

On the Definition of Learning

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Realism and learning

Oliver Kauffmann

Introduction

In this chapter, I argue for a realistic conception of learning. Basically, this means a defense of two assumptions: (i) that, to a large extent, learning from an epistemological point of view involves asymmetrical processes of knowledge- and skill-acquisition; (ii) that acquired knowledge and skills cannot be understood without reference to a mind-independent world to which the subject has cognitive access. In addition, I also defend an ontological claim (iii) about an irreducible bifurcation between mind and world.

Would anyone object to the foregoing claims? Although (i) and (ii) in particular are probably very much in line with common sense, the three assumptions are certainly not commonly accepted in academia, at least not among learning and didactics researchers in the humanities and social sciences in the English-speaking world. Also, the falsehood of (ii) may appear to follow from the truth of (iii), illuminating a blatant inconsistency on my part. Anyway, a realistic conception of learning along the lines sketched is certainly up against the strong dominance of various constructivist positions in the domains mentioned, and in particular, in the field of teacher education.

Let me begin with a few introductory remarks to help the reader understand the background and motivation for writing this chapter. The driving force behind my work with the constructivism-realism issue in the field of learning is an amalgam of two factors: First and foremost, it grows out of the recognition of what I see as inherent epistemological problems with specific versions of constructivism – which is the *raison d'être* for writing this piece. Secondly, I must admit to a certain feeling of discomfort with the widespread “I am a constructivist,” academic lip service witnessed in educational circles (cf. e.g. Phillips 1995), and also recognized by constructivists themselves (e.g. Bauersfeld 1995, p. 137). Denis C. Phillips has described this “descent into sectarianism” as the ugly side of constructivism (Phillips 1995, p. 5). Some constructivists very likely believe that critical discussions of the epistemological

foundations of constructivism “are over and done with many years ago,” and/or that the rise of constructivism in the 1980s really meant the appearance of a new paradigm (cf. e.g. (Fosnot & Perry 2005, p. 34; Glasersfeld & Varela 1987, p. 29) – a new paradigm that should simply be recognized as the leading game in town.¹

What *is* constructivism, then? And, how are my arguments “constructed,” and how is the chapter organized?

Constructivisms

“Constructivism” refers to a plethora of different positions and ideas in the human and social sciences, and constructivist approaches to the specific *analysandum*, “learning,” is likewise a rag rug of different theories. Still, certain basic, common threads may be identified. Thus, according to constructivist learning theory, learning, very briefly put, is conceived as changes in cognizing systems by the building up of viable, adaptive, meaningful structures in those systems and/or their social relations, in contrast to a gradual discovery and apprehension of mind-independent facts. To put it differently, there is a conceptual distinction between “learning as active construction,” and “discovery learning,” as it has been termed by constructivists themselves (cf. e.g. Wood, Cobb & Yackel 1995). Also, it should be noted that although constructivist theories of learning in general are distinguished from constructivist descriptions of teaching (e.g. Fosnot & Perry 2005, p. 33; Larochelle & Bednarz 1998), many researchers see an intimate relation between these areas:

Constructivism is a theory of learning that rejects the idea that it is possible to transfer the content of teaching to pupils. (Rasmussen 1998, p. 554)

Although Rasmussen pushes the envelope by characterizing the constructivist position of learning in terms of a problem with teaching, the important point is that constructivist theories of learning and teaching converge on the denial of knowledge transfer. Learning is not a question of the transference of knowledge, and teaching is not a question of mediating processes of such transferences.

Considered strictly as a theory about learning and knowledge, which is my focus, the following quote from Catherine Fosnot’s preface to her reader (Fosnot 2005) is revealing:

Constructivism is a theory about knowledge and learning; it describes both what “knowing” is and how one “comes to know.” Based on work in psychology, philosophy, science, and biology, the theory describes knowledge not as truths to be transmitted or discovered, but as emergent, developmental, nonobjective, viable constructed explanations by humans engaged in meaning-making in cultural and social communities of discourse. (Fosnot 2005, p. ix)

Positions such as Ernst von Glasersfeld’s “radical constructivism” and Niklas Luhmann’s “operative constructivism” fit in here. But research approaches to education that emphasize the situatedness of activity along cultural and social dimensions are also within Fosnot’s scope. Contributions such as Brown et al. (1989) and Greeno’s (1991) are classic examples (see also Cobb, 2005 for an overview). And, to the extent that these kinds of research emphasize a non-individualistic approach to learning, and typically exhibit no particular interest in (positioning themselves against) the epistemological mind-world-divide debate, they differ from the von Glasersfeld- and Luhmann-inspired research. Still, this (socially oriented) “second kind of constructivism” needs to be carefully dealt with, as it sometimes runs the risk of neglecting – or even eliminating – the mind,² whereas the (individualistically oriented) “first kind of constructivism” runs “the opposite risk”: a neglect of the mind-independent world. Only instances of such a potentially “world-neglecting” kind of constructivism are in the focus of this chapter. The issue of “constructivism of the second kind” will not be dealt with here.

With respect to “the first kind of constructivism,” von Glasersfeld has played a particularly prominent role, and perhaps he was the one who really defined the theoretical groundwork for other constructivists (cf. Meyer 2009, p. 332). With respect to Luhmann, his constructivist thoughts have indeed had some impact outside of Germany, in particular, in Denmark and Norway. However, compared to von Glasersfeld’s so-called “radical constructivism,” Luhmann’s influence on learning, and, more broadly, the educational field, including teaching and teacher education, is minor. Therefore, I primarily take advantage of Von Glasersfeld’s approach in what follows, and leave my specific criticism of the epistemological underpinnings of the Luhmannian system’s approach and its application to the learning field to more local arenas.

