Conceptualizing the researcher-theory relation

Josh Tenenberg

University of Washington Tacoma, jtenenbg@uw.edu

In this paper, I interrogate the relation between a researcher and the theories that the researcher gets involved with. I use my own trajectory as a computing education researcher as a way to make visible how different conceptions of this relation are shaped through prior encounters with different theories in the human sciences, particularly theories of mind, language, and knowledge. While modernist theories stemming from the Enlightenment that presuppose a disengaged researcher have predominated in CS and CER, theories of mind, language, and knowledge associated with pragmatist and phenomenological philosophical perspectives from the 20th century challenge these modernist views. Under these newer theoretical perspectives, the researcher is always already involved with theory, even if such theory has withdrawn into the unnoticed background, a background that gives every research study its intelligibility. Recognizing that all researchers are caught in the grip of theory may help in both abandoning theories that no longer serve and staying open to adopt new and emergent theories.

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As researchers, how we talk about and engage with theory presupposes a conception of the researcher-theory relation. I will give a small example from my own life as a researcher of what I am driving at. When I first began to do research in computing education, theory did not exist to me as a thing, something to talk about, to draw upon, to build, to write papers about. To be confused about. More accurately, theory *did* exist for me, but quite differently than I relate to it now. What I took theory to be back then, as a computer scientist new to computing education research (CER), were the things explicitly called "theory" from computer science: automata theory, formal language theory, complexity theory. Theory existed for me as universal and eternal truths about an objective world represented and described by the statements of the theory, statements built from axiomatic and well-formed atoms, glued together into larger, molecular structures by truth-preserving inference rules, sentential and explicit. So when I started to read empirical studies about programmers and programming, filled with descriptions of programmer cognition, plans, schemas, and strategies, I had no sense in which I was encountering "theory," of any sort.

How might we characterize the relation I had at that time with theory such as what educationalists, philosophers, or social scientists talk about, the sort of theory that this special issue is devoted to? If you had asked me about it back then, I would have said "what theory?" I had no way of talking or thinking about theory. We could say that I was "theory-free" back then, though as I will make clear later, I do not think that this is an apt characterization of my relation with theory.

What I want to do in this editorial, a position paper as much as anything, is to interrogate conceptions of this *relation* between researchers in CER and the theoretical objects that researchers get involved with. What I will not be doing is to say what theory *is*, that is, to focus on theory as an object in and of itself (this is well articulated in other papers in this special issue). Nor am I going to make an argument founded on certain kinds of empirical data, such as what we might obtain if we interview computing education researchers on how they think about theory, or what they think they do with it, or how they conceptualize their relation with it. What I will do instead is to provide a narrative of my own changing conceptions of

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my relation with theory as I developed as a computing education researcher. I will use this personal narrative as a basis to talk about the theories that I was encountering, primarily about mind, language, and knowledge, and how these theories both presuppose and reproduce conceptions of the researcher-theory relation.

In this narrative, I move through three distinct conceptions of my relation to theory, the first of which I have already described above as "theory-free." In my next developmental phase, I grew into a more self-conscious awareness of theory as it was used in empirical studies of programmers and programming that I encountered and started to undertake. I discuss a few of the details of some of these theories from classical cognitive science to argue that they articulate a conception of human being and consciousness as immanently separate from the world. As a result, these theories, prevalent today in CER as well as since its beginnings, led me to a disengaged and instrumental conception of the researcher-theory relation. I saw theories as tools that I could pick up and place back down at will, things under my control. In a final (and ongoing) developmental phase, motivated by my finding that the classical cognitive science theories provided insufficient purchase for analyzing the kinds of socially situated and materially enabled phenomena that I increasingly found of interest, I encountered a number of theories with a phenomenological or pragmatist orientation. Not only do these challenge some of the bedrock assumptions of mind, language, and knowledge associated with classical cognitive science. They also, and at the same time, entail a different conception of the relation between the researcher and theory. This conception is a relation not of instrumentality and disengagement, but of *involvement*. In short, the researcher and the theories in which the research is in contact are inextricably bound up in another's careers.

