

Thinking with Spinoza about ‘hands-on’ learning

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ABSTRACT

Despite its advanced age of about 375 years, the mind–body (psychophysical) problem is alive and well, in part because it is anchored so well institutionally in schools and in research (scientific vs. interpretive psychology). This continued presence is astonishing in the light of the fact that the seed for its solution, sown in Spinoza’s Ethics, is almost as old. The solution rests on the position that there is only one substance, which, invisible, manifests itself in two attributes, thought and extension (body). By thinking with Spinoza, especially by following the ways in which Vygotsky and Marx think with Spinoza, we arrive at an approach suitable for a social psychological theory of learning that does not separate knowing (intellect, thought) from doing and emoting (body). A classroom fragment from a 10th-grade physics curriculum is used as the starting point for overcoming the body–mind problem by thinking with Spinoza.

KEYWORDS

Spinoza; Vygotsky; dualism; thinking body; speech; affect

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Introduction

The lightening bolts of Spinoza’s thought illuminate our research on concept formation according to the Spinoza line. (Vygotsky, 2010, p. 92)

In science, technology, engineering, and mathematics education, teachers are exhorted to use ‘hands-on’ tasks of one or another kind for the purpose of allowing students to make sense of scientific concepts. Yet, as seen in the case of science education, despite decades of research and despite critical and extensive reviews thereof, ‘research has failed to show simple relationships between experiences in the laboratory and student learning’ (Hofstein & Mamlok-Naaman, 2007, p. 106). That is, the connection between doing experiments and using science concepts has not been established, which leads to the failure to theorize how the former might support the latter. Moreover, the learning theories in vogue over the past several decades have favored the mind (where students construct meaning, identity, affect, and so on) and failed to show any necessary (sound) connections between body and mind. In psychology, this is often referred to as the psychophysical problem.

The psychophysical problem in psychological theories is not new. Eighty years ago, numerous critiques were launched at psychology for its dualism that reduced the complex phenomena of the psyche—including knowing, learning, developing, and communicating—either to the physical body and biology (scientific psychology) or to thought, culture, and the mind (interpretive psychology) (Politzer, 1929; Vygotsky, 1997). Reading contemporary literatures in various fields with pertinence to educational issues—education, educational psychology, or psychology—we easily observe the same dualist assumptions at work, for the predominant paradigm concerns the ‘(discursive, mental) construction’ of knowledge, identity, beliefs, and so on. When the body is

considered in studies of learning, then its movements (almost) always are the result of something mental, theorized in the form of schemas, conceptions, conceptual frameworks, ideas, and the likes. Yet a way of going about the psychophysical (body–mind) problem has been around for over 300 years in the work of the Dutch philosopher (Baruch, Benedict de) Spinoza. Although Spinoza has had tremendous influence on philosophy, a search in the Web of Science database (12 September 2016) reveals that only 18 of 2511 hits are articles from the fields of education and educational psychology.

Many of these educational studies do not engage with Spinoza's universe, but only make brief reference (Moore, 2004; Lynch, 2008). However, there is hope that thinking with Spinoza is of significant help in solving the psychological problem, as shown by the influential psychologist Vygotsky, who, near the end of his life, planted the seed for a non-dualist (educational) psychology, through his reading of Spinoza and his rethinking all of his previous work (as the opening citation suggests). Spinoza was very important to Vygotsky. Thus, in the book-length review of the psychological literature entitled *The Teachings about Emotions* (Vygotsky, 1999), which was to be a preparatory work for his own text on emotions, Spinoza's name appears more than 250 times. The purpose of this article is to think with Spinoza so as to work out and exemplify some fundamental aspects of a psychology that educators and psychologists may take on board to develop non-dualist and non-idealist (intellectualist) theories of learning and development. This is especially important for those scholars, who ground their theories in Vygotsky, who, in his own words, rejected the 'untenability of [his own previous] theory' (Vygotsky, in Zavershneva, 2010, p. 54). In this earlier theory for which he is celebrated today, Cartesian dualism is rampant (e.g. focus on the mental at the expense of affect and body, dichotomy of lower and higher functions).¹ Thinking with Spinoza, the late Vygotsky began to abandon the dualism apparent in his earlier work and instead adopted a monism grounded in his reading of the philosopher (e.g. Mikhailov, 2001). Here, I seek to *think with Spinoza* about present-day concerns in learning generally and the relation between bodily experience and forms of thought, thereby 'making his thought relevant today' (Vardoulakis, 2011, p. xvi).

