience. It is only one of the open possibilities. For instance, Merleau-Ponty's ([1942] 1967; [1945] 2002) complex notion of *experience* is a plausible alternative. Hence there are other lines of research, and their results may differ from mine.

This discussion on the nature of experience suggests an anthropological thesis. In this article, I will argue that *technics influence human nature, at least potentially*.

My argument is based on the pragmatist notion of *habit*. Dewey understood *personality* and *character* in terms of habits (1922, 19, 24, 38, 40, 43, 121, 136; cf. Peirce CP 6.228). It must be borne in mind that the classical pragmatists use the term *habit* in a technical sense that cuts across the traditional subject–object dichotomy: a habit is at once both "subjective" and "objective." Dewey (1916a, 54–58; 1922, 14–88) understood *habit* as the union of the effects of an organism and its environment of which it is a part. I have defined habit as an *(approximately and relatively) invariant pattern of potential organism–environment intra-action*[5] (Lindholm 2023a, 8, 13, 33–34). Thus defined, our environment—possibly including instruments external to the body—enters our habits and therefore also our characters.

[5] I have applied Barad (1996) to my earlier definition in which I used traditional terminology.

Dewey (1922: 25–26) distinguished between *active* and *passive means*. Our habits are active means. Because our habits constitute our character, active means necessarily influence us. Our bodily organs and instruments external to ourselves are passive means. Passive means potentially influence us. When not used, a passive means is just a thing. To actualize it, and for it to acquire the status of a means, it must be actively used in a practice, or active means. Dewey emphasized active means to show the importance of the *active use* of instruments rather than the instruments themselves. In short, *the technics we use constitute a part of human nature, at least potentially*.

My thesis is not entirely new. If I have understood correctly, Bernard Stiegler ([1994] 1998) has come to the same conclusion (cf. Lindberg 2013). But our arguments are very different. Stiegler sets out from the Continental tradition—especially Heidegger and Derrida—while my starting point is classical pragmatism. In effect, I am going to show how the same result can be attained from pragmatist premises.

I will begin in Section 2 by reviewing the pragmatist theory of meaning, according to which the meaning of a thing consists in the *potential practical effects* of that thing, and these potential practical effects consist in our *habits* of responding to that thing. The pragmatist theory of meaning provides the theoretical background for the analysis of the pragmatist notion of *habit,* which is a pivotal concept for the following section. I will continue by explaining Dewey's concept of *experience* in more detail in Section 3. Its purpose is to demonstrate the primacy of practice in epistemic matters. I will employ that thesis in the following section. I will generalize the thesis of the theory-ladenness of observation into the thesis of the potential practice-ladenness of experience in Section 4. I will argue that it explains multistability. I will be ready to present my anthropological thesis that technics is at least a potential part of human nature, which is the main purpose of this article, in Section 5. I will anticipate some criticisms and reply to them in Section 6. I will conclude with some suggestions for future inquiry in Section 7.

## 2. Meaning

In this section, I will explain the pragmatist theory of meaning and the technical sense of *habit* upon which it is built. My exposition of the concept of habit is necessary for understanding the concept of experience (and thereby also empiricism), the potential practice-ladenness of experience, and the significance of instruments for our character, the demonstration of which is the main purpose of this article. Peirce's theory of meaning provides the theoretical background from which discourse on habit acquires its philosophical significance.

Peirce introduced the *pragmatic maxim,* which crystallizes the pragmatist theory of meaning, in his 1878 article "How to Make Our Ideas Clear":

> Consider what effects, which might conceivably have practical bearings, we conceive the object of our conception to have. Then, our conception of these effects is the whole of our conception of the object. (Peirce CP 5.402; EP 1, 132.)

> […] what a thing means is simply what habits it involves (CP 5.400; EP 1, 131).
>
> […] we come down to what is tangible and practical, as the root of every real distinction of thought, no matter how subtile [*sic*] it may be; and there is no distinction of meaning so fine as to consist in anything but a possible difference of practice (CP 5.400; EP 1, 131).

In Peirce's early account, meaning is equal to *actual* practical bearings. That invites trouble with *conditionals* and *counterfactuals*. He corrected his actualism on this basis in several writings after 1900 and claimed that to have meaning, it is sufficient for an object to be *potentially* interpret*able* in practice. (CP 2.92, 2.275, 5.18, 5.196, 5.425–27, 5.438, 5.453, 5.457; EP 2, 134–35, 145, 234–35, 340–41, 346, 354, 356.) Short (2007, 173) calls this "the subjunctive version of pragmatism": the meaning of a proposition is how it *would* influence conduct—that is, our habits—*were* it believed and *had* we some practical purpose to which it was germane.