In the next section, I target von Glasersfeld's constructivism (von Glasersfeld 1995b; von Glaserfeld 2007). Firstly, I advance a concern with respect to the epistemological underpinnings of the theory, in particular, what I interpret as a premise about the existence of a basic, sensory *stratum* from which each of us constructs our conception of reality. This assumption plays a crucial, epistemic role in von Glasersfeld's theory of learning. At least one understanding of this assumption gives rise to well-known problems with how a cognizing subject constructs knowledge of a world from simple, conscious sensations. Secondly, I problematize the suggestion often advanced by von Glasersfeld, that realism is basically a matter of a specific *prejudice* – the prejudice according to which an organism perceives an experience-independent reality. Finally, in this section, I point out that the mind and its properties appear very different compared to the physical properties of the world. Despite immense efforts, so far we haven't solved this so called "explanatory gap." Apparently we are confronted with an ontological divide here, which learning theorists of a constructivist persuasion sometimes overlook.

In the next section, I turn to the positive task of delivering an elaboration of the two basic elements of a realistic conception of learning (i-ii), mentioned above. In the fifth and final part of my presentation, I give an argument for realism from the perspective of "implicit learning." In the context of the agenda of this chapter, what implicit learning demonstrates is that learning takes place passively, "under the radar of constructivism." Thus, at the level of brute neurophysiological processes, constraints with respect to mental processes at a higher ontological level are to be found. And some of these constraints are discovered by the demonstration of various forms of implicit learning. The final section sums up.

Constructivism with respect to the world

I think that there are strong reasons that von Glasersfeld's radical constructivism must go. I would also like to add, *en passage*, that my criticism of von Glasersfeld's position does no harm to the epistemology of Piaget, von Glasersfeld's important source of inspiration. In contrast to von Glaserfeld's outlook, my belief is that their epistemological underpinnings are very different from each other. Or, to put it differently:

(also) considered as an interpretation of Piaget's epistemological work, von Glasersfeld's position is false.³

What is von Glasersfeld's position, then – and why, precisely, is it probably flawed?

Here are the central tenets of von Glasersfeld's radical constructivism (cf. von Glasersfeld 1976; von Glasersfeld 1982; von Glasersfeld 1995b; von Glasersfeld 2007): (i) cognitive states do not represent an experience-independent reality; (ii) knowledge of reality is a construction, in the sense that the human individual constructs its own conception of reality, and (iii) therefore, there is no basis for talking about an experience-independent reality. Von Glasersfeld believes that this is relatively close to what Piaget (really) meant. I do not. But forget about the complicated, interpretative questions about "the real Piaget." With respect to radical constructivism *an sich*, the problem is that its epistemological foundations are not obviously true. On the contrary, the very idea that subjects fundamentally construct their own worlds has been heavily criticized in epistemology and psychology for almost a century now, including by Piaget himself, and I shall come to this issue shortly.

Let me charitably put forth a fuller picture of von Glasersfeld's epistemology, which hinges on a number of Piagetian – or "Piagetian" – assumptions.

According to von Glasersfeld, Piaget's thinking radically rejects the classical epistemological tradition's understanding of central concepts such as "reality," "truth," and "knowledge," and the conception of how we acquire knowledge (von Glasersfeld 1995b, p. 54; von Glasersfeld 2007, p. 91). The essence is that each of us constructs a conception of reality, but has no reason whatsoever for believing that we are in the possession of knowledge of an experience-independent reality. But how does this come about? The fundamental premises for the above-mentioned tenets of radical constructivism are explicitly formulated in the following way by von Glasersfeld:

1. Knowledge is not passively received either through the senses or by way of communication; knowledge is actively built up by the cognizing subject.
2. The function of cognition is adaptive, in the biological sense of the term, tending towards fit or viability; cognition serves the subject's organization of the experiential world, not the discovery of an objective ontological reality. (von Glasersfeld 1995b, p. 51)

In fairness to von Glasersfeld, it should be noted that he also delivers an argument for his position independent of his Piaget exegesis, by building on a semantic premise about the fundamental impossibility of intersubjective understanding through language. I take the liberty of ignoring this parallel line of argument, since the inspiration from (his reading of) Piaget is the essential one.

From the quote above, it is clear that biological inspiration is crucial to the radical constructivism von Glasersfeld endorses: The basic idea is about organisms adapting to their surroundings, but transformed into a question about human beings' *mental* adaptation. In itself, this thought is not controversial; it is a central tenet of Piaget's thinking. Assimilation and accommodation are adaptive functions of learning. However, the controversial issue appears, when von Glasersfeld argues that assimilation has two very different meanings, one of which is not noted in the standard reception of Piaget. Thus, as pointed out by von Glasersfeld, "assimilation" may also mean adaptation in the sense that human beings do not have knowledge of an experience-independent reality, but *construct* knowledge, in the sense that experiences are attuned, in relation to existing expectations. Also, the concept of "knowledge" is replaced with the concept of "viability," a concept to which I return in the next section.

From von Glasersfeld's perspective, the focus is not the external mind-world relation, but on the internal mind-mind relation, one might say. An organism, for example, a child, is, in a cognitive sense, confirmed in what it already understands *via* its contact with its surroundings. According to von Glasersfeld, this is something very different from the tradition's understanding of assimilation, which, in accordance with a dominant biological use, means transfer of, and absorption of (physical), material from the external world. In an analogous way, it is used in learning theory to describe cognitive transfer of information about the external world, justifying the assumption that the child will gradually acquire a more adequate understanding of reality.