In the remainder of this contribution, I first develop the idea of the *thinking body*. I then exhibit how we may investigate student learning in science, technology, engineering, and mathematics education by thinking with Spinoza.

The thinking body

Of the many topics that we may broach to think educational issues with Spinoza, the *thinking body* (Ilyenkov, 1977) may be of particular interest to educators and educational researchers in science, technology, engineering, and mathematics. This is so because here, more so than in other areas of the curriculum, the problem of the relation between the body and mind is most acute. The fundamental idea underlying 'hands-on' activities is the provision of bodily experiences that are somehow supposed to underlie the conceptual understandings students are to develop. As educators noted the failure of research to show any benefits, they expanded their call to include the mind as well, as in "'hands-on, minds-on" learning'. Although there are many teacher-oriented websites on this topic across the curriculum, a theory is still missing.

In the attempt to theorize science learning arising from the science lessons, it does not help to begin with students' bodies and suggest that their minds somehow 'abstracted' something from their movements or that they somehow '[mentally] constructed' 'meaning'. All such attempts make body and mind external to one another. Here, Spinoza's (2002a) first book of the *Ethics* helps. It begins with propositions about the nature of substance and its relations to others. Fundamentally, two substances, having different attributes (E IP2), have nothing in common and, therefore, cannot be related by means of cause and effect (E IP3) and one substance cannot be produced by another (E IP6).² A substance is not perceived as such but only through its attributes. Among an infinite

number of possible attributes of the one substance (God, Nature) that Spinoza conceives (E IP11), extension (body) and thought are those that are perceivable by man (E IIA5). These attributes are different but not opposites: '*non opposita sed diversa*, this was the formula of [Spinoza's] new logic' (Deleuze, 1968, p. 51). An attribute must be conceived through itself (E IP10), which means, in the case of extension and thought, that extension has to be conceived through extension, and thought has to be conceived through thought. That puts to rest any attempts to explain the movements of the body through mental constructs (conceptions, schemas), as this may be found in the constructivist and embodiment literatures; and it puts to rest any attempt to explain thinking through body movements, as this may be found in the enactivist and scientific psychological (biological) literatures, especially when they 'confused mind with corporeal things' (Spinoza, 2002b, p. 212). It also puts to rest any simplistic connection that takes us from the hands-on materials to the minds-on concepts.

For Spinoza, the one substance is both a thinking thing and an extended thing (E IIP1, E IIP2). This one thing manifests itself in the *thinking body* of humans (Ilyenkov, 1977). But we cannot get to this substance through addition of, abstraction from, and dialectical sublation of its two mutually exclusive attributes. The substance is not just a student's material body to which the student's thought is added; and it is not a student's thought to which the student's body is added (as in embodiment). That one substance may best be considered as invisible and as transcending any manifestation, which leads us to a 'definition of man invisible all the while carnal—invisible as carnal' (Henry, 2000, p. 29). It is in Spinoza's *Ethics* that we may, therefore, find 'the brilliance of the solution of the problem of the relation of thinking to the world of bodies' (Ilyenkov, 1977, p. 43).