The application of the pragmatic maxim to a concept yields the *operational definition* of that concept. An operational definition states what a concept means in practice[6] (cf. Lindholm 2023a, 14–15).

In short, the meaning of a thing (possibly a speech act) consists in the *potential practical effects* of that thing (possibly another speech act); and these effects consist in our *habits* of responding to that thing. A conceptual difference must make a practical difference.

To understand the pragmatic maxim, we must make an excursion to the analysis of the concept of habit. It must be borne in mind that the classical pragmatists use the term *habit* in a technical sense that cuts across the traditional subject–object dichotomy: a habit is at once both "subjective" and "objective." I have defined *habit* as an *(approximately and relatively) invariant pattern of potential organism–environment intra-action*.[7] An organism and its environment exchange causal signals (including observations and actions) in space and time, and recurring patterns in such exchanges are *habits*. (Lindholm 2023a, 13–14.) I have also argued that the pragmatist notion of *habit* (Dewey 1916a, 54–58; 1922, 14–88) and Rouse's (1987, chs. 4 and 7; 1996, chs. 5–9; 2002, chs. 5–9) notion of *practice* are at least roughly synonymous, though "practice" may capture better what Dewey intended by "habit" (Lindholm 2021, 7; 2023a, 13–14).

Dewey (1916a, 169; 1922, 69, 77; [1925] 1929a, 358) substitutes the distinction between theory and practice with the distinction between intelligent and unintelligent habit (cf. Barad 1996, 166; Rouse 1996, 127; Nöth 2016; West 2016, 216, 219–20; Peirce CP 1.390). Intelligent habit is primary; it can degenerate into unintelligent habit when repeated often enough (Dewey 1916a, 57–58; 1922, 15, 42, 69, 70–71, 77, 208–9; [1925] 1929a, 358; 1938, 32–33; cf. Anderson 2016, 2; Colapietro 2016, 304).

[6] For an example of an operational definition, see Peirce's elaborate account on *lithium* (CP 2.330).
[7] Dewey defined *experience* as *organism–environment interaction*, as I will explain shortly below. I have previously used the usual term *interaction*, but here I apply Barad (1996) and use the term *intra-action*.

Henceforth, when I refer to habits *simpliciter,* I mean *intelligent* habits, unless indicated otherwise.

Habit (practice) is the vehicle of cognition. Reasoning, or the drawing of a conclusion from certain premises, operates upon habit (practice). It serves the purpose of discovering mind-independent facts, because they provide *opportunities for action,* or *affordances* (Gibson 1979). Hence, they are the only *interesting* facts.[8] (Peirce CP 2.137–76, 6.86, 6.286, 6.481; EP 2, 447–48; Dewey [1910] 1933, 100–1; 1916a, 39–40, 54–58, 62, 120, 153–54, 263–64, 319, 323, 400; 1922, 177.) Mind arises from habit (practice), rather than *vice versa* (Dewey 1916a, 39, 57, 344, 392–93). Operationally speaking, belief is habit (practice) (Peirce CP 2.435, 2.643, 4.53, 5.367, 5.417, 5.480, 5.510; EP 1, 112, 114, 198; EP 2, 19, 336–37); and knowledge is a subclass of belief. Therefore, knowledge consists in habit (practice) (Dewey 1916a, 400; 1922, 30–31; cf. Peirce CP 4.531). Thus, reasoning is not distinct from—let alone opposed to—experience. On the contrary, because it is based on habit (practice), it is part of experience.[9] That concludes our excursion.

Recall that both Peirce (CP 6.228) and Dewey (1922, 19, 24, 38, 40, 43, 121, 136) maintain that human character consists in its habits and that habits presuppose and incorporate certain traits of the human environment.

Peirce follows Kant ([1781/7] 1956) in restricting the applicability of concepts to possible experience. The difference is that Peirce's notion of experience not only includes observation but also *entire practices*. For Peirce and Dewey, observation is not self-sufficient: an ongoing course of purposive action constrains it.[10] Peirce also departs from Kant in the respect that the pragmatic maxim eliminates transcendent realities (including *Dinge an sich*) from discourse.[11] They may or may not exist, but we cannot possibly apply concepts to them. Hence they simply drop out as nonsensical.[12]

According to Peirce (CP 5.465; EP 2, 400–1), the determination of the meaning of a thing is an *experimental* matter. To determine what a thing (possibly a speech act) means, one must study how different organisms (including humans) respond to it (possibly another speech act). That naturalizes semantics. Peirce himself did not explain that notion in detail, but Dewey (1929b: 81–84) provided an account on how experiment gives rise to meaning. I have slightly improved my previous versions (Lindholm 2021, 7; 2022, 694; 2023a, 16; 2023b; 2023c, 106):

[8] This motivates my claim that a thing can only be *important* if it is both "subjective" and "objective" simultaneously; see note 2.