Von Glasersfeld admits that this orthodox reading of "assimilation" may be found in Piaget's writings. Here is an example:

One can say [...] that all needs tend first of all to incorporate things and people into the subject's own activity, that is, to "assimilate" the external world into the structures that have already been constructed, and secondly to readjust these structures as a function of subtle transformations, that is,

to “accommodate” them to external objects. From this point of view, all mental life, as indeed all organic life, tends progressively to assimilate the surrounding environment. (Piaget 1967, p. 7-8)

However, he points out that Piaget also writes about assimilation in a more radical, bio-cybernetic sense, which has nothing to do with the organism’s (*in casu*, the child’s) access to reality through the construction of a gradually more adequate model of reality, but instead is to be understood as a construction of a model of reality, in the sense of *an internal organization of its experience*:

In my interpretation, assimilation must instead be understood as treating new material *as an instance of something known*. (von Glasersfeld 1995b, p. 62)

It is this difference between two understandings of assimilation that gives rise to the difference between “radical constructivism” and “trivial constructivism.” The latter may be briefly described as the position that the child gradually constructs cognitive resources (schemata, concepts, models) that enable it to cope with a mind-independent reality through adequate representations.

How should we evaluate von Glasersfeld’s position? According to himself, the sole reason people might find his position strange, when compared to “trivial constructivism,” is that we rely on *a realist prejudice*, according to which an organism perceives an experience-independent reality. Instead, we should see perception as a continuing “equilibration,” relative to the given experiences.

Von Glasersfeld is not right, however, about one’s feeling of discomfort with his position, that it comes from a mere realist *prejudice*. One problematic issue stems from what follows from his own position: how – from his premises – is an organism really able to learn anything beyond its own constructed “world”? If not, one may, *via modus tollens*, argue that his position is logically falsified, from the obvious fact that we do learn about the world. The argument would run like this: if the consequent, Q (Q = nothing about a mind-independent world can be learned) of von Glasersfeld’s position (G) may be falsified ($\neg Q$, that is, it is *not* true, that nothing can be learned about a mind-independent world), it follows logically that G is false – Glasersfeld’s position is untenable. But this would be a mistaken reasoning. Von Glasersfeld

would not admit that Q could be falsified, because he would (rightly) point out that Q (and not $\neg Q$) follows directly from G . So the strategy against von Glasersfeld – if one feels uncomfortable with Q – is to look into the premises of G itself. To put it slightly differently, and stronger: whether or not one would endorse the claim that we actually learn something about a mind-independent world ($\neg Q \vee Q$), one should deal with his premises for G . This neatly shows the interrelation between epistemology and learning theory: in order to address and evaluate basic questions about learning, one will sometimes have to deal with the epistemological underpinnings of the concept in question. If (and only if) these underpinnings may be demonstrated to be problematic, one would be able to deal with the question of whether learning is really about a mind-independent world, *without begging the question* against G (von Glasersfeld).

We might then, for the sake of argument, admit, that “a feeling of uncomfortableness with his position stems from a mere realist prejudice,” and see whether the premises of G themselves are problematic. And I believe that they are – or at least, might be.

Take a look at this neat summary of the epistemological underpinnings of von Glasersfeld’s position, by Denis C. Phillips and Jonas F. Soltis:

In brief, von Glasersfeld argues that the individual learner is *not* the recipient of knowledge that is pressed onto his or her consciousness by some “external reality.” In this regard he differs markedly from Locke and also from Plato. But, similarly to Locke, he seems to hold the view that each individual is only in “contact” with the impressions (or stimuli or experiences) that are received via the sense organs. Thus the task for the learner is to construct a body of knowledge on the basis of these sense impressions [...]. (Phillips & Soltis 2009, p. 50)

The problem with the two central epistemological premises – that each individual is only in “contact” with the impressions (or stimuli or experiences) received via the sense organs, from which the learner’s task is to construct a body of knowledge on the basis of these sense impressions – is that they may give a distorted picture of what it is to experience the world. The idea of a clear divide between conceptualization and the “sensory given” has, for more than a century, been under attack from very different quarters, for example, gestalt psychology,

analytical epistemology, phenomenology, and pragmatism, not to mention from the (late) Wittgensteinian approach (e.g. Wittgenstein 1953). In addition, to the extent that von Glasersfeld believes himself to build on Piaget's thinking, it is striking that he never considers that Piaget, too, criticizes the empiricist idea of "something given to the senses." More specifically, Piaget identifies the demonstration of the gestalt character of perceptual experiences delivered by the so-called "gestalt psychologists" as a premise in the argument against Ernst Mach's phenomenalism (cf. e.g. Piaget 1972b, p. 45-48). Furthermore, via his conception of equilibrium, Piaget explicitly develops Wolfgang Kohler's and Max Wertheimer's gestalt psychological considerations of the structuring of sensory experiences (see Piaget 1973, p. 125-141).

I will be a bit more specific about what is – or may – be wrong with the idea that each individual is only "in contact" with the stimuli (or experiences) received via the sense organs, apparently endorsed by von Glasersfeld.

