

## Theorizing passivity

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My experiences across many different disciplines have shown that the peer review process essentially is conservative and, in some discipline, produces a regression to some mean—all articles in a particular journal resemble each other. As a result, there is little innovation in the forms and contents of thinking and theorizing. Despite being in special institutional positions (variously theorized as *gatekeepers* or *obligatory points of passage*), few editors appear to allow more innovative work to be published, where by innovative I refer to both content and genres of research and writing. Unsurprisingly, few authors attempt to submit innovative work when they have good reasons to believe that such work would be rejected. Although this journal has set itself the goal to foster innovative approaches to theory, method, genre, and so on of science education research, change may come slow given the predominance of conservatism in the field. In this editorial, I therefore point out one concept that deserves attention because it will radically reshape the ways in which knowing, learning, identity, and so on are theorized and the way in which we can (have to) teach science and develop science curriculum. The concept I have in mind is *passivity* (and the associate concept of *passibility*, the capacity to feel, suffer, and to be susceptible to sensation and emotion), which currently does not figure in any science education theory. In this editorial, I articulate and exemplify the use of this concept, and thereby hope to encourage science educators to reconfigure not only what they do, teach, and research but also how they do these things.

All articles of this issue, in more or less direct ways, articulate knowing and learning science in terms of human (student, teacher) agency. Ritchie, Kidman, and Vaughan show how scientists who have become science teachers learn to use narratives from their field as a means to produce identity in the classrooms; Richardson and Vann articulate how children of immigrants to a meat-packing town in the US deploy the knowledgeability gained during their upbringing in the Mexican culture to make sense of the pig dissections in science class; similarly, Elmesky and Seiler describe how the experiences African American students made outside schools

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mediate their agency within science classrooms; Oliveira, Sadler, and Suslak reveal how expertise is attained by means of two different types of language-mediated processes; and Krage provides careful descriptions of the agency students exhibit in the process of making sense of computer-based modeling tasks in the domain of genetics. That all articles somehow are concerned with agency is not surprising given the central role that the concept plays in many theories of knowing and learning (Piaget, constructivism) generally and in cultural theories in particular. In cultural sociology, for example, *agency* is theorized in a dialectical relationship with *structure*, a construct relating to aspects lying both within and outside the acting human being. The focus on agency, however, is asymmetrical, failing to capture an essential component of human experience, *passivity*, which is not adequately captured in the idea of *truncated agency*.

*Passivity* turns out to be of special importance in recent philosophical work, because agency cannot be thought without it. Here, passivity does not mean not speaking or not physically engaging with the situation because of this or that reason, which, from a theoretical perspective, still is a form of agency (just as pauses in music are central aspects of the music that have to be theorized in and for themselves rather than as absence of sound). In fact, there may have to be a theoretical asymmetry in favor of passivity because at one point in history, the first human beings *found themselves* endowed with agency that they have not willed (intended) for themselves. Furthermore, in their upbringing, children learn that they can realize goals that they set themselves and in that are aware at least implicitly of their agency. To the present day, however, most social scientists have failed to articulate passivity as a theoretical concept. This is surprising, for although we have intentions (goals) that direct and mediate what we do in conscious ways, the intentions themselves are not intended: we merely are hosts (and in some instances hostage) to intentions that nevertheless are ascribed to us. Passivity therefore is at the very heart of agency and yet it is curiously absent from theorizing in the social sciences. In the following, I provide sketches of passivity for the purpose of exhibiting the phenomenon and therefore the need to theorize this important component of knowing, learning, identity, agency, etc. in science.

### Three paradigmatic examples of passivity

Personally, I often find philosophical discourse difficult, especially when it does not employ concrete examples in the context of which the important concepts are articulated such that it would allow me to integrate them into my own lifeworld. To concretize the issue concerning passivity for my readers, I therefore discuss three concrete situations related to knowing and learning that others easily can relate to. The first example comes from particular dimensions of conversations generally: I use language that is not mine so that what I say is both mine and not mine. My second paradigmatic example is touch: in touching, I sense the world that is outside my body and simultaneously I can feel it inside; and the sense impressions (the capacity for which are captured in the concept of *passibility*) allow me to take note of the sense in my situation. Finally, the third example comes from a cognitive phenomenological experiment I conducted while I was a fellow in the neurocognitive science section of the *Hanse Institute of Advanced Studies* (Delmenhorst, Germany); it shows that

perception and learning happen to me and that I cannot intend to know what I do not know.