[9] According to Peirce, reasoning manifests his third category, which he prosaically called *thirdness*. According to Peirce, each of the three categories is necessarily present to experience (see also de Waal 2010, 10). For my account on Peirce's categories, see Lindholm (2023a, 27–30).

[10] I will explain this notion in the two following sections.

[11] I will explain in the following section that the phenomenal world, which is at once both "subjective" and "objective," is the object of our knowledge.

[12] Thus, Peirce (CP 5.525) was correct in calling Kant a "somewhat confused pragmatist": Kant's mistake was to allow discourse on *Dinge an sich* even though his own principles forbid that. Had Kant been consistent, he would have concluded that the concept of *Dinge an sich* is impossible. See also how the young Peirce refutes concepts, the objects of which are not knowable (CP 5.310–311; EP 1, 51–52).

(1) A known change (possibly nothing, possibly a speech act) is introduced.
(2) Something else (possibly nothing, possibly another speech act) changes as a result.
(3) The changes are correlated.
(4) The previous steps are repeated in different conditions.
(5) If the correlation persists, the agent develops a habit.
(6) The habit associates the cause (the action of the agent) with its putative effect.[13]
(7) Thereby, the cause and its putative effect become (fallible) sign-vehicles of each other: the presence of the one *means* the presence of the other.

This schema applies to linguistic and nonlinguistic meanings[14] alike (Dewey 1916a, 14–19).

We are able to assign meaning to objects on the basis of already established habits: they associate the objects with their potential practical effects. We are also able to project *ends-in-view* (cf. Dewey 1916a, 121–23, 127–29, 205–6) on the basis of habits: by applying knowledge about the potential practical effects of a thing, one may *use* that thing as a means to achieve its potential practical effects. There occurs a conversion of cause–effect relations into means–ends relations, which is, according to Dewey ([1925] 1929a, 136, 177, 180–83, 369–70; 1929b, 84, 295–96), the purpose of all intelligent action. When the task is fulfilled, he calls the result *art* (Dewey [1925] 1929a, 370; cf. Dewey 1916a, 320). Thus, all purposive behavior presupposes habits.

I have defended the pragmatic maxim against Horkheimer ([1947] 2004, 33) in Lindholm (2023b; 2023c, 104–6).

## 3. Experience

In this section, I will explore the pragmatist notion of *experience*. Thereby, I also implicitly probe the jurisdiction of empiricism, or the doctrine that all knowledge stems from experience; and that of phenomenology, or the science of experience *qua* experience.

Dewey (1896; 1916a, 42, 56, 91–92, 232–34; [1934] 1980, 37; 1938, 66–70; cf. Jung 2010, 147–49, 155–57) provided a phenomenological account on *experience*,[15] operationally defined as *organism–environment intra-action* (Dewey 1941, 183–84; Barad 1996). Its idea is that experience takes place in a holistic *situation*. A situation involves events that take place in an environment, possibly including a number of agents with all their practical and conceptual skills (cf. Barad 1996; Rouse 2002, ch. 8). Thus, a situation is both "subjective" and "objective" simultaneously. An ongoing course of purposive action, which habit makes possible, maintains the unity and coherence of the situation. Epistemically, the situation as a whole is basic, but

[13] I say "putative," because our ability to ascribe causality to phenomena is eminently fallible.
[14] I have explained the notion of *nonlinguistic meanings* in Lindholm (2023a, 17; 2023c, 103–104).
[15] Dewey is actually doing phenomenology though he does not use the very term "phenomenology" itself. I have previously called Dewey's phenomenology "experiential holism" (Lindholm 2023a, 19–23).

a situation can be analyzed into parts, if need be, and if the agent has already mastered the skill of analysis. According to Johnson (2010), contemporary cognitive science corroborates Dewey's phenomenology.

The concept of *situation* might be understood more easily if it is explained as (at least roughly) synonymous to the pragmatist concept of *phenomenon*. Peirce (CP 5.425; EP 2, 340) considered *phenomenon* in the sense of "effect," as in "the Zeeman effect" or "the Hall effect." In this sense, phenomena are repeatable configurations of the *world* (and, *contra* Kant ([1781/7] 1956), not of a "subject"), possibly including a number of agents. Hacking ([1983] 2010, 220–32), Bohr (Barad 1996, 170–71), and Rouse (2002, ch. 8) understand phenomena in a strikingly similar fashion. According to the pragmatic maxim, the phenomenal world is the object of our knowledge. But because a phenomenon in the sense explained above is at once both "subjective" and "objective," that does not compromise the "objectivity" of knowledge.