Considered from an experiential point of view, it may be simply pointed out that "the sensory given" does not exist. What do I mean by this? I mean that this idea does not fit "the phenomenal structure" of our sensory experiences. By "phenomenal structure," I refer to what may be objectively known about the formal conditions for having sensory experiences of the world, as uncovered by adopting a descriptive, first person stance. This peculiar perspective has been particularly highlighted and applied by the phenomenological tradition along multifarious dimensions, a tradition initiated by Edmund Husserl's explorations.⁴ For example, Husserl (1913) presents an early, classic catalogue of examples and results. A central phenomenological distinction that may figure as a general example is *the division between "immanence" and "transcendence"*: To have sensory experiences of physical objects means, among other things, to experience a world of intentional objects, the properties of which are never fully uncovered for the observer, that is, by "presenting" all sides at once. Nevertheless, concrete objects are present to us as fully individuated objects; we anticipate the not yet presented sides of objects, an anticipation exhibited most clearly in the mature organism's mastery of sensory-motor interactions with familiar, concrete objects. This peculiar epistemological feature – that concrete objects *present* themselves as concrete, in conjunction with the fact that, at the same time, they *escape full, simultaneous appearance*, is

what phenomenologists call “transcendence.” “Immanence,” on the other hand, denotes the idea of the subject’s fully epistemic mastery of its objects, owing to the transparency of its intentional objects, a feature typically ascribed to (some or all the properties of) the mind (cf. e.g. Husserl 1913, § 38).

In order to evaluate whether the phenomenologically-based criticism of the idea that each individual is only in contact with the impressions (or stimuli or experiences) received via the sense organs, is correct, it would have been useful if von Glasersfeld engaged in the discussion of the phenomenological approach to the questions of transcendence and immanence, which he does not. He probably considers the phenomenological tradition an inherent part of the Western history of philosophy, a long tradition he is clearly against through and through (cf. e.g. von Glasersfeld 1995b, p. 24-52; von Glasersfeld & Varela 1987). Whereas phenomenologists believe that we are directly presented with, and live in a common world, according to von Glasersfeld, we are, on the contrary, in a fundamental, epistemic sense, closed off from an external world:

Our “knowledge,” whatever rational meaning give to that term, must begin with experience – such as, for instance, the cut we make between the part of our experience that we come to call “ourselves” and all the rest of our experience, which we then call our “world.” Hence, this world of ours, no matter how we structure it, no matter how well we manage to keep it stable with permanent objects and recurrent interactions, is by definition the “subjective” world of our experience and not the ontological reality of which philosophers have dreamed. (von Glasersfeld & Varela 1987, p. 6-7)

The problem here becomes how to manage to build up our “knowledge” of our individual, subjective “worlds,” if the material merely consists of simple sense impressions, which do not have any inherent phenomenal structure whatsoever. One might retort that this is not what von Glasersfeld means. But this is what he writes. Consider this:

Any specification or description of the constraints, therefore, must be formulated in terms of the availability of single, as yet uncoordinated signals (i.e., particles of experience) and of the regularities or interdependence of these signals which the knowing organism, as a result of his own cognizing

activity, singles out from his initially undifferentiated continuous stream of experience. (von Glasersfeld 2007, p. 80)

In other words, according to von Glasersfeld, an organism must rely on “signals” it receives from an undifferentiated stream of consciousness. This is really a sort of empiricism, where the data, as well as the “world” the individual constructs of them, are internal, in relation to the organism’s cognitive system: “all invariances and regularities are our construction” (von Glaserfeld & Varela 1987, p. 7). However, this leads to solipsism, which von Glasersfeld denies, saying that it is precisely the philosophical tradition that wants us to accept that we really already *do* have this knowledge of an external world (ibid.; cmp. also with von Glasersfeld 1995a, p. 7). However, this is not an argument, but it certainly is an interesting response, because it flies in the face of common sense, and although much of science has common-sense phenomena as its *explananda*, the *explanans* need not be, and very often are not. Still, even if we admit that a counterintuitive position such as solipsism may be correct, this claim amounts to nothing more than the proposition being metaphysically and logically possible. And it does not remedy the fact that the epistemological premises of von Glasersfeld’s position appear problematic to the extent that the phenomenal structure of sense impressions as possible paths to knowledge of an external world is ignored (or ruled out by *fiat*).

Let me point out another problem with von Glasersfeld’s position. One might say that the burden of proof lies with the one who obviously goes against a generally accepted, justified claim. And *realism* – not constructivism – is that generally accepted, and by default, justified, claim. From a didactic perspective, constructivist-oriented science teachers often find it very difficult indeed to get their students to “play around” with their realist scientific prejudices, and adopt a reflective stance from which this view has merely relative value, that is, to give up the claim’s default epistemic status (cf. Duit 1995, p. 279-280; Mitchell & Baird 1986).

From conversational conventions, one would have to take the burden of proof seriously, and answer the question of why solipsism or weaker versions of constructivism are true, instead of realists being obliged to lift the burden of proof with respect to the correctness of realism. I hasten to add that this is not to say that the default claim

is true, of course. But a consideration of conversational implicature makes it a reasonable claim that the burden of proof lies with those who believe this claim to be false. This is important, to the extent that some proponents of realism are themselves on the edge of begging the question against constructivists by relying on the truthfulness of this realist background assumption (e.g. Fox 2001, p. 26-27; Searle 1995).

