cognitive agents interacting (Weinbaum & Veitas 2017), dialogue, then, fuels an ongoing individuation – change! – in all of them. Of course, as in any social exchange the dialogical situation must consist of marking and expressing differences, here I agree with the authors' approach. However, given the delicate nature of its creative potential, I believe that dialogue needs *different* differences to be brought forth – certainly not the continuously perpetuated ones, which are already known to have contributed to an impasse. Perhaps some of the other dichotomies identified but not explored by the authors might have therefore served their intended outcome better than the flagship knowledge/reality dichotomy of constructivism can.

« 3 » Because the difference of positions along the knowledge/reality spectrum has become a source of identity anchors for constructivists – one which gives rise to self-identifications such as von Glasersfeld's "radical" (§16) or Maturana's "super-realist" (§19) – my methodological hesitation is particularly relevant for the discussion of that first axis. The second dimension selected by the authors, one that spreads between the individual and society (§§25–30), is in my view less problematic as a potential foundation for a fruitful dialogue. This is because what superficially appears as a conceptual dichotomy analogous to the knowledge/reality one is more of a spectrum of interests, rather than an order of mutually excluding stances. Should the three interests discussed, von Glasersfeld's (§28), Maturana's (§29) and Luhmann's (§30) be put together as different parts of one bigger puzzle, they would neatly contain the perspectives of three different cognitive systems involved: that of the human psyche, that of the human mammalian animal, and that of the social system's own cognitive autonomy, respectively.

« 4 » Even if the complementarity of their stances has been difficult to acknowledge by the above-mentioned theorists themselves, approaches such as Rolando García's (1999) revision of Piaget (§27) do provide frameworks for their fruitful integration. Perhaps the García kind of "therapy," offering a broader conceptual container to hold the seemingly mutually excluding positions, could be exactly what

is needed for a dialogue to unfold. I am curious as to what the authors' opinion about that is (Q2).

« 5 » While not finding the discussion of the individual-society problematic *per se*, I regret to see that the authors have decided against the inclusion of the "(social) constructionism" line of research in their overview (§2). Without that inclusion the spectrum between the human individual and society does not extend fully, which may be another reason for the lack of apparent incommensurability exposed in the discussion. The extension of the axis towards the stances of social constructionism would have certainly brought many mutual incommensurabilities to the fore, calling for another dialogue space to contain them. Here, as I have argued in a previous commentary (Lenartowicz 2016), it might be advantageous to construct the "conceptual therapist" position by following the example of Raivo Palmaru (2016a, 2016b), who has been addressing at great lengths the apparent incommensurability between the cognitive operation of the human mind, as constructivism has it, and the problematic issues of the emergence and existence of society, as social constructionism describes them. Palmaru's conclusion that, just like in human cognition, self-organisation also occurs at the supra-individual level, where shared knowledge and socio-cultural meanings emerge in the operatively closed motion, is very close to my own understanding of how points of convergence and complementarity can be found between the otherwise diverging lines of research.

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Non-Dualism and Self-Reference in Constructivism

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> **Upshot** · The target article claims that constructivism should be regarded as a manifold movement, but not as a unique philosophical doctrine. This commentary evaluates the legitimacy of this claim.

« 1 » In §2 of their target article, Gastón Becerra and José Antonio Castorina distinguish two constructivist families:
a   "constructivism interested in cognitive theory";
b   "social constructionism."
The use of the same word "construction" in both families can motivate a feeling of semantic familiarity even though nothing is the "same" in the texts of the respective family, in particular when the social dimension of cognition is at stake. This is the case with Niklas Luhmann for §2a and Bruno Latour for §2b.

« 2 » The scrutiny of the constructivist family resemblances is based on the clarification of the constructivist attempts to transcend the dualities (§§7f) that emerge from "tensioned axes" (§7) present in modern and contemporary cognitive theories. Here, "constructivism interested in cognitive theory" (§2a) is understood as an opponent of the heritage of modern philosophy, mainly of Descartes's substance dualism. Two basic dualisms are presented as the consequence of the metaphysical or epistemological grounding in the subject/object opposition: "knowledge/reality" (§§11–24) and "individual/society" (§§25–30). The description of constructivism as an epistemology that aims at a deliberate dissolution of the dualisms of modern philosophy is a first attempt to specify a common ground for the constructivist family as a whole. Let us call it the "dissolution of dualistic thinking." Even if the authors succeeded in the identification of the dissolution of dualist thinking as a continuous resemblance among constructivists, the difficulties return when one observes the manifold strategies put in practice to accomplish the dissolution. Heinz von Foer-