Peirce (CP 1.90, 6.7–65, 6.102–63, 6.238–71, 6.287–317, 7.572; EP 1, 285–371; EP 2, 3) endorsed *synechism*,[16] or the doctrine that there are continua between many (if not all) polar opposites.[17] It rejects, among other things, the sharp division between organism and environment. By virtue of our habits, there is a continuum between them: there are some events or phenomena that involve both the organism and its environment and cannot therefore be ascribed to one but not the other.

Other organisms are a part of our environment (cf. Dewey 1938, ch. III). Therefore, we are also continuous with other people. That is a methodological presupposition of social psychology. Habits are essentially social and therefore usually shared: they are public, observable, and causal processes and therefore open for others to learn. When newborn human beings are socialized into a community, they cannot but acquire the already existing habits and customs of the community. Later, they may become able to criticize them. (Cf. Dewey [1910] 1933; 1916a; 1922.)

Humans are active creatures by nature: action is the rule and contemplation without overt action is the exception. We do not first receive a stimulus, then process it neurally, and finally respond to it overtly. This linear sequence does not take the cyclical, bidirectional feedback structure of experience into account (cf. Lindholm 2023a). Rather, the usual scenario is that *we act already, and we observe and process our observations simultaneously*. Thus, at least some stimuli may be *results* of our already committed actions. Stimuli are not basic for another reason as well: to be able to identify a stimulus *qua* stimulus in the first place, one needs *training*.

That suggests that purposive action conditions (but does not determine) observation. The purpose (end-in-view) of the ongoing course of action acts as a *filter:* we attend to the observations that bear on the attainment of the purpose and ignore the rest. That economizes on cognitive resources. Therefore the world is experienced as *opportunities for action*. To know is to know what to *do*. That means that *practice is epistemically more basic than observation*. Merleau-Ponty's notion of the body is at least roughly identical to Dewey's phenomenology:

[16] From συνεχής ("continuous"). See also Dewey (1938, 18–19, 23–24), Gale (2010, 65–67), and Santaella (2016).
[17] It seems possible that there is at least one universal medium, namely *matter itself*. In a deep sense, the unity of the world consists in its materiality (cf. Kuusinen 1959, 24).

> What counts for the orientation of the spectacle is not my body as it in fact is, as a thing in objective space, but as a system of possible actions, a virtual body with its phenomenal 'place' defined by its task and situation. My body is wherever there is something to be done. (Merleau-Ponty [1945] 2002, 291.)

Most human activities are non-epistemic: for instance, conversation, the use and enjoyment of certain goods, routine work, or games.[18] Epistemic activity, or *inquiry*, acquires its meaning, significance, purpose, and resources from such activities. (Dewey 1916b, 1–13.)

In practice, each situation involves at least some novelties; it is highly unlikely that two situations could be exactly similar in every respect. Therefore, our habitual action can fail at any time due to unexpected circumstances. We can never be sure about its results. That makes all experience *fallible*[19] and hence *experimental* (Dewey 1916a, 163–78, 237, 317–22; [1925] 1929a, 70).

A situation becomes *problematic* when habitual action fails. That calls for epistemic activity, or *inquiry*. In a problematic situation, objects may have many different meanings, of which some may be contradictory; or they may have no meaning at all. Either way, we do not know how to respond.

Because the epistemic status of our observations is problematic, inquiry reduces events to *data*. But data are not self-sufficient: they present *problems to be solved*. The construction of a solution is up to us. Moreover, data are *selected* by applying prior knowledge to determine what is potentially relevant for the problem at hand. In this sense, data are *taken*, rather than *given*. (Dewey 1929b, 99–100, 103–4, 122–24, 133–34, 172–80, 189–91, 258–59.)

By definition, the problematic situation cannot provide a solution for us. We must analyze it until we find parts that have unique meanings that suggest a solution. Then we can construct a putative solution by rearranging the relevant parts and try whether it succeeds.

Inquiry, whether everyday problem-solving or a scientific endeavor, conforms to Peirce's *belief–doubt model of inquiry*, which I will describe shortly below. The model explains in detail how all experience involves experimentation, at least potentially. It is based on two operational definitions. Peirce defined *belief* operationally as *habit*[20] and *doubt* as the *privation of habit* (Peirce CP 2.435, 2.643, 5.367, 5.417; EP 1, 112, 114, 198; EP 2, 19, 336–37).