My language is not mine

Passivity can be shown in practical, everyday conversation where I, as everyone else, use language to express myself. But this language is not mine; in fact, in most everyday situation, I do not even think about what I am going to say but speak in the same way that I do not think about where to place my feet but walk. But if this is the case, then what I say is not conscious prior to having been articulated so that I am to some extent passive with respect to my own utterances. More so, because my talk is *for the other*, I (have to) presuppose that what I say inherently is intelligible: I cannot say what I want but have to say what the (generalized) other already understands. That is, in talking I am constrained to realizing cultural possibilities of talking and using language—and the passive voice in “I am constrained” points us to the role of passivity in conceptualizing my talking.

With respect to science education, typical conversations occur in science classrooms or in interviews concerning everyday phenomena that—because they have become paradigmatic situations for illustrating scientific ideas and theories—are of interest to scientists and science educators. The following excerpt comes from one such interview that a graduate student of mine conducted with an adult concerning the phenomenon of day and night and the movements of earth and sun as possible explanations. Excerpt 1 begins somewhere during the interview at the moment the interviewee (Mary) completes a description of the sun moving across the sky (turn 07). The interviewer utters what a culturally competent listener (reader) hears as a follow up question concerning the direction of the sun’s movement (turn 08). After a brief pause, Mary utters a proposition about the sun being in the east in the morning (turn 10), which is followed by an interrogative (“why?”) on the part of the interviewer (turn 12). Mary then states that she has never thought about “that” and then proffers a candidate next turn to follow the interrogative (turn 14).

Excerpt 1<sup>1</sup>

07 M: so the sun is in the position of thata sky ((hand gesture)) ↑position-  
((looks at interviewer, makes eye contact))(0.18)

08 I: yea (0.86) a:nd which? direction. (0.30) maybe east? or north? o:r-  
((Points with thumb into different directions [Fig. 1a]))

09 (0.33)

10 M: ‘o:h:: ((hand moves up to the chin, eyes move upward, pensive [Fig. 1b]))  
(0.26) in the morning it should be in the east.

11 (0.17)

12 I: yea:. why?

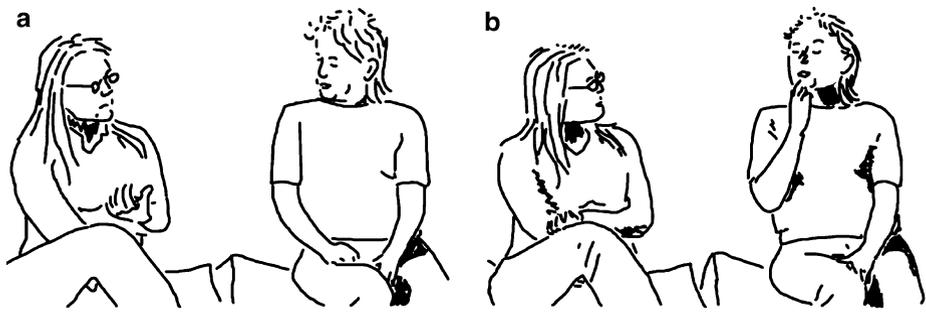
<sup>1</sup> The following transcription conventions have been used: ((hand gesture))—transcribers comments and observations are in double parentheses; a:nd—colon indicates a lengthening of the phoneme, about .1 s per colon; ?- —punctuation is used not grammatically but to indicate prosodic features: strongly falling, strongly rising, and level pitch toward the end of the utterance unit; <<p>uh>—triangular brackets and enclosed letters indicate speech features: “p” for piano, low speech volume, “pp” for pianissimo, very low speech volume; ‘^—pitch contours falling and rising/falling; (1.70), time in tenth of seconds; =—equal sign indicate latching, that is, two words or two speakers uttering sounds/words without pause and overlap.

