of the social world. It can be credited with providing a wide range of path-breaking insights. However, his understanding and use of constructivist theories also seems to be bound to his practical situation and paradigmatic efforts. It simultaneously was a way of selling his supertheory to a broader audience. His use of a new vocabulary and a new epistemological approach was useful in underpinning his claims to originality.

« 7 » The preceding comments focus on the work of Luhmann, but similar comments might be made with regard to the research programs of Piaget, von Glasersfeld, Maturana and others, as well. Let me therefore conclude with some general observations. The nature of the relationship between ideas and the social conditions in which they develop has long been among the central concerns of fields like the sociology of knowledge, the social history of ideas, and social epistemology. Among constructivists, too, it has been debated how the form of this relationship can be properly characterized and how it should be conceptualized and studied. Not many, however, have tried to apply this point of view to the genesis and impact of constructivist theories themselves. At least in sociology, constructivist scholars have remained strangely and regrettably silent on the social conditions that have influenced (and continue to influence) the formulation of their own theories. The target article of Becerra and Castorina offers an opportunity to stimulate research in this direction. In my view, it is necessary to develop such a reflective perspective on theoretical and epistemological work itself. Research along these lines also seems to be able to further the dialogue among different constructivist research programs.

« 8 » Let me end with a request. The critical reconstruction of constructivist theories provided by Becerra and Castorina points in the first place to the heterogeneity of constructivist theories. At the same time, however, their reconstruction can be used to reflect on the social contexts that first allowed the institutionalization of dualisms, such as subject/object or knowledge/reality, and now enable us to problematize these same dualisms. While Becerra and Castorina offered an interdisciplinary reconstruction of constructivist theories, I hope that they will be able to provide some additional reflections on the socio-historical contextualization of these theories.

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Forms of Constructivism and Forms for Constructivism

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> Upshot • I discuss the strategy proposed in the target article to address constructivist epistemology by means of "dualities." I argue that the concept of "form" is more suitable for answering constructivist questions, and I explore some consequences of this proposal.

The problem

« 1 » According to Gastón Becerra and José Antonio Castorina, constructivism is a "movement full of tensions" (§1) and not a standardized or unified approach. Given its internal multiplicity it would be relevant to reconstruct its identity or try to distinguish at least its main constitutive differences. The strategy adopted by the authors is that of contrasting two (or three?) conceptual oppositions in four representative figures of this movement since, according to their proposal, constructivism is defined precisely by problematizing certain dualities (§6).

« 2 » These dualities are knowledge/reality and individual/society, and there is also an (ambiguous, to some extent) analysis of the subject/object pair. The names called to testify about this are Jean Piaget, Ernst von Glasersfeld, Humberto Maturana and Niklas Luhmann. According to Becerra and Castorina, in their works there can be detected three possible positions facing each duality: overcoming, elimination or restitution (§7).

« 3 » The main goal of the authors is linking different traditions within constructivist epistemology to achieve "cross-fertilizations" among approaches (§7). Although the goal is ambitious, the target article provides only a partial solution to the goal by focusing on worn-out epistemological debates of constructivism. Thus, the analysis remains restricted to a single type of constructivism, i.e., that which is "interested in cognitive theory" and ignores the other type of constructivism distinguished by the authors, so-called "(social) constructionism" (§2) in order to avoid "an extremely large and dense argumentation" (§10).

« 4 » At the core of Becerra and Castorina's argument is the expectation of defining constructivism by means of oppositions. However, there is no word about the reasons for this: why would this be the best way to define this movement full of tensions called constructivism? Instead of a justification, we have to expect that this duality-approach will allow us to reach relevant conclusions. But is this goal achieved at the end?

« 5 » Despite their meticulous reading of the four selected authors, the result is a somewhat forced analytical construction, which sets aside important details of each approach to give coherence to the proposed scheme. Consequently, the final product is not a unified scheme either but a patchwork of disparate concepts and themes.

« 6 » My claim is that instead of misspending theoretical efforts on revisiting out-dated oppositions or processing complex theoretical frameworks to make them fit into a certain model, a much better definition of constructivism could be achieved by deepening the very concept of "duality." So, in this commentary, I will try to deepen the thesis of "duality" of Becerra and Castorina. However, I will appeal to the very basis of the argument and not to details of a particular concept or author. My goal is to test whether it is possible to sustain the argumentative strategy of the authors.

202

Dividing dualities

« 7 » First, I propose to replace the concept of duality by that of form. A form, according to the mathematician George Spencer Brown (1969), is a mark distinguishing two sides, a marked side and a not-marked one. From an epistemological perspective, signs, words and sounds are forms. Although the form has two sides, and one side "exists" only because of the other, it is not a duality in the sense intended by Becerra and Castorina. There is no opposition, but exclusion between the two sides of a form. One side stands out against a background that makes it possible to distinguish the mark. Following this simple reasoning, constructivism, as a scientific theory, is a conceptual constellation of forms sometimes associated, opposed, synthesized or reproduced.