The belief–doubt model of inquiry is iterative. We begin with whatever beliefs (habits) we have. A failure in habitual action provides a positive ground for doubt. That prompts an inquiry. It consists in abduction (the introduction of a novel

[18] This claim seems to violate enactivism, namely, its thesis that all experience be cognitive. That thesis is attractive to an extent: a pragmatist can state that habitual action sustains cognition. But that does not make all habitual action *epistemic:* that would require that the purpose of the habitual activity in question be *learning,* or the express acquisition of knowledge. My purpose is not, however, to refute enactivism. Since I have no qualifications in cognitive science, I will simply suspend judgment about it.

[19] The classical pragmatists advocated *fallibilism,* or the position that *any single belief, including mathematics and logic, can be questioned, if there arise positive reasons to do so*.

[20] A careful reader can see that both *meanings* and *beliefs* are defined as *habits*.

hypothesis that accommodates the failure), deduction (the derivation of certain testable consequences of the hypothesis), and induction (experimentation whether or not the consequences of the hypothesis obtain). If the hypothesis resolves the problematic situation, it gives rise to a novel belief (habit), and we can resume our prior activities.[21] If the hypothesis fails to do so, we must revert to the abductive stage. The belief–doubt model describes one form of *habit of habit-change*, or *habituescence* (Peirce MS 930, 18; cf. West 2014; 2016; Gorlée 2016; Nöth 2016).

This model dispenses with both epistemic foundations and epistemic ends (in the sense of τέλος). Inquiry consists in active adaptation and readaptation to (at least potentially) changing circumstances. If followed consistently, the model predicts that our purposive behavior will accommodate to whatever "objectively" constrains it. Thereby, the structure of these constraints gradually becomes the structure of our habits. But as Hume ([1739–40] 1854a, bk. I, pt. III; [1748] 1854b, § 4) correctly observed, the world can change. Therefore, we cannot posit a fixed end for inquiry. We can only say that *if* there is something that stays (approximately and relatively) invariant, *then* our habits (beliefs) will accommodate to it. If we set out from an epistemic foundation, but the world changes, then the foundation may lose its legitimacy, which would compromise our quest for truth. Therefore, we need not—and indeed should not—establish an epistemic foundation from which to proceed safely. Hence, it does not matter at all how we begin inquiry or whether we aspire for a permanent truth. Epistemic justification issues from the *process* of self-correction rather than from a privileged set of beliefs: no belief is privileged; anything can be called into question if need be. One could adapt Eduard Bernstein's (1899, 169) political slogan "the movement is everything, and the final goal is nothing" to epistemology. One could also adapt the colloquial slogan "if it ain't broke, don't fix it" to epistemology as well. Peirce himself would have disapproved the conclusion that truth can change,[22] but we need not agree with him in this respect.

The belief–doubt model of inquiry is further evidence against discourse on transcendent realities (including *Dinge an sich*). According to Peirce (CP 5.412; EP 2, 332), everything that bears on conduct can be discovered experimentally: for if it could not be discovered experimentally, how could it bear on anything we do? A transcendent reality is not amenable to experiment and, by Ockham's razor, drops out of inquiry as a useless hypothesis. Thus, "[t]he world as we experience it is a real world" (Dewey 1929b, 295).

Määttänen (2015, ix) describes the pragmatist notion of experience as follows:

> Human beings are embodied creatures, which are in constant interaction with other elements in the world. The world is experienced as possibilities of action. The hidden causes of perception are not the object of knowledge. The

[21] I have reconstructed the belief–doubt model from Peirce (CP 2.619–664, 5.161–74, 5.265, 5.374–76, 5.416, 6.469–73; EP 1, 28–29, 114–15, 186–99; EP 2, 212–18, 287–88, 336–37, 440–42). See also Lindholm (2023a, 25–27).

[22] Peirce chided William James, his friend and collaborator and co-founder of pragmatism, for the notion of the mutability of truth (see Peirce CP 6.485; EP 2, 450, 457–58; James [1907] 1916, 27, 222–26, 241, 246–49, 255–58; 1909, 59, 68–69, 80, 96–97, 155–60, 158n1).

> structure of experience and the proper object of knowledge can be expressed with the simple scheme: $\mathbf{S_1} \rightarrow \mathbf{O} \rightarrow \mathbf{S_2}$. The situation $\mathbf{S_1}$ is problematic, and some operations **O** have to be performed in order to attain the situation $\mathbf{S_2}$. The latter situation is hidden at first, but not in principle. The object of knowledge is the relation between these situations, and this relation is mediated by controlled activity, certain operations. To know is to know what to do in the situations one encounters in the world. This object of knowledge is within our epistemic access, and there is no need to contrast it with something "more real" beyond the scope of our epistemic access.