Consider this analogy: A person who asks, “How do you know that there are not 489 invisible angels in this room?” might be answered in the following way: “Well, first give me a reason for believing that there are 489 (and not 0, 5679, or 21...) angels in the room.” This response expresses a reasonable expectation with respect to getting the other party to qualify what justifies *his* belief. In an analogous way, Glasersfeld’s argument simply doesn’t get started by disputing realism *as a mere prejudice*. It is much more than that: *It is our default epistemological perspective on a world as being there, waiting to be explored*. Husserl’s conception of “the natural attitude” captures this idea.

Finally, it should be mentioned that von Glasersfeld apparently limits the set of data from which an organism “constructs its own worlds” to *consciously presented data* – to conscious experiences. Thus, he seems to overlook the information an organism receives below the conscious threshold, or at least such information does not seem to play any role in his theory.⁵ This is strange, to the extent that the child’s dynamic sensory-motor interaction with its environment, which plays a central role in “its construction of reality,” is orthogonal to the conscious/unconscious divide, from Piaget’s perspective.⁶ As other critics have pointed out (e.g. Martínez-Delgado 2002, p. 843), von Glasersfeld, to the extent that he sometimes *does* mention “an environment,” takes advantage of this notion as placeholder for mind-*independent* objects. In other words, there appears to be an implicit realist element in the theory, which is not consistent with the intended constructivism. The following quote illustrates this implicit realist element:

[...] in Piaget’s constructivist theory [...] the actions take place in an environment and are grounded in and directed at objects that constitute the organism’s experiential world, not things in themselves that have an independent existence [...]. (von Glasersfeld 2005, p. 4)

Hence, on top of the theory-inherent problem with the epistemological premises raised above, other lacunas might be found in radical constructivism. Surely, it is radical – but it apparently harbors inconsistencies and problems that make it difficult to get away from a realist grounding and turned into constructivism *proper*.

Realism with respect to the world (and the mind)

What is meant by “realism,” in the context of learning? “Realism” means (i) that, to a large extent, learning involves asymmetrical processes of knowledge- and skill-acquisition, and (ii) that acquired knowledge and skills cannot be understood without reference to a mind-independent world to which the subject has cognitive access. In addition, I also advance an ontological claim (iii) about an irreducible bifurcation of mind and world. I will now add some details to these points.

Learning (at any level, and in any form and aspect) is a relational phenomenon, like thinking, desiring, and perceiving. This means that there are (at least) two *relata*: a subject, and specific content, skills, expertise, and so forth, to be learned. A learning subject is a subject who acquires beliefs or knowledge that x, skills with respect to y, competence to z, and so on. Whatever it takes to learn, if learning does not result in a change with respect to the subject, as a result of the learning process, we would not say, at the end of the day, that learning took place. Although I believe there are good (and well known) reasons for not saying that learning takes place on the part of subjects, still, subjects learn, just as subjects perceive, think, desire, and act. Subjects as *loci* for learning that does not imply that learning *itself* is a feature (property) of subjects, just as little as “dancing” would be. Remember: Learning is a relational phenomenon. But, to the extent that over time (perhaps a whole life) a subject has learned, it follows that certain characteristics of that subject have changed; maybe the specific content, “the world,” the organizations, facilitators, and so on, that are involved, have changed, too. But necessarily, the subject has undergone some change as a result of the learning process, such as “transformation of life,” acquiring the mastery of a technique, skill, rule, and so forth. Among other things, learning results in the transformation of a subject. Again: this is not to exclude the occurrence of other transformations, as well. Learning as a transformational process is different from the

conditions making this transformation possible. Thus, in principle, the transformation may be studied apart from these conditions.

A human subject can be understood as an embodied entity with certain mental features, (normally) part of, and engaged in a societal context. And, to the extent that mental and bodily features are influenced by the subject's learning process, the mind and the body are fields of potential interest for those studying learning. Remember: If you accept that there is a change in the subject over time due to learning, this change necessarily involves physical features (physical dispositions, neural firing-patterns, etc.) and/or mental features (life attitude, acquiring knowledge in various forms, schematas, etc.) Also, to the extent that mental features supervene upon physical features (a widely accepted, although fundamentally ontological assumption, which itself is not fully understood), the body must be of a peculiar interest to those studying learning. Again, this does not deny that there is a social level of learning (which has received much attention in learning theory), where societal features are in particular focus, in contrast to "subjective features." Still, learning necessarily involves embodied subjects. A learning society, *S*, which learns something, but where its members *s*₁, *s*₂, *s*₃...*s*_{*n*} do not learn anything, does not make sense. Whether or not societies and organizations may *also* be properly said to learn, *per se*, is another question, irrelevant here. In addition, this is not to deny that societal features are emergent, and as such have a specific ontological feature (cf. Durkheim, etc.). These features are studied in the social sciences, and a subset of these plays roles in the subject's learning, as studied in sociology and anthropology of education.

Theorists of learning must, for the above-mentioned reasons, acknowledge the creature (the embodied subject with certain mental features entangled in a society) as having a special status, *qua* the one who learns (whatever is learned, and whichever way learning takes place). Therefore, what is going on *in*, *at*, and *with* the subject's mind and body is of peculiar interest for understanding learning. Furthermore – by accepting the metaphysical supervenience claim above – what is going on *in*, *at*, and *with* the subject's *body* is essential to understand learning. Hence, even if learning itself is not a property of a subject, what is going on *in*, *at*, and *with* the subject is of special interest for a learning theory.