« 8 » In certain operations it is possible to apply a form to itself to determine whether reflexivity has been achieved. Examples are: observing observations, calculating calculations, etc. Not all forms have such reflexiveness, nor do they have to have it, but it is crucial that constructivist epistemology be able to test its forms by performing this kind of "re-entry" operation (Spencer Brown 1969). Constructivism stands out among other epistemologies by looking for concepts that are capable of re-entry, and each epistemological problem of constructivism can be summed up by this type of criterion.

« 9 » Constructivist epistemology not only describes forms, but unceasingly produces and reproduces this type of form. Thus, constructivist approaches can put concepts such as subject/object or knowledge/reality to the test of reflexivity: Who makes this distinction between subject and object; is it the subject or the object? Is the knowledge/reality duality real? On which side is the operation carried out? It is up to constructivism to take this type of questioning to its limits and to stress the forms.

Realizing forms

« 10 » If we accept the above, for constructivism, reality is a two-sided form. The marked side is real, only the unmarked side cannot be knowledge or construction, but what is not real. No constructivist would accept that constructions are not real, because if they were not, they would not have oc-

curred at all (Mascareño 2010). Reality can be known or unknown, but knowledge cannot be unreal. Descartes was already aware of this when he divided the world into two sides and gave *res cogitans* its respective status of reality (*res*).

« 11 » The unmarked side is simply what has not occurred at all, independently of any individual perception. Constructivism is neither a practical philosophy for everyday choices nor a statistical framework. Thus, trees that do not produce sound when falling in uninhabited forests can be a probabilistic issue or a mere nonsense for someone, but not a test for reality. This occurs or does not.

« 12 » For constructivism it is more productive to test the form knowledge/construction instead of that of real/unreal. Constructions are the result of a search for knowledge to be known by means of constructions since knowledge is the unmarked side of constructions. Current or past constructions are real, as well as knowledge. For constructivism reality is the unity between knowledge and construction, since if any sides of the form are removed, it remains unreal. Without construction knowledge is unreal. Without knowledge construction is unreal.

Time

« 13 » In the pair individual/society the problem seems to be agency. Who constructs? The individual or the collective? What would be its unmarked space? Both the individual and society act, so both are on the same side. What would be the form of agency? Passivity? Internal experience? Reality, again?

« 14 » Agency is one of the most complicated issues for any epistemology since it is always presented as an assumption to elaborate theorems, and not as a variable to be demonstrated. There is no systematic analysis about the agency of agency, and constructivism should explore paths in this direction.

« 15 » Kant's greatest legacy to constructivism is action. Knowing is acting. Kant was able to transcend the rationalism/empiricism dilemma with a synthesis filtered by the categories of reason and moved by empirical intuitions. The phenomenon/noumenon form was a way of maintaining

the Cartesian problem without solving it or rejecting it altogether. This form remained as a backdrop for the actor in the scene.

« 16 » From Kant on, action was taken for granted, but nothing was asked about its unmarked space. So, if we search for it now, we will have to move carefully into unknown territory.

« 17 » Passivity is not a good candidate since it can also be a type of activity. An actor could have actively decided not to act, so this would not be genuine passivity. Internal experience does not seem suitable either, because an internally experienced action (a fantasy, a plan, etc.) or an acted experience (a romantic declaration or a planning) can easily be exchanged by moving the motive's attribution from one side to the other.

« 18 » However, activity and passivity, and action and experience, have something in common. They all indicate a before and an after, which means that the problem of the agency is only secondarily social because it is mainly a temporary question (Nassehi 1993: 182).

« 19 » Time has the form before/after (Luhmann 1995: 60). Present time is the unit showing the incessant reproduction (re-entry) of the form itself. Every action marks a before and an after and it is itself the mark. Action is not a reflexive concept because, unlike time, it cannot be applied to itself (ibid). For constructivism, action is a first-order concept (Foerster 2003).

« 20 » Constructions of constructivism are not actions but forms, i.e., events that occur or do not. The problem of individual/society duality is about attributions of actions and has more practical than epistemological value. The emergence of non-human entities that construct presents maybe a complex problem for humanism but not for constructivism. For constructivism it is only about new horizons to explore the form knowledge/construction.

Conclusion

« 21 » Constructivist epistemology should not turn into a neo-structuralist search for conscious or unconscious oppositions. Forms instead allow constructivism to constantly cross from one side to the other and to produce new distinctions in every operation.