Given that experience is organism–environment intra-action, and given that phenomenology is the science of experience *qua* experience, then it seems to follow that phenomenology studies *modes of organism–environment intra-action*. That counters accusations of "subjectivism."[23]

## 4. The Practice-Ladenness of Experience

In this section, I will apply my thesis of the epistemic primacy of practice to explain multistability.

According to the thesis of the theory-ladenness of observation, proponents of different theories see the "same" set of data differently.[24] The thesis is Kantian in spirit (see Kant [1781/7] 1956): cognition (theory) enters experience and at least partially constitutes it. In this section, I will generalize that into the thesis that *all experience is potentially practice-laden*. I have sketched this generalization already in Lindholm (2024, 57–58); I have adapted that presentation for the purposes of this article.

As I have explained, habits (practices) associate objects with their potential practical effects. When we encounter objects, our habits (practices) related to them remind us about what they can do, or what we can achieve by using them. Thus, as I have explained, our habits make the projection of ends-in-view (purposes) possible.

Purpose arises from habit (practice) and filters experience according to its relevance. The "same" object may be relevant to a different degree for different purposes. Therefore the "same" object may appear differently in different practices. Moreover, different habits (practices) with their different purposes maintain the unity and coherence of different situations. Thus, again, the "same" object may appear differently in different situations. In this sense, Dewey (1922, 32) understands habits as "refractive media." In short, *experience is, at least potentially, habit-laden (practice-laden)*. The practitioners of different practices, at least potentially, experience the "same" objects differently.

Dewey (1916a, 169; 1922, 69, 77; [1925] 1929a, 358) rejected the distinction between theory and practice. Theory is not distinct from, or opposed to, practice; on the contrary, theorizing is one of the scientific practices (Rouse 1996, 127; Barad

[23] See also Ihde ([1977] 2012, 10–13).

[24] For instance, if the data is the duck-rabbit (cf. Wittgenstein [1953] 2009, §§ 118–57, 201–17), some observers regard it as a duck, others as a rabbit.

1996, 166). Because experience is, at least potentially, practice-laden and because theorizing is one of the scientific practices, the thesis of the theory-ladenness of observation follows as a *possible* special case: *some* experiences, including observations, *can potentially* be theory-laden.

Habit (practice) is the vehicle of cognition, as I have explained. Because habit (practice) enters experience, at least potentially, cognition enters experience, at least potentially. That naturalizes the Kantian spirit that the thesis of the theory-ladenness of observation involves.

Different people engage in different practices. Therefore, they potentially experience the "same" objects differently. Even a single person can have different practices related to the "same" object. Therefore, even the "same" person can be able to experience the "same" object in different ways. That explains multistability.

## 5. Philosophical Anthropology

In this section, I will discuss human nature in general and argue that *technics are, at least potentially, constitutive of human nature*. That is the main thesis of this article. It is implicit in Ihde's instrumental phenomenology. I will make it explicit here.

Recall that both Peirce (CP 6.228) and Dewey (1922, 19, 24, 38, 40, 43, 121, 136) argued that *we are our habits (practices)*. Each habit (practice) is a mode of experience, or organism–environment intra-action. Habit (practice), organism–environment intra-action, and the situation in which it takes place are both "subjective" and "objective" simultaneously. In short, *our identities are not just "subjective" but they also display "objective" traits that result from the biological structure of our bodies and their intra-action with a relatively stable environment of which we are a part*.

I repeat that the world is experienced as *opportunities for action*. Because we are not immaterial Cartesian souls but a part of the world, that also applies to ourselves, our bodies, and therefore also to our identities: *we are what we do*.

By Peirce's *synechism*,[25] we are continuous with our environment, including other people. The medium between us and our environment, and between each other, is our habits (practices). Learning the customs of a person's social group is a significant part of the formation of their personality. When we relocate ourselves or make changes in our environment, that affects our identity to some degree, because different situations are compatible with a different set of habits (practices).

Now, technics are, at least potentially, constitutive of human nature in at least two senses. First, each habit (practice) is an active means. In this sense, technics *necessarily* affect our nature. Each time we learn a new skill, we also reconstruct ourselves to a degree. Second, instruments external to the body, or potential means, are also a *possible* part of the environment that we happen to inhabit. In this sense, technics *potentially* affect our nature. Our environment, possibly including technics, enters our very being. That implies that each time we learn to use an instrument, we also reconstruct ourselves to a degree.

[25] See note 16.

We are continuous with a particular environment to which we have adapted our habits (practices). By using instruments external to our bodies, or potential means, we can reconstruct our environment. On the one hand, that involves a change in our nature. On the other, we can reconstruct other environments so that they resemble our native environment to a greater degree: for instance, we can build space stations to inhabit space. That decreases the cultural shock we might otherwise experience when we move to different environments.