Learning has mind-to-world “direction of fit” (Anscombe 1957; Searle 1979), in the sense that the subject’s take on the world is changed as a result of the learning process, in ways that give the subject an enhanced understanding of, mastery of, and ability to cope with her life, body, and/or features of the world. This is an asymmetrical relation, to the extent that changes in or with *the subject* (or set of subjects) primarily are what makes the proposition “learning is taking place” become true – and not changes in *the world*. Here, learning is like perceiving, but unlike desiring (and its derivatives). When I want you to pass the salt, I have an interest in the world’s change to the effect that I get x. The world (*in casu* you) is to change, not I, in order to satisfy my desire for salt. But in learning, as in perceiving, I am (ultimately) the one who is to change, for learning and perceiving taking place and not (only) the world.

Learning has mind-to-world direction of fit, since there are worldly features that cannot be *contingently* dealt with through learning. These features are uncovered in various ways by the environment’s giving us feedback. This is the fact regarding feedback that is often forgotten by constructivists, or that figures as a more or less implicit (but underdetermined) realist component of their theory. This was already mentioned at the end of section 3 (also see Fox 2001, p. 27-29; Martínez-Delgado 2002, p. 843-846). It is certainly true that learning sometimes (perhaps often) involves the active engagement of, movement of, and acting out by the subject, as pointed out by so many researchers of learning, since the days of Dewey. But the world “strikes back”: there are constraints in the world that shape my learning (about the world) by setting limits to my physical “engagement” with and within this world. These features are features of a mind-independent world, and include the mental worlds of other minds, reacted upon by proxy through their bodies and language.

The existence of objective features is not only implicit in von Glasersfeld’s account; but the choice of the concept of “viability” as a replacement for the concept of knowledge (with its implications of truth) has the effect of blurring this fact (see e.g. von Glasersfeld 1980, p. 970-974; von Glasersfeld 1982, p. 614 *et passim*; von Glasersfeld 1995b: 14; 68-69; see also Martínez-Delgado 2002, p. 843f on this point). The role of mind-independent features as truth makers is downplayed, or simply neglected.

Our world, with its individual worlds of other minds included – through our engagement with it and in it – has an impact to our minds and bodies. And learning is the specific set of processes through which subjects become more able to cope with their worlds, which, to a large extent is *the world, our world*. Not a world that is mind-independent in the Kantian, *an sich* sense, but in the sense that the experienced features of *this world* are different from – implying that they may be distinguished from – the mind itself and its features. The Husserlian distinction between transcendence and immanence in experience, mentioned above, is just one exemplification of this realist, epistemic outlook. These distinctions are not arbitrary, varying from subject to subject; they direct our attention to invariant features of perception, thinking, and learning, which help us to acknowledge the central bifurcation of mind and world, a bifurcation that does not exclude that it is possible to epistemically transcend the ontological divide between mind and world, *by learning about this world*.

The foregoing does not deny that there exist significant, culturally-based differences with respect to what is learned, dependent as it is on societal, cultural, and other features. Also, there is perhaps no limit to fantasy, story-telling, and similar kinds of discursive acts in which we talk about our worlds and ourselves. But there are still limits to forms and the content of learning, because learning is not like freely confabulating, dreaming, or otherwise making up stories. Learning is part of our culture, sure. But it also part of our nature, as much as perceiving and thinking are.

There are normative constraints on thinking (Aristotle gave us insight to this with his elementary logic). There are structural and content constraints on perception. And similarly, there are natural constraints on the processes of learning. These limits are invariants of the world in which we live and of the mind that makes us experience this world. That there is no natural *vehicle* for learning (in contrast with the case of perception) makes it seem much easier and justifiable to either study learning completely apart from the mind, that is, from a social perspective, or by moving in the opposite direction, into the subject, conceiving learning as a mere construction of the individual mind. And both these moves, downplaying the mind and the world respectively as they do, are not ontologically coherent to the extent they ultimately do not acknowledge a difference between mind and world:

an epistemological difference, and an ontological one. Compressed into one sentence, the ontological difference is that the mind and its properties, for all we know, appear different from the (physical) world. But whereas the ontological difference exemplifies an “explanatory gap” (cf. e.g. Chalmers 1995), the epistemological difference describes a condition and a possibility: that the mind (somehow supervening upon the body) *is able to learn about our world*.

Implicit learning – below the radar of constructivism

There is a domain of research in learning, where constructivism has no foothold at all. This is the field of implicit learning. In this last part of my chapter I briefly launch a criticism against constructivism along a different path, which in a peculiar way is complimentary to the criticism raised above.

I believe that the existence of implicit learning demonstrates that there are facets of learning that go against the assumptions about how learning subjects construct their realities, or how cognitive systems observe by making differences, to paraphrase what learning is about from constructivist points of view. I also believe that this criticism has the potential to target constructivism more broadly; that is, widening the scope, compared to the narrow focus of a von Glasersfeld type of position. The premises of my critique also add some flesh and bone to the somewhat formal outline of the realist picture of learning I sketched above.

Why is implicit learning a problem for constructivism? Let me briefly outline the implicit-explicit learning distinction, before I address this question.

“Implicit learning” is defined as an organism’s capacity for unintended learning, without being conscious of what is learned or how it is learned. Explicit learning takes place when an organism consciously learns. A related assumption is that a precondition for an organism’s capacity to articulate what has been learned is that it is (or was) conscious of it. It was Polanyi’s conception of “tacit knowing” that influenced the early studies of “implicit learning” (Reber 1967; Reber 1993b; Reber, Allen & Reber 1999), and through the development of this research field, grounded by Reber’s early studies, the distinction between implicit and explicit learning has

gained strong empirical support (Reber 1993a; Berry & Dienes 1993; Goschke 1997; Stadler & Frensch 1998; Cleeremans et al. 1998; Frensch & Cleeremans 2002; Seger et al. 2000), although a number of methodological problems have also been identified (see e.g. Shanks & St. John, 1994; Gaillard et al. 2006), which still perplex the research field (Nakamura 2013).