Thinking with Spinoza enables us to begin theorizing not by positing two opposing substances, body and mind (culture), but with the supposition that there is only one substance, one single object of investigation. The starting point for theorizing human knowing and learning, initially stated in the axiom 'man thinks' (Spinoza, 2002a, p. 244, E IIA2), becomes in our approach 'the person' in the 'full vitality of life', including 'the motives, interests, and inclinations of the thinking individual' (Vygotsky, 1987, p. 50) and 'the decisive causes for their change and development are situated in the material life of society' (Marx & Engels, 1978, p. x). Thinking with Spinoza, therefore, our one single object of inquiry 'is the *thinking body* of living, real man ... only considered from two different and even opposing aspects or points of view' (Ilyenkov, 1977, p. 31). Any attempt of putting back together what has been taken apart must fail. Instead, just as Spinoza begins by positing a single substance—real, infinite Nature—as his starting point, we begin with the real living human being, a thinking body, which has thinking and extension as its attributes. Saying that a student's thinking causes his arm to move the transparency to and, after touching the pointer suspension, away from the electroscope is as false as saying that the movements *embody* thought. It is equally false to say that a student[s hand / finger configuration and is the embodiment of some (mental) conception or schema. In each of these ways of speaking, we would begin with one or the other, body or thought, and then are forced to explain the other by means of a mode inappropriate to it: movement embodies thought or thought contains schemas of movement. The relation of body and thought (idea) has been expressed in the case of a circle (Ilyenkov, 1977; Spinoza, 2002a). When a circle is produced, for example, by moving a pen on a string around a fixed point where the other end of the string is held, a circle is obtained. 'Consciousness' of the real-circle producing movement is an *adequate* idea of the circle. In this example, there are not two things, body and thought that are somehow combined. We do not get to the thinking body by combining what has already been divided, just as physicists do not get to light by trying to combine the wave and particle pictures. Instead, there is a single circle-producing movement and idea of the circle. Making a real, material circle and knowing a circle no longer are two different things, as this is possible when educators say of students that they know but are unable to apply their knowledge. The idea (knowledge) of a circle is adequate when the production of the thing is adequate: there is no knowing a circle that would differ from making a circle.

The preceding description introduces the notion of consciousness, where the movements of the body and its relation to the object are reflected. Consciousness is a problem 'still more extraordinary than the problem of thinking' (Vygotsky, 1987, p. 285). The notion was not Spinoza's. But others thinking with Spinoza began using it recognizing that it is 'cursed' with matter from the beginning (Marx & Engels, 1978; Vygotsky, 1987). Consciousness must not be conflated with Spinoza's *thought*; instead, like the thinking body, it is a phenomenon that manifests itself in sensible material and supersensible ideas. Playing on the registers of their native German language, Marx and Engels (1978) note that 'consciousness [Bewußtsein] never can be anything else but conscious being [bewußtes Sein], and the being of men is their real life process' (p. 26). This in fact is a version of the Spinozist propositions E IIP7 according to which 'the order and connection of ideas is the same as the order and connection of things' (Spinoza, 2002a, p. 247), E IIP13 according to which 'The object of the idea constituting the human mind is the body' (p. 251), and E IIP14 according to which 'the human mind is capable of perceiving a great many things, and this capacity will vary in proportion to the variety of states which its body can assume' (p. 255). The necessary consequence of this is that consciousness *follows* but reflects the body's movements. When we think with Spinoza, we do not equate consciousness with thought but instead take it to be a characteristic of the thinking body.

Spinoza discusses how ideas arise from affections of the body by external bodies. We actually have to go further than Spinoza because human beings do not just sense and passively receive the world (Ilyenkov, 1977). In transforming the material world, humans also transform their consciousness. Thus, to understand knowing and learning in 'hands-on' lessons, we need to approach what students do as real *sensual* labor that produces the phenomenon, the human relation, and the supersensible ideal; it does not suffice take an intellectualist attitude, according to which everything that is said and done is mere expression of the contents of mind.

One area where the psychophysical problem appears is in the gap between plans (e.g. instructions for hands-on activities) and situated actions. Thinking with Spinoza allows us to realize that sensual human activity has to be different from what appears in perception or intuition, for what we see or conceive never is the phenomenon but always only a manifestation thereof (Maine de Biran, 1841). In the language of this philosopher, the bodily movements seen are only signs of 'pure sensations', and associated 'ideas are only images and copies' (p. 295). Sensual human activity, therefore, is different from the many ways in which it may be described and instructed. It is invisible. For this reason, no written and pictorial instruction can guarantee students (such as those featured below) that what they plan to do (automatically) leads to the production of the phenomenon. If, on the other hand, that sensual human activity were visible and conceivable as it really is, then it could be put into words and become inherently instructable—in which case, there would be no gap between plans/instructions and situated actions. As life is not thus, students will have to find the sense of the instruction in their own situated actions—but after the fact. At that point, then, the instructions constitute or do not constitute a verbal account of what they have done. When they succeed in producing the phenomenon, students' accounts of what they have done satisfy the necessary but insufficient condition for explaining the phenomenon. Moreover, the explanation that they arrive at in their group work may still not correspond to the universally valid explanation because 'inadequate and confused ideas follow by the same necessity as adequate, or clear and distinct, ideas' (Spinoza, 2002a, p. 264, E IIP36).