There is an important reason why I focus on the researcher-theory relation, and do so as an editorial for these special issues of ACM TOCE on Conceptualizing and Using Theory in Computing Education Research. And that is that the very *raison d'être* of the special issues, and what I take to be an implicit purport of all of the authors contributing to it, is not only to *say* something about theory, but to *change research practice as a result*. To change one or more people's practice is to change their relation to the world. That is, theory matters when it is taken up, adopted, used, gotten ahold of by other researchers and the community at large, when it finds its way into the instructional designs and tools that structure learning environments. But what might hinder this, a claim that I will elaborate and defend below, is if we see ourselves as disinterested and neutral, who can at will pick up, use, *and then place back down* whatever theory we take as relevant for our current purposes. Because this disengaged conception of our relation to theory overlooks the way in which theory can often hold us captive in its grip, the way in which we (individually and collectively) become irrevocably *changed* by theory, the way in which we are already caught up in the theories that we have (perhaps implicitly) encountered before we even arrived on the CER scene. Theories, when they are doing their job, can cause us trouble, challenge us to rethink and re-evaluate and reconceptualize what we thought we already knew.

1 PICKING UP THEORY AND PUTTING IT DOWN AFTERWARDS

As I undertook my first empirical studies in CER in the 1990's, I implicitly developed a conception of theory as I was becoming accustomed to its use in the literature that I was reading, a conception of theory as something objective: theory generalizes how the world *is*, as in the natural sciences, not how the world

is *conceived*. As I began to notice and work with theoretical objects, I saw new depth in the research that I was reading. When I speak of *noticing* theory, what I was noticing was that a considerable amount of language was being used in the studies that I was reading that told me something about how the researchers were orienting to their research: the questions that they were investigating, the reasons why they were collecting particular data sources, how they were analyzing the data sources and warranting claims, and how all of this related to what other people were doing and saying about similar kinds of research. This language was usually concentrated in the initial parts of the paper, the introduction and background sections, although I could see that the language used in these sections was then spread across the balance of the paper, as if these early sections were establishing a common ground with the reader about the entire perspective under which the research was undertaken and should be read. This is of course a retrospective gloss that at the time I would most likely have described differently. Theory was coming into focus as a thing, but I never had to inquire into its characteristics, what made theory *theory*, what was "theoretical" about it, and how in being "theoretical," theory was different from something else (such as "data" or "analysis").

To give some concreteness, I discuss a paper by Pennington (1987) that exemplifies the kind of theory that I was encountering, as well as the particularities of theory (of mind, language, and knowledge) typical of the conceptual web that Pennington draws upon and contributes to. "The present research," she writes, "investigates the role of programming knowledge in program comprehension and the nature of mental representations of programs: specifically, whether procedural (control flow) or functional (goal hierarchy) relations dominate programmers' mental representations of programs" (Pennington, 1987, p. 295). The key theoretical move described by the author is that computer programs are treated as linguistic objects, as *texts*, and therefore the process that expert computer programmers undertake (internally, mentally) in trying to understand a computer program is much as how people in general (not just computer programmers) understand *natural* language. As a consequence of this theoretical approach, Pennington explicates what at the time was a common way of theorizing natural language text understanding. For example, "various knowledge structures (often referred to as schemas or frames) relevant to the text are activated in the course of comprehension of the text (e.g., Adams & Collins, 1979; Rumelhart, 1980)" (p. 296), "[t]his process results in a mental representation of the text that is influenced by information and structure in the stimulus text as well as information and structure provided by activated knowledge" (p. 297), and "a key process in text comprehension involves chunking the text into segments that correspond to schema categories so that labels for segments will constitute the macrostructure for the text (Kintsch, 1977)" (p. 297). In short, complex, structured, private activity within an individual's mind is taken as the basis by which individuals come to understand the language that they generate and encounter.

We can see a similar view of the relation between language, knowledge, and mind in a burst of cognitively-oriented research in CER at the time, exemplified in the research of Soloway and colleagues. "The content and structure of novice knowledge has been studied in several different domains … A key generalization is that novices use schemalike structures called *plans*. We propose two kinds of plan knowledge and links between them. We discuss the programming plans for both the introductory programming language Pascal and natural language step-by-step procedures" (Bonar & Soloway, 1985, p. 136). It is no coincidence that this research was being undertaken in the 1980's, when artificial intelligence