Within cognitive neuropsychology, for almost half a century, a similar distinction between “implicit” and “explicit” abilities has played a pivotal role in the understanding of cognitive and emotive capacities, and their neural underpinnings (see e.g. Weiskrantz 1997; de Gelder et al. 2001). For example, people with prosopagnosia, that is, the inability to consciously recognize persons by their faces, despite otherwise normal perceptual capacities, may be demonstrated to have retained implicit knowledge with respect to faces. Thus, a significant positive galvanic skin response was measured when pictures of known faces were presented together with the matching name, in contrast with a non-matching name (Bauer 1984). Another much studied neurocognitive syndrome is blindsight, a visual syndrome where, owing to damage to their primary visual cortex, the patients have acquired blindness in the corresponding part of the visual field. Despite this damage, it may be experimentally shown that they retain certain perceptual and visuomotor abilities. Thus, by applying forced choice methods, these patients demonstrate the abilities to detect and discriminate among perceptual properties of a stimulus in their visual field, such as location, spatial orientation, form, direction of movement, and even color, despite the fact that they report no conscious experience of the presented stimuli (cf. e.g. Cowey 2010).

With respect to constructivism, implicit learning is problematic for a number of reasons. Firstly, in contrast to the idea of learning conceived as *active* construction, processes of implicit learning are *passive*. By “passive,” I mean without reach of knowledge and the control of the conscious subject. We react to our environment, to meeting other people, to minute changes in the surfaces with which we are in contact, by standing, running, sitting on chairs; we react to subtle and not-so-subtle changes in pitch, light intensity, saturation of colors, minute changes of facial expression, humidity, temperature, and a world of other properties with which we are confronted. We react to things done *to* us and *with* us; we are immersed in an environment

with all sorts of simple, complicated and complex, concrete, abstract, physical, mental, and social things, processes, and events. We exhibit instinctive, adaptive, conditioned, and habituated responses, which in the heyday of behaviorism were considered core examples of learning behavior. Behaviorism had its problems, but no one would deny that the underlying mechanisms may be implemented, and that the behavioral response patterns may be elicited, whereas the idea that behaviorism lends us the full picture of learning is certainly wrong. The point is that we exhibit a vast number of reactions to our environment, without intention to (re)act, or without having knowledge-in-action of these reaction patterns. Thus, implicit learning goes against a conception of learning as an active, deliberate “process of construction,” with the conscious subject in command.

Secondly, a central part of the foregoing picture is that we are not *conscious* of these reactions to our environment. Constructivism clearly builds on an active, personal component in the subject’s construction of “its world,” but we are not always conscious of our constructions, and sometimes rely on processes that are completely non-mental, to the extent that they are not cognitively penetrable by consciousness at all, and their content – although paraphrasable in language in an elliptical way – is not itself semantically structured, for example, David Milner and Melvyn Goodale’s highly influential work on the ventral-dorsal bifurcation of information processing in primates’ visual systems (Milner & Goodale 1995; Milner & Goodale 2008).

Thirdly, implicit processes exemplify cognitive features that are *primary*, from an evolutionary point of view, compared to explicit, conscious, and semantically structured mental states (see in particular Reber 1992 and Reber & Allen 2000). Hence, to the extent that the processes exemplify that organisms rely on *reliable*, implicit, cognitive reactions to the environment, these features cannot be ignored, when compared to conscious, language-driven “constructions.” Humans and other mammals share the cognitive abilities to react and respond to the physical world. And, from an evolutionary point of view, it would be strange, if our consciously accessible cognition of “a world” were connected to our implicit cognition in no important way. Quite the contrary, we do have reason to think that the conscious mind and the unconscious mind are not epistemically quite separate, and that, from an ontological point of view, the mind supervenes upon the body and

its neurobiological properties, although – I admit – this relation is not understood.

Finally, let me add *en passant*,⁷ that although constructivists such as von Glasersfeld, Luhmann, and their followers, often point out that constructivism is consistent with biological research, neurophysiology, and the cognitive sciences, this is a truth with important caveats. It is true that the neurobiological research on cognitive, living systems done by Francisco Varela and Humberto Maturana is often referred to by constructivists, particularly those of a Luhmannian sort, but this represents a very small fraction of research in (neuro)biology, the impact of which has been minor. And, more importantly, the cognitive perspectives of the biological system and “the system of the mind” of the systems approach are mutually incompatible, thus, there *really* is no common ground between such systems, from an epistemic point of view. Therefore, the huge amount of neurobiological and -physiological research dealing with the interfaces between mind and body is not really interesting, not revealing, not relevant to the systems approach at all. At bottom, it is instead the idea of *autopoiesis* (and related properties) as a central feature of living systems and of the cognizing mind, which matters to this approach. Certainly, the transformational aspects of sensory processing, as revealed by neurophysiological and -biological research are also highly important to constructivists adopting a systems approach (cf. e.g. von Glasersfeld & Varela 1987). But the interpretation of these facts is always seen in light of the systems approach itself, epitomized by the axiomatic idea of *autopoiesis*, revealing the risk of running into a vicious circle.