13 (1.06)

14 M: <<p>uh> why::? (1.70) <<p>uh: i never think about that.> () i ^thi:nk (0.33) i:ts=a becau:se (0.24) of the movement of the ↑‘sun.

Figure 1a shows how the two participants are oriented to another bodily, and the patterned turn taking in Excerpt 1 shows the same orientation toward one another on the level of the verbal utterances. For example, one person (who therefore is recognizable as the interviewer) uses interrogatives, that is, terms that are used to solicit information from another person (which, why). These terms, as the transcription shows, also are associated with a particular upward movement of the pitch that culturally competent speakers hear as a question; similar upward movements of the pitch allow us to hear “east” and “north” (turn 08) as candidate responses to follow the interrogative “which?” Mary produces an utterance that we can understand to be at least a partially correct next turn, as seen from the fact that the interviewer first utters the affirmative “yea,” and then follows up with the interrogative “why?” commonly used to solicit an explanation.

Here, then, Mary provides an answer even prior to having thought about the physical phenomenon so that she could not have constructed a conception (turn 10, Fig. 1b, turn 14). Because the conversation unfolds in real time, she does not have the time to construct a conception on the spot. Rather, she has to use the resources provided in the language and in the situation (e.g., in the interviewer’s pitch). She uses a language that she presupposes to be intelligible to the interviewer. The entire excerpt makes it clear that Mary is willing to oblige the interviewer; and yet, it is also evident that the content of the utterance in turn 10 does not constitute the real answer. From the perspective of the conversation, it in fact is not even clear whether an utterance is a question or another utterance an answer unless we consider turns in pairs. Thus, what it is that the interviewer does in her utterance (e.g., turn 08) depends on the next utterance (turn 10). Here it is completed as a question–answer pair, at least partially. Thus, the nature of the interviewer’s utterance depends on Mary’s utterance and vice versa. Although there is a certain degree of agency in the performative dimension of the production of the utterance, the type of action we are in the process of observing is not clear until we have available the next turn. That is, each participant is both actively producing utterances and passive with respect to their effects. A second level of passivity can be observed at the level of the content and structure of the utterances: conversations unfold so quickly in real time that



**Fig. 1** Interviewer (left) and Mary (right) orient to one another, using a language that is not their own in a form of activity that enables and constrains them so that they are not entirely free to do and say as they please

there is not time to take time out and reflect, think up a next turn privately, and then spill it out using language. A better way of thinking about conversations unfolding in real time is that speakers are the means by which language realizes itself in concrete ways even when speakers never have thought about some topic or phenomenon before.

This analysis is consistent with speech act theory (Austin, 1962), where each speech act is understood as comprising three components: performance (locutionary act), intent (illocutionary act), and effect (perlocutionary act). In producing an utterance, a speaker constitutes the performance. As with acts in general, the performance (locutionary act) realizes a particular intent (goal, illocutionary act). Finally, as all acts, the speech act has an outcome or effect (perlocutionary act); this effect *completes* the speech act. That is, participants in communication do not know what the outcome of an utterance is until it comes to be known through the response of another person in the situation who, because of the human capacity to passivity, is affected by the preceding performance. Because of its effect on other participants in the situation, any speech act therefore implies a responsibility that the speaker has with respect to the other, who has been affected in the action.

### Touching is being touched

Touching generally and self-touching in particular constitutes a case in which the integral relation between agency and passivity clearly comes to stand out. Readers easily can reproduce this phenomenological investigation used to articulate our openness to the world. This openness has two sides, an active and a passive: we open ourselves to engage with the world, but thereby also make ourselves vulnerable with respect to what happens to us and how the world affects us (see Fig. 2).