was experiencing a period of considerable growth as one of the important subareas of Computer Science. One of the most important strands within AI at the time (and since its inception) was what is now termed *Good Old Fashioned Artificial Intelligence* (GOFAI). GOFAI was centered on the construction of heuristic search methods operating on explicit (often sentential) forms of knowledge representation, such as the first-order predicate calculus or variations of it (Hayes, 1979). These representations were seen as "mental models" that mirrored the structure of knowledge possessed by human experts (Buchanan & Smith, 1988; Gentner & Stevens, 1983) about a given domain. GOFAI was influenced by and influencing the larger enterprise of cognitive science (Bobrow & Collins, 1975), a multi-disciplinary effort at the intersection of Psychology, Philosophy, Linguistics, Anthropology, Neuroscience, and Computer Science (Miller, 2003). In this way, new understandings of the human mind would find their way into new computational forms of automated reasoning, and conversely, conjectures about the mind could be "tested" by writing and executing computer programs, comparing computational performance with expert human performance on similar tasks. In essence, the computer was seen as a metaphor for the mind, and vice-versa (Johnson-Laird, 1988, p. 367). This is only the latest in a philosophical tradition that views the mind as a machine, a tradition stemming from "the great shift in cosmology which occurred in the seventeenth century, from a picture of the world-order based on the Ideas to one of the universe as mechanism" (Taylor, 1985, pp. 4–5).

Another characteristic of the cognitivist viewpoint is the inheritance of a Cartesian dualism between the goings on "out there" in the world and the mental representations "in here" in the mind. Mind is seen as a "mirror" onto which nature presses itself (Rorty, 1979). This is not only metaphorical, but ontologized, in that mind—insubstantial, immaterial, filled with representations and universals—is taken as a distinctly different *kind* of thing than the particular, material substance of which the world is made. As a result, a key concern becomes epistemological: how it is that the cognizing mind (i.e. mental representations and processes that operate on them) is brought into correspondence with the material world (Rorty, 1979). We see this concern manifest in the Pennington study discussed earlier. "We assume that one mediating factor in correspondences between text structure [of the program out in the world that is being read] and the structure of mental representations [in the mind of the expert programmer] is the structure of programming knowledge activated during comprehension" (Pennington, 1987, p. 304). If there are correspondences, then some means must be found by which this correspondence has been (or has to be) built, i.e. correspondences have to be *explained*, since they are not taken as natural in any sense. And mental models, that in their structure and operational processes provide replicas *of* the world, are the key ways in which this explanatory task is discharged. So the key concern of education (and its researchers) that arises within and as a result of the cognitivist picture of the world is how learners *acquire* these accurate mental models.

This conception of the interplay between mind, language, and knowledge can be summarized as one that gives ontological significance and explanatory primacy to mental representations and models, mechanical mental procedures, and knowledge acquisition, what is sometimes called *classical cognitive science* (Testa, 2021) or *first generation cognitive science* (Johnson, 2010), which I shorthand as *cognitivism.* Throughout the history of CER, we can see cognitivist approaches, including a focus on the misconceptions that learners often have of the expert concepts that they encounter (Pea, 1986; James C.

Spohrer et al., 1985), a continuing concern in CER, as we see in a report from an ITiCSE 2020 working group report on "Notional Machines in Computing Education."

> A characteristic of NMs [notional machines] is that they represent something that can be interacted with, even if just mentally. … They are created in the context of teaching computing (in general) by teachers as pedagogic devices to help learners understand a simplified version of a conceptual model. … The learner's (personal) mental model will initially be 'incomplete, imprecise, incoherent,' as indicated above and may or may not cohere, first towards the NM offered by the teacher and perhaps later towards the more complex, generally accepted technical conceptual understanding of the computing phenomenon 'caricatured' in the NM. (Fincher et al., 2020, p. 24)

The conception of people that arises from the cognitivist dualism between mind and world is what Taylor (1985, p. 5) calls the *disengaged modern consciousness*. "The liberation through objectification wrought by the cosmological revolution of the seventeenth century has become for many the model of the agent's relation to the world, and hence sets the very definition of what it is to be an agent." As a result, in being inherently, ontologically separate from the world, people's instrumental use of things never threatens to alter people's separateness from these instrumentalities. We build things (machines, tools, computers) in order to use them, not to be *altered* by them, to *merge with* them (Clark, 2001; Haraway, 1991), to be *bound by and to* them. A consequence of this disengaged modern consciousness is that the researcher-theory relation is often thought in exactly these same terms: theories are instrumentalities, just as easily put down as picked up. I call this the *disengaged conception* of the researcher-theory relation.