Thinking with Spinoza, allows abandoning the assumption of a causal relationship between body and mind (concepts). We do not have to assume that hand gestures or speech are *caused* by preexisting thought. Instead, thought is theorized dynamically as becoming in speaking, which, in its prosodic dimension, also manifests affective orientations to the lived reality. It was while thinking with Spinoza that Vygotsky came to realize the Cartesianism in his previous conception that 'the higher function is a mastery of the lower' (in Zavershneva, 2010, p. 42), that is, mind as master of the biological body. Thinking with Spinoza, we therefore consider not the relation between body and thought but take these to be the manifestations of a *thinking body* the very action of which is

thought. In other words, relationship between the thinking body and thought is like that between the eye and seeing, between legs and walking, that is, as an organ and its actions. As organ of thought, the thinking body is 'capable of actively building ... anew each time in accordance with the forms and arrangement of the "external things"' 'its present and future actions *readymade* and *innate within it* together with its bodily-organized structure' (Ilyenkov, 1977, p. 50, 51).

In the *Ethics*, we find that 'the object of the idea constituting the human mind is the body' (Spinoza, 2002a, p. 251, E IIP13). If this proposition were taken aboard in this manner, it could be read as consistent with a Piagetian position, whereby the mind somehow abstracts its schema from concrete, bodily experiences. Thinking with Spinoza, we have to disagree with Piaget and constructivism. As originally shown in the analysis of the commodity in exchange relations, its supersensible aspect, the ideal value, is nothing other than the relation between humans that reflects the relation between things, attributed to the sensible thing as its suprasensible dimension (Marx & Engels, 1962). The ideal (suprasensible) thus initially is a real, concrete, therefore, sensible human relation but is later simultaneously attributed to the thing and the human mind. This is precisely the point taken up in a Spinozist take on the genesis of higher psychological functions and personality. Thus, any higher psychological function was a physical relation between real people (Vygotsky, 1989). There is a real (material) relation between people that is reflected in the relationship between things attributed to one of the participating things.

Thinking with Spinoza about a lesson fragment

The lesson fragment

The lesson fragment derives from a curriculum on static electricity in a German 10th-grade class taught by a doctoral student in physics education and a physics professor. The fragment was recorded during a task that asked students to develop an explanation for what initially tends to be a surprising phenomenon. When an electrostatically charged body, such as an overhead transparency that has been rubbed with a piece of cloth, is brought close to but not touching an electroscope (instrument showing the presence of electrical charges), its needle deflects. If the needle suspension is briefly touched, the needle returns to its zero position only to deflect again when the charged body is removed. The transcription fragment is excerpted from the middle of one group's work (Figure 1).

In this sequence, Phil takes the previously charged transparency film (turn 01, turn 09) to the electro-scope and, after having touched the needle suspension with the index finger of his left hand (turn 07), pulls it away. The content of the talk includes verbal accounts of actions and observations ('it deflects', 'I pack down here with my fingers again', 'I pull it away', 'it remains thus') and explanatory statements concerning the movement of hypothesized electrons moving freely in the needle and its suspension ('it [electrons] is up there', 'I pack down here the electrons that are pulled away up here [through electro-static influence of the transparency]', 'now there is an equilibration inside'). In other words, we observe students, who, through their physical actions, produce a physical phenomenon that they account for by means of an evolving descriptive and theoretical language.

Thinking with Spinoza about the lesson fragment

Much of contemporary learning research focuses on the semantic (i.e. supersensible) aspects of speech, concerned with the ideal 'meanings' thereof at the expense of the physical (sensible) dimensions of speech. For example, most affect (emotion) research is based on interpretations of what research participants *say* related to affect and emotion, which constitutes an intellectualist reduction (Vygotsky, 1999). Such a reduction is one 'among the most basic defects of traditional approaches to the study of psychology' (Vygotsky, 1987, p. 50). Few studies are investigating affect