Run the fingertips of your right hand along parts of your left hand *with the intention to sense its surface characteristics*. Focus on sensing both the shape of what you touch and its surface characteristic. As you intently focus on getting information from the surface and its characteristic, you may notice that the sense of the left hand to be touched disappears into the background. All you feel is the surface you touch. Now continue touching with the right hand but switch your attention to the left, focusing on feeling the touch as if there was an itch that you scratched with your right hand. You notice that you can feel being touched but that what you previously have noticed with your right hand totally disappears into the background. You feel with your left hand and the right hand disappears from your consciousness.



**Fig. 2** Self-touching constitutes a paradigmatic case for showing how agency involves passivity

In the next stage of the investigation, return to the first step where you explore the surface of your left hand using the fingertips of the right hand. But now shift your attention and intention from feeling the surface of the left hand to the touching finger itself. Although you might initially find it difficult, you eventually come to a point where you feel that something touches you, impressing on your fingertips. Equivalently, you can concentrate on your left hand and feel how it senses the surface of the fingertips of the right hand.

This investigation shows that in each hand, my intention and focus determine whether I feel the touching or the being touched. In touching and feeling the surface (topology) and its characteristic, I am outside of myself, feeling what the world outside of me is like. To feel, I have to be outside of myself, outside of my skin, being in contact with the other than myself. Simultaneously, as the corresponding parts of the investigation show, I am being touched, and this I can feel *inside* of my skin. I feel what I feel within the boundary that my skin constitutes between the outside and inside of myself: the world (here my other hand) is pressing upon me, impressing (and therefore shaping) me. With the intention to touch I intend to go outside myself, but in the process I am touched; but I am touched because I intend to touch: touching is *self-touching the other* (Derrida, 2005). In touching, human agency and passibility are invoked simultaneously; this same conclusion is valid for all other senses as well.

From the investigation we can learn this: Touching *is* being touched. The agential touching involves the passivity of being touched, although I generally notice either the agential or the passive aspect. That is, in intending to learn something about the outside world, I open myself up to being impressed by that which is other. Even when I participate in conversations similar to Mary and the interviewer, I have to open myself not only actively orienting and attending to the other, but to be affected by the changing pressure that the sound waves the speaker produces exert on my eardrums. I am therefore doubly passive, first with respect to the intention to (want to) learn and with respect to what I sense and learn, which is the result of the world touching me as much as I touch it. Touching is a paradigm case that teaches how sensing the world is both passive and agential, and more so the former than the latter, because I am passive with respect to the intentions underlying my agency.

### The impossibility to intend the object of learning

Constructivism in particular theorizes learning as an active process, whereby learners actively construct new knowledge while focusing the object of learning (as captured in the learning [lesson, curriculum] objectives). Constructivism theorizes learning as intentional. Other theories—phenomenology, cultural-historical activity theory—also emphasize the role of intention in human behavior; but these theories rightly point out that intention requires an object. Intention is transitive: actions, the acting subject, and the object acted upon are interdependent, an interdependence sociologically oriented researchers make thematic in the notion of an agency/structure dialectic (Sewell, 1992). But here then arises the problem: How can I (the learner) intend to know something that I do not yet know and therefore cannot make it the object of my intention to learn? Christopher Columbus could not intend to discover (know, know about) the Americas prior to having discovered (come to know about) the Americas. To elaborate a bit on this contradiction, I draw

on the following investigation that I explicitly arranged to better understand this aspect of learning.

During my stay in the Institute for Advanced Studies, I spent 3 months analyzing data from a 10th-grade physics course on electricity. As in other studies, I observed that students did not see in their investigations what the teacher wanted them to see, although the former were intently looking and the latter suggested to them that they had not yet been successful. How can it be that students look at some experimental setup or some other situation without seeing what they are supposed to perceive and which, according to the teacher, is sufficiently salient to be visible. To better understand what is going on, I decided to conduct an experiment in which I would bicycle the same route 20 days in a row and, following each time, write down everything I remembered and draw maps of particular stretches of my trip.