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ster, Humberto Maturana and Luhmann's common use of the concept of distinction in first- and second-order observations, with its two sides; the frequent quotations of George Spencer Brown's (1969) *Laws of Form*; and, here, the meaning of the operations of indication, re-entry, recursion, and the difference of marked/unmarked spaces should decrease excessive optimism concerning an easy dissolution of dualistic thinking. Instead of seeing the dissolution strategy as the pure elimination of the opposites, one should explain the reflexivity of either side of the form in the system's dynamic, a way evoked by Luhmann. Reflexivity in the form of observation supposes that one of the two sides of the form can represent to the other a reflective function referring to the operative meaning of the distinction itself. In observations, the distinction in the structure of a form through which one observes is not a simple opposition between abstract, fixed sides, contradistinguished as opposites, such as subject/object. Rather, it entails a reflective movement and an inner unevenness between the sides that justify the difference of marked/unmarked space(s), or inner-side/outer-side in the operative unity of a form (Luhmann 1997a: 877). Thus, a confrontation of the constructivist movement's grammar of the opposites with modern philosophy should not be limited to a critique of dualisms in the Cartesian or Kantian versions. §8 of the target article seems only concerned with the *Critique of Pure Reason*, which is a drastic reduction of a more complex theoretical context.

« 3 » Regarding §2a, the article has reviewed Jean Piaget, Ernst von Glasersfeld, von Foerster, Maturana and Luhmann's versions. Notwithstanding a reference to Francisco Varela, his contributions to a constructivist view on cognition and embodiment are overlooked. An assessment of Varela's views on embodiment would bring useful insights into the problem of the "elimination of dualistic thinking." It could also have been important if the authors had written about cognition from the perspective of the neurosciences or if they had pondered the implications of constructivism *qua* enactivism in the debates on the dissemination of computational metaphors in the cognitivist programmes (Varela, Thompson & Rosch 1991).

« 4 » The feeling of a thwarted way towards a definition of what is common among cognitive constructivists could have been partially avoided if the authors had identified a common source of cognitive constructivism (§2a). Such a common source can be found in the history of cybernetics and in von Foerster's "second-order cybernetics." According to von Glasersfeld (1995: 60–63, 67; 1999b: 286), also Piaget, whose own constructivist thinking relies on basic categories explicitly introduced in cybernetics during and after the 1940s, such as self-organization, circular causation or self-referential processes in the structural organization of the cognitive operations in child development (Piaget 1937). The article elected two "axes" ("knowledge/reality" and "individual/society") in the explanation of the constructivists' commonalities. §10 elucidates the motives for the choice of these binaries in conditional formulas. The binary individual/society clarifies "where the inquiry about the subject or system of knowledge is." Apparently, here it is suggested that the dualism individual/society serves the purpose of locating cognition, but this is far from being convincing. A major difficulty is the linking of the dualisms of the two "axes." If cognition has multiple instantiations, how to conceive of cognition within communicative, social processes? (Q1)

« 5 » A much broader historical context than an abstract of Immanuel Kant's transcendental reply to metaphysics (§8) is needed to recognize the depth of the ontological explanations of cognition in modern and contemporary philosophy. Kant's solution to the riddle of the "possibility of knowledge" confronting the opposition of dogmatic and sceptical prior solutions is the authors' recommended summary of the meaning of ontology for the constructivist movement. It is a narrow account of a much more complex network of theoretical stimuli. Georg W. F. Hegel's dialectics, Edmund Husserl's phenomenology, Martin Heidegger's *Daseinsanalyse* or Spencer Brown's calculus of form were sources for Luhmann's depiction of "European rationality" (Luhmann 1992: 51–91). The dialogue between Jürgen Habermas and Luhmann (Habermas & Luhmann 1971) included hermeneutics and a stance regarding the herme-

neutical overcoming of the subject/object distinction, the *Geist/Natur* divide and the implications of the system/environment distinction in the overcoming of these old dichotomies. Gotthard Günther offered an entirely new approach to Hegel's dialectics, inspired by cybernetic categories, leading to a new ontology of reflexion (Balsemão Pires 2010) that would be of key interest in the appraisal of recent philosophical ideas about the observer and self-reference in observations. Ludwig Wittgenstein's version of the blindness of the first-order observer, in his metaphor of the eye and the visual field, is mentioned by von Foerster (1993), illustrating the source of blind spots in first-order observations.

« 6 » According to the target article, Piaget's views on the epistemological meaning of the concept of reality seem irresolute. This is mainly due to his theoretical manoeuvring within philosophical semantics. But, his appraisal of schematism in learning and the organic-psychic articulation of the schemes with sensorimotor operations transformed the subject/object dichotomy into a genetic view on the acquisition of cognitive skills (Piaget 1959). Consequently, the disagreement between idealists and realists is not the proper metatheoretical frame to depict the processes an organic-psychic evolving system undergoes in learning. Here, the reference to Kant and the epistemological background of the Kantian overcoming of traditional metaphysics may seem out-dated. Generally speaking and stressing the common views between Piaget and Luhmann, a "realist" viewpoint in operative constructivism is only acceptable under a proviso. I am referring to the acquisition of self-reference in evolutionary systems. Luhmann's *Es gibt Systeme* may be rephrased as: what is real is system-dependent. This conclusion leads to the question: Is the frame of Kantian transcendental philosophy sufficient to articulate the setting and the problems posed by the status of systemic reflexivity and self-reference? (Q2)