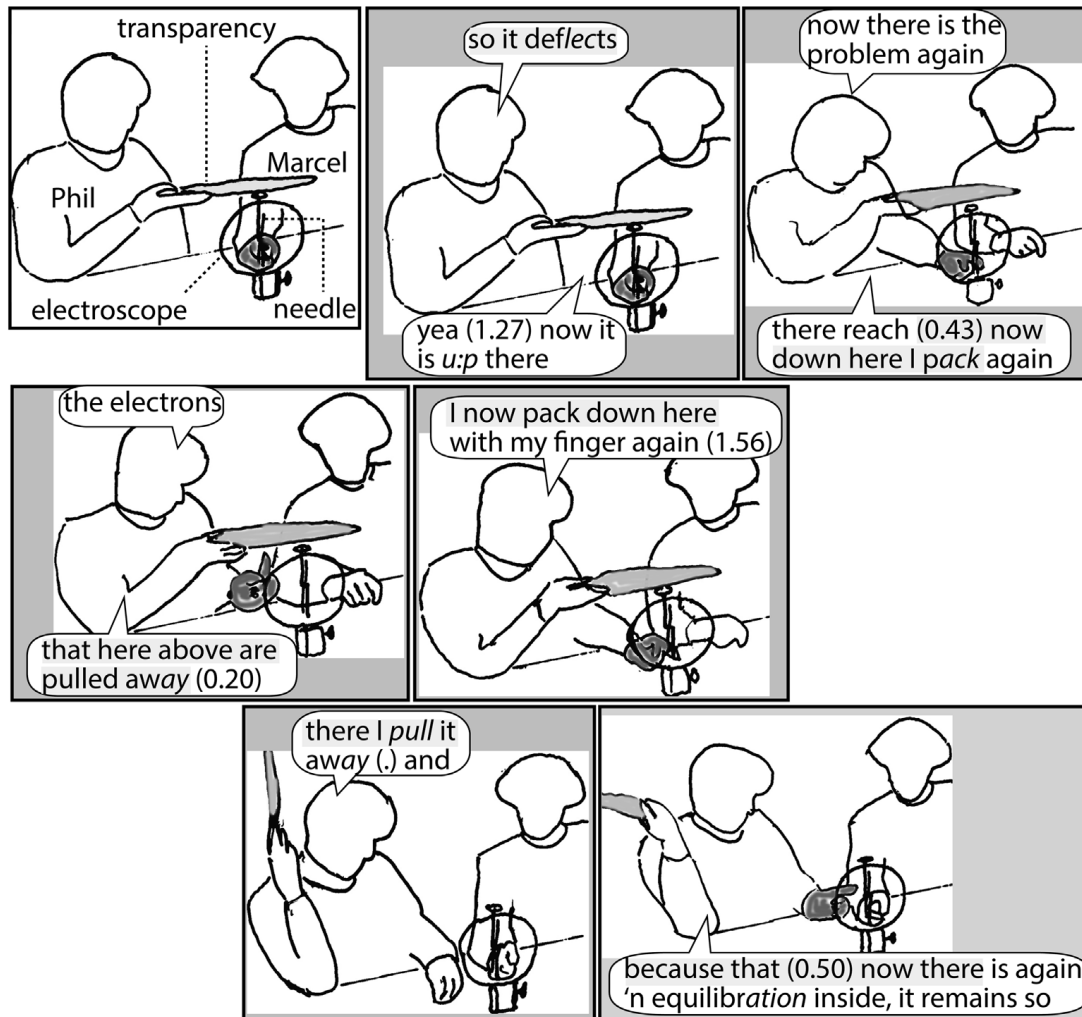


Figure 1. Transcription of a lesson fragment.

Notes: Shaded text coincides with drawing, (1.27) = time in seconds, (.) = less than 0.1 s, *italics* = emphasized speech, : = lengthening of preceding phoneme, ((index)) = transcriber's observation, ;,? = punctuation mark falling, strongly falling, rising, strongly rising intonation)

through the analysis of prosody, the material dimension of speech, including intensity, pitch, pitch contour, rhythm, and so on. These phenomena are correlated with specific emotions (e.g. Roth & Tobin, 2010), so that their analysis avoids the problems of interpretive psychology. Social phenomena, including learning, are better understood in terms of material resonance. This is quite evident from the revised transcription above, which exhibits verbal exchanges as *transactional* rather than *interactional* phenomena. An active listener (e.g. Marcel) is changing *prior* to replying. This also means that the state of the listener is dependent on the state of speech and speaker; there is no exchange of information packets between a self-identical sender and (interpreting) receiver as in classical information theory. In search for alternative ways of thinking about learning, let us, therefore, reorient and think with Spinoza about the lesson fragment.