Once more, the world is experienced as *opportunities for action*. Now, the introduction of a technic changes the opportunities of action that the world supplies. Thus, technics enter the structure of our experience, at least potentially. That justifies the underlying idea of Marshall McLuhan's ([1962] 1967; [1964] 2003) media philosophy (though not necessarily its results).

Thus, technics can, at least potentially, become a part of ourselves. For the converse, there are no instruments that are not part of somebody. That follows from Dewey's (1922, 25–26) distinction between active and passive means: to qualify as a means, an instrument must be used in a practice.

Barad's (1996) notion of intra-action itself has anthropological consequences that challenge scientific realism. Her argument is based on the cooperation of agents and nature in the (re)production of phenomena. When we speak about nature, we are simultaneously speaking about who we are, at least implicitly. In what follows, I will explain why.

Barad argues that it is problematic to envisage a "reality" that is independent of our intra-actions with, and descriptions of, it. Barad (1996: 184) believes that "[t]he Enlightenment notion of science is premised on a separation between knowing subjects and observation-independent objects." That suggests that scientific realism is inherently Cartesian. The view from nowhere—or the God's Eye point of view (cf. Putnam 1981, 49), which Enlightenment objectivism requires from scientific knowledge—is pretentious and virtually impossible. It masks the agency of those who claim to have discovered universal laws; and it relegates all unmasked agency to nature itself, as if scientists were immaterial Cartesian souls spectating and registering the unfolding of the miracles of nature.[26] At the same time, ironically, nature is also seen as passive, ready to be bent to do our bidding.[27] In this picture, scientific knowledge would emerge automatically, without intervention, which is patently absurd.

Barad introduced "agential realism" based on an ontology that she derived from Niels Bohr's epistemological writings. Her purpose is *not,* however, to reconstruct Bohr's own view; she is simply using his writings to reconstruct a compatible ontology independently of whether he would have accepted it himself.

Barad argues that phenomena, in the (re)production of which agents participate with all their practical and conceptual skills, are constitutive of reality. That reality is not composed of things-in-themselves or things-behind-phenomena, but things-in-phenomena. Our participation *within* nature constitutes "agential reality."

[26] Dewey (1929b, 23, 196, 204, 211, 213, 245, 291) rejected "the spectator theory of knowledge." The very word θεωρία ("theory") literally stems from θεωρός ("spectator").

[27] Somewhat polemically, Barad (1996, 185) asks: "Why would we be interested in such a thing as an 'independent reality' anyway? We don't live in such a world."

Phenomena make up agential reality; scientific theories describe phenomena; therefore, scientific theories describe agential reality. Truth as correspondence obtains (or does not obtain) between theories and agential reality, not an observer-independent reality. Reality is constituted "by the between" of such distinctions. Agency cannot be designated as residing in agencies of observation or objects in isolation; both are implicated with all their mutual relations. In short, agency is located in phenomena.

The wholeness she requires from phenomena does not, however, signify the dissolution of boundaries. On the contrary, boundaries are necessary for making meanings, and there is no agential reality without constructed boundaries. According to Barad (1996, 182), "agential realism explicitly shows that boundaries are interested instances of power, specific constructions, with real material consequences." Yet boundaries are not fixed.

Reproducibility and communicability are criteria of objectivity. Reproducibility is not, however, possible because of our ability to measure observer-independent properties of an observer-independent reality, let alone a transcendent reality. It is possible because scientific investigations are embodied, grounded in experience, in praxis.

Barad makes a brief declaration of agential realism: (1) it grounds and situates knowledge claims in local experiences: objectivity is literally embodied; (2) it privileges neither the material nor the cultural: the apparatus of bodily production is material–cultural, and so is agential reality (cf. Haraway 1988, 595); (3) it entails the interrogation of boundaries and critical reflexivity; and (4) it underlines the necessity of an ethics of knowing.

Thus, according to Barad, phenomena are material–cultural be-in's [*sic*]: being material and being socially constructed do not exclude each other. Thus, Barad (1996, 183) concludes that "[a]gency is a matter of intra-acting, that is, agency is an enactment, it is not something someone has."[28] If she is correct, agential realism is a realism compatible with social constructivism.

## 6. Criticism

I have argued that our technics are, at least potentially, a part of our nature. Then, one is entitled to ask whether that applies to other species.[29] I reply that ants build anthills that are part of *their* nature, bees build beehives that are part of *their* nature; birds build nests that are part of *their* nature; beavers build dams that are part of *their* nature; and this holds analogously for any species that applies any kind of technics. I believe there is a continuum between nature and technics.[30] For instance,

[28] Rouse (2002, ch. 7) provides an account of how human embodiment has epistemic significance in the (re)production of phenomena.