« 22 » It is not necessary to force constructivism to comply with imposed dualities. It is more productive to formally examine whether its constructions can pass the test of reflexivity. If constructivism says something about the world that cannot be applied to itself, then we will have to start over with the task.

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From Constructivist Monologues to Dialogues and Polylogues

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> Upshot • Gastón Becerra and José Antonio Castorina compare a selection of constructivist epistemologies aiming at a general definition of constructivist epistemology. While I can agree on many aspects of their critical analysis, I want to underline some concerns but also argue for enhanced methodological perspectives.

Introduction

« 23 » In their inspiring and important target article, Gastón Becerra and José Antonio Castorina reveal convergences, divergences, and singularities of selected constructivist epistemologies in a "heterogeneous movement" (§6) by means of "problematizing certain dualisms – such as subject/object, knowledge/reality, or individual/ society – that have been shown to be central

for epistemological inquiry" (Abstract). In doing so, they provide a number of insights regarding tensions between knowledge/ reality and individual/society both within conceptualizations of Jean Piaget, Ernst von Glasersfeld, Humberto Maturana, and Niklas Luhmann and in terms of clarifying relations between the respective epistemologies. The importance of such a critical endeavor cannot be underestimated since a deeper understanding of (inter)relations between constructivist concepts, discourses, and practices is needed in order to open up future perspectives for the heterogeneous movement, or at least for some strands of it. It is also needed to develop comprehensible and viable ways of dealing with contemporary problems in a globalized and medialized world. While I have some sympathy for the authors' position and find their clarifications in the target article valuable, I see some difficulties and options for enhancing methodological perspectives, too.

« 24 » On the one hand, it seems clear that open and dynamic definitions are needed to cope with the heterogeneous fields of constructivist approaches. Listings of concepts or umbrella terms that aim at covering all perspectives – from old constructivist ideas in *The Upanishads*[1] to possible future perspectives on constructing cyber-physical systems[2] based on semi-automated human-

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[1] Already in this ancient collection of texts (approximately 750–550 BCE) distinctions between "true knowledge" and "not true knowledge" ("illusion") as well as possibilities of distinguishing between perceptions in states of dreaming and perceptions in waking states are being considered. Here, "illusion" (*Maya*) does not refer to pure inventions of human imagination denying reality. It's rather about varying degrees of awareness and misleading sense-worlds of manifold phenomena. In the words of Wendy Doniger O'Flaherty: "to say that the universe is an illusion (māyā) is not to say that it is unreal; it is to say, instead, that it is not what it seems to be, that it is something constantly being made. Māyā not only deceives people about the things they think they know; more basically, it limits their knowledge." (Doniger O'Flaherty 1984: 119)

[2] In this emerging field, principles of design, modeling, construction and analysis of cyber-physical systems are being discussed intensively, but so far, not in terms of philosophical

oids, semi-autonomous machines, and actors enrooted in synthetic biology – may be helpful in propaedeutic contexts, to some extent, but not for the renewal of research programs. However, grouping key issues around dualities like subject/object, knowledge/reality, individual/society, etc. (§6) runs the risk of remaining bound to dualist thinking, although not necessarily in terms of discrete (as compared to continuous) dualities.[3] But even if different interpretations like unities in/of difference, complementarities, antagonisms or "seeking to overcome dualism through integration or dialectical articulation of terms" (§7) are considered, analysis of constructivist epistemologies might face difficulties. For example, dealing with influential constructivist epistemologies as outlined by Siegfried Schmidt (2017: 143–152) in *Histories and Discourses* ("Geschichten & Diskurse"), who has developed a non-dualist approach in his recent work inspired by the non-dualist philosopher Josef Mitterer, would prove to be a rather paradoxical endeavor.

« 25 » I agree that different variants of constructivism may be regarded as different interpretations of connections between knowledge and the construction of reality. After all, most important is the focus on *how-questions* and genetic, generative or procedural perspectives (Rusch 2012: 174). Along with respective modalities we find corresponding claims, conceptual postulates, thematic preferences, problem arrangements, and methodologies aiming at different scopes.[4] (Post-)modern construc-

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issues of constructivist approaches (see, for example, Suh 2014; Alur 2015; Druml 2017).

[3] Of course, all dualities are "distinctive" in some sense – but thinking in terms of, for example, "strictly discrete" or "continua" makes a difference.

[4] The comparison of the constructivist epistemologies in the target article gives a good example of contrasting conceptual postulates and thematic preferences as well as different scopes. Further different scopes and contrasting elements could be pointed out by considering other system-theoretical, socio-culturalist, social-psychological, cybernetic, cognitive scientific, constructionist or (knowledge-)sociological and philosophical variants in the wide field of constructivist approaches.