In many ways, the original transcription (Figure 1), even though it includes visual images rather than translating and reducing to words what can be seen, is insufficient in capturing an important aspect of the experience that it occludes. As a consequence, the transcription eliminates from analysis the very affectation that is important when thinking with Spinoza. This affectation exists in the form of hearing, a phenomenon that is material and ideal simultaneously. This lacuna is addressed in the following revised transcription.

Revised transcription of turns 01–04

P: [((says)) so it deflects]
 M: [((hears)) so it deflects] [((says)) yes (1.27) now it is up there]
 P: [((hears)) yes (1.27) now it is up there] ...

The first aspect we observe is the *material* double presence of each word, corresponding to its simultaneous presence in the mouth of the speaker and in the ear of the recipient. For Marcel to take up and reply, he has to attend to the words unfurling from Phil's lips, which gives body to a little-headed recommendation: 'the word is what ... is absolutely impossible for one person but a reality for two' (Vygotsky, 1987, p. 285).³ But it cannot be that Marcel somehow waits to receive information as a packet *and then* 'interprets' it, as constructivist approaches would have it. Instead, active listening already means dealing with speech as it unfolds; that transformation is brought about by thinking, which itself is invisible. Reading the transcription from left to right and thereby following the temporal unfolding of speech, we realize that as an active, attentive recipient, Marcel is affected before knowing what will have come at him. This is so because he can grasp the phrase as a whole only when speaking has ended. It is, therefore, incorrect to say that Marcel 'interprets' what Phil has said, because Marcel is already actively attending and being affected before the end of Phil's speech. Perhaps even more poignantly, the recipient is affected before knowing 'the meaning' of the statement, especially when the term 'meaning' is taken in its usual purely intellectual sense. The conceptual content of a phrase can be grasped as a whole only some time after saying has ended. That is, Marcel is affected, emotionally and intellectually, by the saying of the speech prior to a grasp of what is happening to him. In a similar way, Phil can know his thought only when his speech has ended, for 'thought is not expressed but completed in the word' (Vygotsky, 1987, p. 250). This is so because Marcel's thinking begins with the first syllable heard, temporarily ending only when his own speaking has ended. This Spinozist analysis flies into the face of much of present-day research, which precisely operates on the assumption that speech expresses (renders) the thought that pre-exists speech. In thinking with Spinoza, speaking, which is a physical act, cannot be determined by pre-existing thought: 'The body cannot determine the mind to think, nor can the mind determine the body to motion or rest, or to anything else (if there is anything else)' (Spinoza, 2002a, p. 279, E III P2).

The preceding paragraph notes that in the second turn (Marcel) thinking with respect to 'so it deflects' begins not after the saying has ended but from the start. Thinking, therefore, begins with something outside the *thinking body*. Spinoza is concerned with how all 'particular things', manifestations of the one and only substance, 'follow from the same necessity and force of Nature' (Spinoza, 2002a, p. 278, E III Pref.). Thinking with Spinoza requires researchers to do a 'deterministic analysis' of thinking, which cannot rest with thinking 'identify[ing] its motive force ... [which] direct[s] the movement of thought in one direction or another' (Vygotsky, 1987, p. 50). To explain the event of thinking, we have to exhibit its effective cause. As shown, Marcel's thinking continues with the reply part of the response, which, in turns, affects its recipient. Thinking, here, has its beginning and ending outside the thinking body. In this way we are thinking with Spinoza, for 'to explain the event we call "thinking", to disclose its effective *cause*' we included it 'in the chain of events within *which it arises of necessity* and not *fortuitously*' (Ilyenkov, 1977, p. 37). That is, when thinking with Spinoza, we conduct a deterministic analysis that includes the various ways in which (a) the person is affected and (b) affects resonate in the person.