« 7 » Piaget (1937) conceived a model of the cognitive development of the child, introducing his notions of scheme and assimilation. He emphasised the concrete operations in the construction of patterns embedded in sensorimotor habits of the child, which would be mobilized to form coherent

cognitive structures in assimilation. The more or less successful way the child organizes the world depends entirely on the degree of coherence acquired by cognitive schemes in connection with the organism's activity. Here, the distinction of idealism/realism does not help. No one is trying to ignore the physical existence of matter, as established by means of the scientific description of the behaviour of defined properties. Properties of the domain of the physical existence and the psychological construction of reality may converge in what is relevant for an organism. But this is not equivalent to claiming that outside the operative convergences is a mind-independent reality, as a meta-organic reality (see Glasersfeld 1995 for a similar conclusion). Maturana's notion of the "domain of existence" of biological systems clarifies the self-referential knot of the organism and its "domain of existence" in the following:

" The operation of distinction that brings forth and specifies a unity, also brings forth and specifies its domain of existence as the domain of the operational coherences entailed by the operation of the properties through which the unity is characterised in its distinction." (Maturana 1990: 64)

« 8 » The authors' approach to the knowledge/reality binary would have gone straight to the point of the significance of the constructivist turn, if they had depicted von Foerster's ideas on second-order cybernetics, self-reference, recursion or the distinction between trivial/non-trivial machines (Foerster 1993). Von Glasersfeld's 1983 "Declaration to the American Society for Cybernetics" (cited in Schmidt 1987: 12) summarized von Foerster's views on reality as an outcome of the interaction between observers and their domain of observation, not as a thing in itself. In this, von Foerster agrees with Maturana. In the volume on "radical constructivism" edited by Siegfried Schmidt (1987), the brief historical characterisation of constructivism as a general theory of cognition and a non-reductionist epistemology included Piaget's genetic epistemology as one of the forerunners. Recently, Albert Müller (2017: 75) mentioned von Glasersfeld's appraisal of Piaget's work, in his seminal paper of 1974, as a pioneering

event in the spreading of the label "radical constructivism." All these references should support the view of an effective overcoming of the idealist/realist opposition in constructivism. However, the target article does not present a convincing defence of constructivism against the accusation of idealism, or against so-called "ontological idealism" (§16), based on a due consideration of the role of self-reference in the form of observations. Therefore, a last question is justified: Do the authors consider that the constructivist project of dissolution of the metaphysical/epistemic dualisms succeeded in all their proponents, only in some of them, or in none of them? **(Q3)**

Finally let me address yet another aspect that deserves scrutiny: the all-embracing view of enactivism. Enactivism and constructivism join together in the elimination of the object of naïve realism and both share the emphasis on self-reference, acquired in evolution. However, in the epistemological strategies of enactivists and constructivists the elimination of the object of naive realism is something that should not be assessed through the lenses of the dualistic categories of those theories of knowledge that deal with the object/subject duality, such as the modern versions of scepticism, or Kant's doctrine of the *a priori*, but also what the authors refer to as the five varieties of realism (§12). A serious consideration of the meaning of the evolutionary acquisition of self-reference in dynamic systems would stress the realization of cognition in a great variety of systems and the formation of inner environments in cognitive systems.[1] A constructivist/enactivist view of reality requires inner environments of the type illustrated by Luhmann in his version of the functional differentiation of society and formation of partial systems in the social system. Enactivism would be a poor idea if not connected to complexity and to the system's acquisition of autonomy in its process of reduction of complexity. Society's self-differentiation is a way to deal with the inner complexity of communication that demands a high degree of autonomous social functioning and operating not depen-

dent on one's own psychological reduction of meaning complexity in individual consciousness or individual action. This entails not only a distinction between psychic and communicative elements and operations in social/psychic systems, but also differences in the meaning of action and cognitive forms mobilized in both types of systems. Focusing on the social representation of action and actors, these differences have been stressed by Luhmann in the notions of person, intelligence, memory and learning in social systems, since his essays on *Trust* (1968) and *Sociology of Law* (1987). If self-reference is a common trait of psychic and social systems, a distinction should be drawn between the evolution of action and of actors according to the psychological structure of meaning processing and the social system's own evolution with its own self-referential forms. Such a distinction is decisive in the investigation of the communicative processing of expectations in social systems. In their examination of the individual/society axis, in §30, the authors introduce a discussion of Luhmann's theory of social systems, but their explanation seems a sketch of work to be done.

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1 | See my independently published e-book *Sequencialidade do Sentido e Formas Cognitivas* (2018).