Needless to say, constructivist restrictions with respect to the *compatibility of the cognitive perspectives of different systems*, with respect to considering the complicated transformations of sensory signals as *enabling cognition of our world*, and with respect to *the prospects of inter-systems (neuro)biological research*, are very alien to – and incompatible with – the realist perspective on learning that I have sketched out.

Conclusion

I have argued for a realist approach to learning. On the one hand, I have argued by *indirect means*, through a critique of one specific, influential

constructivist position, that is, von Glaserfeld's radical constructivism. The epistemological foundations of this theory were in focus. On the other hand, I have also argued *directly* for realism, by delivering a number of arguments for this position, by taking advantage of insights from phenomenology, implicit learning and cognition, as well as the supervenience approach to the relation between body and mind.

Notes

- 1 One should bear in mind that "paradigm" is used in at least three different ways in educational research. The chapters referred to in Fosnot & Perry (2005) and Glaserfeld & Varela (1987) apparently intend the meaning of "paradigm" that implies semantic incommensurability with respect to the meaning of key terms across different paradigms, i.e. a standard (strong), Kuhnian sense of paradigm. If constructivists use "paradigm" this way, they should at least be aware of the extensive criticism of Kuhn's conception of semantic incommensurability that follows from it: basically, that it refers to something non-existent. But also, very often researchers in the humanities and the social sciences use "paradigm" in a much looser sense, and the field of learning and education is certainly no exception to this. Thus, Ernest (1995) enlists no fewer than seven different educational paradigms, three of which happen to be constructivist. And, according to Ernest, the most important issues that are central to distinguishing among paradigms are the underlying metaphors for "mind" and "world" (Ernest 1995, p. 466). But firstly, since there are several instances of overlap among metaphors across paradigms – for example, the metaphor for "world" is identical in the paradigms of empiricism and in information-processing theory (ibid. p. 468) – and secondly, since Ernest also describes how paradigms develop into each other, semantic incommensurability is clearly not implied by him – and rightly so, I should like to add. But if so, a constructivist cannot use "the paradigm umbrella argument" to avoid criticism – just as little, of course, a realist can avoid this. Finally, a normative use of "paradigm" in educational contexts can be identified. Thus, Clifford Konold refers to "paradigms" as something like normative efforts to transfer epistemological insights from learning theory to didactics (*in casu* teaching of mathematics, cf. Konold 1995, p. 180). An instance of this is the consideration showed to "the replacement paradigm" in teaching science. In accordance with this paradigm, students' everyday conceptions ought to be replaced by scientific ones (cf. e.g. Duit 1995). This paradigm is criticized by constructivists; epistemological concerns along constructivist lines result in their opting for everyday conceptions replacement by multiple coexisting scientific views, rather than a single one (Duit 1995, p. 278).
- 2 "The" situated learning approach may, in some of its instantiations, exemplify this. In a forthcoming paper I argue that this position is unsound precisely

to the extent that it ignores three real, cognitive features of subjects, in order to understand a specific learning task; introspection, attention, and consciousness. Put differently, in at least one version, this approach relies implicitly on a cognitive perspective, in order to be able to specify the precise conditions for a subject's access to a community of practice. The case I have in mind, and exploit, is the case of wine tasting, often described and used by Etienne Wenger – the so-called “purple-in-the-nose” case (Wenger 2006). This case is particularly interesting, because – in contrast with most of situated learning scenarios – it specifically addresses consciousness. Or, it apparently does.

- 3 I believe that, at the same time, Piaget's genetic epistemology harbors an acknowledged realist position with respect to the existence of the external world, and a “genetic-transcendental constructivism,” when it comes to the question of the development of knowledge in the child. If true, this sits fairly uneasily with the reading of Piaget that forms the core of von Glasersfeld's constructivism. In other words, I think von Glasersfeld is on his own here – Piaget would not agree with von Glasersfeld, if he had had the chance to discuss it. In particular, several explicit, realist comments in Piaget's *opus* make von Glasersfeld's interpretation contentious, although these comments also make the estimation of where precisely to place Piaget on the constructivism–realism map rather difficult. Even the book to which von Glasersfeld refers as essential to his interpretation of Piaget as a radical constructivist (Piaget 1954) harbors this double epistemological perspective. Whether Piaget's position is really an unstable one, comprising both realist and transcendently constructivist elements, I cannot address here. For an explicit acknowledgment and discussion of Piaget's realism, see Kitchener (1986). For a discussion of an inherent constructivism–realism paradox in Piaget's genetic epistemology, see Kauffmann (2013).
- 4 It should be noted that one does not have to subscribe to phenomenology to investigate the phenomenal structure of sensory experiences. Piaget, for example, although acknowledging the gestalt ordering of our sensory world, at the same time also embodied a rather critical stance toward a number of transcendental elements of phenomenological thinking (cf. Piaget 1972a, chapters 3 and 4).
- 5 I am indebted to an anonymous referee, for raising a number of critical points with respect to this issue. Perhaps von Glasersfeld does not restrict the scope of “sensory signals from which a subject constructs its ‘world’” to simple, conscious sensations. But I find no clear evidence in his writings of this possibility. On the other hand, it is probably not correct to attribute to von Glasersfeld an (implicit) acceptance of the empiricist “Myth of the Given,” as I claimed in an earlier draft of this chapter.
- 6 This is implicitly recognized by von Glasersfeld, when he (correctly) points out that Piaget “does not supply a model of what consciousness might be and how it works” (Glasersfeld 1995c, p. 377).
- 7 These final remarks are very sketchy. The ideas and arguments will be spelled out in full, in further publications.

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