The revised transcription makes immediately apparent that *responding* has to begin by actively attending to the address of the other. Marcel would not be able to reply to Phil had he not actively attended before—in which case he might say, 'did you say something?' or 'did you ask me something?' That is, replying is possible only if the word (here 'so it deflects') is common to Phil and

Marcel—i.e. if intersubjectivity exists. But if the word is *common* to the interlocutors, it cannot be a mediator. Thinking with Spinoza, we take ‘the word’, with its sensible manifestation as material sound and its supersensible manifestation in the idea, to be a manifestation of the *unity* of multiplicity (Negri, 1991). Just as no economic exchange relation exists if there is no commodity, no verbal exchange relation exists if there is no word (or equivalent sign). Just as commodity simultaneously is use-value and exchange-value, unity/ identity of radically different manifestations, the word has intended and effectual function (‘meaning’) (Roth, 2006). As a result, in a group there are as many ideas to go with a word as there are members. Once we think with Spinoza, intersubjectivity is a pseudo-problem of dualism. This is so because when we think with Spinoza, ‘only that exists, which is common for me and the other, wherein I and the other agree, what is not only mine [mein]—what is general [*allgemein* = mine of all]’ (Feuerbach, 1846, p. 308). This statement actually articulates the immediate consequence of *Ethics*, whereby an individual’s capacities are determined by ‘the variety of states which its body can assume’ (Spinoza, 2002a, p. 255, E IIP14) and any idea is a function of the relation between body and its surrounding world. The universal, Spinoza’s thought (‘an attribute of God’, E IIP1), is ‘what is impossible for one person, but possible for two’ (Feuerbach, 1846, p. 283). As shown above, this is the very phrase that the late Vygotsky, thinking with Spinoza, has taken up for his own purpose in his vision for a psychology to come.

When we think with Spinoza, we do not just focus on the sensible (material) manifestations of the word. Words, as other things used to signify, ‘while being wholly “material”, palpable-corporeal formations, acquire all their “meaning [značenie]” (function [funkcija] and rôle) from “thought” and even owe to it their specific corporeal existence’ (Ilyenkov, 2012, p. 178). The corporeal, sensible manifestation of the word, therefore, is integral to grammar and, therefore, to the function of the word.⁴ Thus, for example, articulated with falling intonation, the ‘yes’ (turn 02) can be heard as affirmation. Had it been produced with strongly rising intonation (e.g. ‘yes?’), it might have been heard as questioning the preceding statement, as glossed by ‘Do you really think so?’ (especially when accompanied by a particular facial expression) or as inviting elaboration (as in ‘Yes? and?’). That is, we do not know the function of the sound-word ‘yes’ unless we know how it is taken up, which considerably depends on the intonation and other bodily manifestations. The upshot of this is that the dictionary sense of a word, in some contexts, may be completely irrelevant to the event. But if the ‘meaning’ of a phrase, a manifestation of thought, depends on its material body (prosody), no idealist (constructivist) theory will suffice providing a satisfactory account.

Given that speech has sensible (physical) and supersensible (semantic, cultural) attributes, it may not surprise to read that ‘the central problem and the *via regia* of all historical psychology’ exists in the relation of ‘thinking and speech’ (Vygotsky, 2010, p. 94). The relation between thinking and speech is not that of two phenomena external to each other, but there is ‘a *continuous* transition of the external to the internal and the internal to the external, a real rather than imaginary unity’ (p. 94). This connection can be understood in the preceding analysis of speaking that unfolds in time. Because speech is material, it changes the physical environment in its unfolding. But thinking, the ‘internal’ part of the unfolding event, ‘fulfills a function or resolves some task’ (Vygotsky, 1987, p. 250) takes the changes in the physical environment into account, and, therefore, evolves in speaking. That is, when we read the revised fragment from left to right, thinking is changing, whether we consider the speaker or the recipient.

On overcoming the psychophysical problem

The lesson fragment and its analysis suggests we reflect on the relation between ‘hands-on’ tasks and ‘the understandings’ or ‘knowledge’ students are said to construct. Two aspects are to be highlighted. First, as the students ‘account evidences, they succeed in producing the scientific phenomenon to be investigated. It may be said that they *followed* the instructions. The problem with such a description is that it absents the real sensual labor required to bring to life something

like the contents of instruction. That is, the simplicity of the instructions, once successfully ‘followed’, conceals the knowledgeability of practical action and practical reason and, therefore, the relationship of body and mind. When unsuccessful, the students ‘lost the phenomenon’, that is, they did not see what they were supposed to see (the *scientific* object).

From a Spinozist perspective, however, there is no sense to the distinction between knowing some-thing and the ability to apply it or between knowing something and the ability to think. This is so because ideas are the results of the affectations of the body such that ‘the order and connection of ideas is the same as the order and connections of things’(Spinoza, 2002a, p. 247, E IIP7). Persons unable to ‘apply’ knowledge to the object are able to do something else: produce phrases about the object, a symbolic (theoretical) mastery rather than real (practical) mastery. What such education leads to is ‘oriented not toward an objective situation, not toward objective truth in its true—materialist—sense, but toward success, utility, consensus, considerations of the “simplicity and elegance” of semiotic con-structs’ (Ilyenkov, 2007, p. 77).