And it is just such a disengaged conception of theory that I developed as I did more computing education research. In carrying out and publishing additional empirical studies, in reading more widely and more perceptively, theory began to emerge from the unremarkable background as something to be noticed and talked about explicitly. I could *seek out* particular theories that I hoped would illuminate the research problems that I found myself working upon—mindset theory, self-determination theory, motivation crowding theory, metacognition theory, social role theory, plural subject theory, and on and on. I had a clear instrumental sense of theory, that it was something that I could *use*, a lens placed in front of the eyes through which I could "read" data, or a scalpel through which I could peel back the layers of cruft covering the surface of a phenomenon to reveal what was truly going on (in the minds—where else?) of those from whom I collected the data. And just as I could pick up theory, I could place it back down, freeing myself to pick up the next theory relevant for whatever study I was poised to undertake. Getting ahold of some theory, then, seemed like a real advance over being theory-free, that it placed powerful tools that others had developed into my toolbox, in the same way that code libraries provide powerful tools that a software developer can simply *use* without having to build them oneself. Different theories serve different purposes, so that the new challenge was to acquire and use the appropriate theory for the current study: "Link Research to Relevant Theory" (Fincher & Petre, 2004, p. 28; Shavelson & Towne, 2002, p. 3).

2 GETTING INVOLVED IN THEORY

But about a decade ago, cracks started to appear in the edifice of my taken for granted view. I began to have research questions for which the cognitivist approaches did not seem to offer solutions. One of these

concerned the nature of "programming plans" that figured so heavily in domain-specific theories in CER as well as in studies of expert computer programmers. The research suggests that experts have these plans (Pennington, 1987), while novice programmers struggle to acquire them (Bonar & Soloway, 1985; Jim C. Spohrer & Soloway, 1986). The question is, are these plans individual mental things, or are they socially shared things? If socially shared, in what way does a cognitivism of individual mentality account for this, especially if these individual mental schemas are supposed to be causally prior to any action or interaction that an agent might take? Another way to ask this is, if you and I are experts, and we have our own stock of programming plans stored away in our individual minds for later retrieval, plans that serve as the basis for our key actions while programming, why should my plans have any similarities to your plans? Even more generally, how is it that any mental things (processes, strategies, conceptions, models) can come to be socially shared? And if you and I are cooperating in our work, such as writing a program together, how can we come to know that we have a shared understanding sufficient so that our actions and words are intelligible to one another? I am not suggesting that no account might be made for shared endeavors and human cooperation based on a conception of relatively isolated and disembodied individual minds, but that doing so is not obvious or straightforward within the cognitivist program as I understood it at the time.

Another explanatory lacuna for cognitivism within CER was that we did not seem to have a grasp on how graphical representations (such as UML) figured into the ways that experts used them to carry out their professional work, how students could, should, or did use them in writing programs, or how we should teach their use. This is particularly perplexing given how important and ubiquitous "graphing practices, which includes producing, reading, and interpreting graphs, are … to not only scientific communication but also to the scientific enterprise more broadly" (Roth, 2003, p. 3). In CER, there had been studies undertaken that primarily looked at the characteristics of the graphical design representations produced by students (Eckerdal et al., 2006), and I was a co-researcher in one of these studies (Tenenberg et al., 2005). But there were no studies that actually examined the *use* of these representations by students in their actual software development activity as it unfolds, i.e. not through an examination of artifacts in isolation, or through retrospective descriptions by students of what they thought they did, but through directly seeing their use. And there are still no such studies, as far as I know. Similarly, a colleague and I found that although there had been a number of studies related to graphical software representations produced by expert software developers, most from a cognitivist perspective, there were none investigating the use-in-context of any of these graphical notations (Socha & Tenenberg, 2013). Classical cognitivism offered little in the way of theoretical tools for analyzing the video data sources that we were collecting of in-situ work.