In the course of my investigation, I become aware of the fact that I am noticing new aspects of the landscape even during the latter part of the investigation. For example, on Day 7, I notice two gigantic towers (silos) that I have not perceived before, although they are much higher than the surrounding trees. I am struck—how could I not have noticed these two silos that from that point on are going to be so salient to me. Even more so, I immediately notice that I begin to forget that I had not been aware of these silos prior to Day 7. But when I reflect upon this, two thoughts strike me. First, if prior to Day 7 a teacher had given me a test about my experiences, I would have failed all questions pertaining to the two giant silos. There has been no entry in my notes about these silos prior to that day, and I clearly noted after returning home about the fact that I have seen them for the first time. (I have noted similar occurrences for many other aspects in this investigation as in other related ones conducted during that time.) Second, how could I intend to discover the two silos if I did not already know about their existence, in which case I would not have to discover and learn about them? This is all the more interesting when considering the fact that the light from these towers likely has been falling onto my retina on Days 1–6, too. If a teacher were to have asked me to observe and discover, I would have failed with respect to the two towers on six occasions. That is, at the moment I discover them, I have been passive with respect to knowing about the two gigantic towers existing right next to the road that I nevertheless have been passing on six previous occasions. It is my human capacity to feel and to be susceptible to sensation that I have been able to discover the towers, not because I wanted to construct their existence (of which I was unaware) or knowledge about them (which I could not have because I did not know of the existence of the towers).

### **Toward improving cultural theories**

The three examples I provide in the previous section all exhibit the centrality of passivity with respect to *being in the world* (e.g., having a conversation) and learning. This passivity, however, has neither been theorized nor been addressed in science education practice. Current learning theories of all ilk are aspect blind to this dimension of knowing and learning and thereby fail to understand the fundamental constraints that learners are subject to. A similar absence makes it impossible for us to understand the difference between the planned and enacted curriculum: If agency were to be the only dimension responsible, then there ought not be a difference between the two dimensions. However, teachers are both agential and passive with

respect to the ways in which the enacted curriculum unfolds: It is a collective process and product so that teachers also are subject to their conditions as much as they bring these about (and changes therein). These constraints are captured in the following impossible requirements with respect to the phenomenon of learning: To learn something (as stated in the curriculum as learning objectives), I need to know what it is so that it can be the object of my intention; if I know the something (to be learned), I no longer need to learn it. Because I cannot intend knowing what I do not already know, I am essentially passive with respect what I come to learn. I am a host (hostage) to my own learning. This has some implications in the way that dialectical theories of knowing used in cultural studies are best articulated.

The most frequently cited dialectical theory links *agency* and *structure*, where structure itself consists of the dialectical relation of (material, social) *resources* and (personal) *schema*. That is, in acting we employ resources and in the process form new schema; and our schema mediate what we can perceive as resources and how we perceive them. But without schema and resources, there cannot be anything like agency—there cannot be action without a (material) subject and a (material) object involved in the transaction. This dialectical theory, therefore, can be expressed as

$$\text{agency} \parallel \text{resources} \mid \text{schema} \quad (1)$$

I show here, however, that agency inherently stands in a dialectical relationship with passivity so that an improved theory may be expressed as

$$\text{agency} \mid \text{passivity} \parallel \text{resources} \mid \text{schema} \quad (2)$$

In this expression, agency and passivity presuppose one another just as resources and schema do in existing dialectical theories.

Thinking about knowing and learning in science education comes with tremendous potential for understanding what happens in our classrooms and what the particular constraints are in attempting to achieve specific learning outcomes. Future research in science education has to work out how curriculum planning, teaching, and research have to be reconfigured to address and accommodate the essential passivity that is presupposed in and makes possible the already-theorized agency. Most importantly, *passivity* as articulated here does not refer to situations where someone decides not to speak—e.g., because someone else “silences” them, or because the person feels, as students from First Nations often feel in Western-style schools, that there is no space to get into the conversation. In such situation, there is an intent that orient a particular form of agency: not doing something others in the situation already do. Rather, as I show here, I am concerned with theorizing passivity that is at the very heart of agency.

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