Second, in the lesson fragment we observe students produce the physical phenomenon again, here with a beginning explanation that includes typical scientific words, such as ‘electrons’, coordinated with descriptions of the actions. Existing research tends to describe learning as ‘abstraction’, whereby students somehow get to conceptualize the ‘deep structure’ of a phenomenon. Initially, however, when asked ‘what happened and why?’, students in this situation—and in many other instances of the static electricity curriculum—initially reproduced the phenomenon inviting the teacher to ‘Look!’ They did not represent the phenomenon in words but produced it so that it existed materially in their midst and accessible by (and common to) all. They did the work of producing it, and this production initially stood for itself. Later, when more familiar with the reliable production of the phenomenon, they began talking about and explaining it in the absence of one or all parts of the equipment. In this case, other objects substituted for (and therefore symbolized) parts of the equipment and hand/arm movements similar (identical) to the original work-related movements were used symbolically to make perceptual and work-related aspects of the phenomenon present again. Over time, and with repeated attempts at producing an explanation, words were increasingly used in place of the materials and symbolic hand movements until they eventually produced descriptions and explanations in verbal form, sometimes accompanied by a sketch.

In this instance, the students’ relation to the world came to double itself. This doubling occurred in the form of ‘language [which] is consciousness that exists in practice for other people and therefore for myself’ (Marx & Engels, 1978, p. 30; Vygotsky, 1987, p. 285).⁵ That consciousness never is pure because matter weighs on the ‘soul’ from its beginnings. In this Spinozist take on the relation between matter and consciousness, we find the foundation for a non-dualist (educational) psychology. The relation to the natural world (here the electroscope and transparency) conditioned the students’ relation to each other (that they were talking and what they were talking about), and their relation to each other conditioned the relation to nature (their verbal exchange relation produced and became the description and explanation of the phenomenon). This double conditioning of the relation to the world and the relation to each other reveals ‘the identity of nature and man’ (Marx & Engels, 1978, p. 31), that is, of biology and culture (Vygotsky, 1997). Because the ‘human essence ... is the ensemble of societal relations’(Marx & Engels, 1978, p. 6), that is, the essence is societal, ‘identity of nature and man’ includes the identity (therefore unity) of multiplicity. There no longer is a dualist, parallelist, or dialectical-op-positional conception of nature and society (culture, thought); instead, there is one phenomenon that transcends nature and culture but manifests itself as such.

Conclusion

Thinking with Spinoza allows us to overcome the problems that are endemic to recent theories of learning; that is, it allows us to begin a post-constructivist agenda of research. Spinoza helps us subvert the constructivist investment in an idealist conception of consciousness at the expense of its materiality. For even when the body is explicitly addressed in learning theories, it is typically so in idealist terms, just as affect is inappropriately investigated through intellectualizations thereof. Thinking with Spinoza also makes unnecessary the frequent recourse to sign mediation because a sign is common (to mind–body) or it is not a reality at all.

This article thinks with Spinoza through the educational psychology of Vygotsky. The case study shows that as soon as we think in this way, new fundamental insights into education, research, and theory emerge. This includes the decision to not focus exclusively on the purely ideal, supersensible dimension of language at the expense of its sensible body. Instead, I have shown how a focus on prosody and the resonance of sound-words reveals a non-dualist theory of learning.

Notes

1. The dualism is a remnant of a dialectical form of theorizing that works with the juxtaposition of mutually exclusive opposites rather than a unity that manifests itself in plurality (e.g. Holland, 1998; Negri, 1991).
2. In the following, expressions such as I.P2 refer to the relevant book (here I) and proposition (here 2) of the *Ethics*.
3. This is actually a paraphrase of the materialist philosopher Feuerbach (1846).
4. The Russian *značenie*, generally translated as ‘meaning’, also translates ‘significance’, ‘weight’, and ‘value’, and is specified in the preceding quotation in the sense of ‘function’.
5. In the original Russian edition, Vygotsky quotes Marx and Engels. In all English translations, the quotation marks have been deleted.

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