[29] I thank Ave Mets (private communication) for asking this question.

[30] Aristotle (1929, 192b5–35, 193a25–193b10, 194a20–30, 199a5–20, 199a30–199b10, 199b25–35, 252a10–15; 1933, 1032a10–b5) argued that technics imitates and supplements nature by fulfilling ends that nature itself is unable to achieve. On the other hand, see also Aristotle (1929, 230a25–231a20, 254a1–15, 254b10–30, 255a20–30, 255b10–25; 1933, 1023b25–36).

some scholars argue that even plants communicate (e.g., Karban 2008; Heil and Karban 2010); and the media they use seem to qualify as technics of disseminating information.

I have suggested that the world, including the truth about the world, can change. That can be understood as a rehashing of Hume's ([1739–40] 1854a, bk. I, pt. III; [1748] 1854b, § 4) problem of induction. That seems to undermine the possibility of empirical knowledge. That, in turn, is a challenge to my empiricism. I reply that that might be a problem if knowledge is considered representationally. But I consider knowledge as a subspecies of belief, that is, habit. Peirce's belief–doubt model predicts that if the world changes, then a readaptation of our beliefs (habits) will take place, and we will simply learn new ways of accomplishing our ends-in-view—or revise our ends-in-view accordingly. Thus, the pragmatist solution to the problem of induction is very simple and straightforward.

Gale (2010, 62) contends that Dewey's notion of *experience* is difficult because it is simply a reformulation of Hegel's Absolute Mind. Because the notion is "mystical," he claims, nobody has understood it. I disagree. I do not know which of the words "organism," "environment," and "interaction" Gale considers "mystical" or "difficult," but at least to me they are perfectly conceivable in naturalist terms.

Noddings (2010, 277–78) argues that Dewey's notion of experience may be too narrow. She wants to take women's experiences into account. Thus, inquiry may commence not only when we stumble upon a problem; we can also proactively *look for* problems. Moreover, the agent of inquiry may be a group, and the consequences of inquiry for other groups must be taken into account. She is correct, but I believe that Peirce and Dewey can accommodate these improvements without too much trouble. The notion of organism–environment intra-action and the belief–doubt model of inquiry are by no means incompatible with them. It seems to me that the active search for problems, collective agency, and sensitivity to the interests of other groups can be simply added to Peirce's and Dewey's accounts and leave the rest intact. Alas, sometimes Peirce himself engaged in looking for problems (CP 5.394; EP 1, 128).

## 7. Conclusion

We are our habits (practices). Technics enter our habits (practices), at least potentially. I have argued that therefore technics enter human nature, at least potentially. That takes place in two ways. First, our personalities consist in our habits (practices), and each habit (practice) is a skill, or active means. Second, habits (practices) incorporate both the traits of persons and of their environment, and instruments external to the body, or passive means, are a possible part of the environment. I have also argued that experience is potentially habit-laden (practice-laden) and that, therefore, the "same" object can appear differently in different practices, even for the "same" person. I have argued that that explains Ihde's concept of *multistability*.

Given that experience is potentially practice-laden, and given that practices potentially incorporate technics, it seems that *technics potentially affect experience*.

That provides a justification for Don Ihde's instrumental phenomenology, and especially its theory of embodiment relations.

I believe this discussion also bears on transhumanism. If technics are already a potential part of being human, then it seems that the possible transition into transhumanism may not be very radical. Alas, humans have used prostheses for a long time, and they do not seem to involve a threat to humanity. It is not necessarily revolutionary if prostheses become digitized in the near future.

Barad's (1996) notion of *intra-action* can also be applied directly to Ihde's theory of human–technics interaction. Then it becomes *human–technics intra-action*. Barad's concept emphasizes that the human and the technic are mutually responsible for the identity and determinacy of each other. Ihde (2009, 23) himself seems to agree: he grants that both in pragmatism and in phenomenology, one can discern what could be called an *interrelational ontology*. The agent is ontologically related to an environment, but the interrelation is such that both are transformed within this relationality. Ihde also suggests that technology could *mediate* consciousness.

A natural direction for further inquiry is to apply this general notion of technics influencing our identity and character to particular technics. It might be philosophically interesting how the use of the phonetic alphabet, the printing press, or the internet influence human practices and thought. A natural sequel to such an inquiry is a comparison of the results with Marshall McLuhan's ([1962] 1967; [1964] 2003) media philosophy.

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