Urged to do so by colleagues, I began to seek out theorists in the social sciences and philosophy identified as *phenomenological* or *pragmatist*: Bourdieu, Taylor, Dewey, Mead, Peirce, Wittgenstein, Garfinkel, Schutz, Heidegger, Rorty, Brandom. At first, I did not really understand what these theorists were saying. It was as if I had expected to hear one language when another was being spoken, so that nothing made sense. Surely these phenomenological and pragmatist researchers cannot mean *this* when they say *that*? As I continued my work in this tradition, I began to make some sense of it, to find my feet. And what I found was that these theories offered a different account of mind, knowledge, and language than the disengaged individual. Instead, they offered a theory of *involvement*, of the dissolution of the

dualities of mind/body, individual/society, and person/world. In order to give a better sense of how these theories do so, I provide an example that uses this theoretical orientation, drawn from an analysis that colleagues and I carried out in an undergraduate Data Structures classroom at a U.S. university and reported in the *Communications* (Tenenberg et al., 2018). I point out some key theoretical features of this orientation, contrasting these with the cognitivist ones described in the prior section. And then I use these theories to support a claim that the researcher-theory relation is one of involvement, rather than disengaged instrumentality.

In the analysis that colleagues and I carried out, the teacher stands in front of a "standard" classroom—rows of desks, a projection screen, students seated and eyes straight ahead. The teacher is at a blackboard writing code for an *add* method to an *ArrayList* class, soliciting fragments of code from students. This is the mundane and ordinary back and forth of a teacher and students writing code together endemic to computer science classrooms. In this analysis, we frame the behavior of students and teacher not as composed of or explained by schemas, representations, skills, motives, procedures, strategies, and similar, the individual as the unit of analysis. Rather, we take the entire group of people (students and teacher together) in joint activity as the unit of analysis, describing this joint activity as an irreducibly *social practice*, what Wittgenstein (2009, p. 8) calls a language-game, that is "the whole, consisting of language and the activities into which it is woven". In a language-game, the participants "act as if they were following specific rules of the game, and an observer can read these rules off from the practice of the game even if the players never articulated or are aware of the rules" (Tenenberg et al., 2018). Our analysis was based on *in situ* audio-visual recordings, fifteen minutes from one class session of the fourteen one- to two-hour sessions that we captured in the classroom and computer laboratory during a single academic term. In this analysis, we go through the episode one spoken utterance at a time, noting what particular code-related inscriptions get written on the blackboard and the activity into which these code inscriptions are woven. The following is typical of the analysis.

> In the subsequent turn sequence, the student continues his earlier utterance, saying "which I believe will be an object you could just call it add" and Alan saying "okay (0.5) so I'm going to make public [writes and speaks the following words at the same time] void add [writes '('] and it'll [writes 'Object' as he speaks the rest of his turn] take an object what do you want to call that object." Alan's writing and corresponding speech do three things at the same time: acknowledge what the student offered, provide a positive evaluation in the writing, and correct and elaborate what was said while putting it into code.

In the end, we see a single, two-part *rule of propriety* that the participants use to structure their activity and give what is written on the blackboard its status as authoritatively correct code. The rule is that the teacher, who acts as a gate-keeper of what gets written on the blackboard, writes all and *only* those student code offers that the teacher treats as correct and appropriate. And all student code offers save one that the teacher rejects are accompanied by an explanation of *why* the code was not written on the board, why it is incorrect or inappropriate ("a little strange … a verb," "too vague," "but we don't know if there's 10 slots because it could have already been resized"). To gloss the rule that the teacher and students enact, we can say "[w]hat is right is written, what is not right is explained" (Tenenberg et al., 2018). To call this a "rule of propriety" is to say not only that this rule is followed uniformly throughout this episode, but that

it is the main form of *teaching* something important about computer programs and programming, about what is correct and appropriate when writing programs within a community of programmers.

What are the features of this analysis, and my descriptions of it, that reflect a phenomenological and pragmatist perspective? One is the emphasis on a *social unit of analysis*, irreducible to the individuals who constitute the social group. This is what Durkheim (1982) emphasizes as the *sui generis* of sociality, that a social group is something "new," above and beyond the individuals who constitute the group. As a result, there is a coherent sense in which we can talk about the *group* as a collective enacting a particular rule, or producing a particular structure of authority, even if none of the individuals of the group is aware of the rule that is followed or the authority that is produced (Garfinkel & Sacks, 1970; Wittgenstein, 1953). Second is a fundamental concern with *action-in-context*, with what it is that people *do* in their socio-environmental transactions (Bernstein, 2010), rather than a focus on (for instance) the beliefs of the group members, or the artifacts and documents that they produce as the precipitate of their joint efforts. This doing of action requires and presupposes the embodiment of human actors and their inextricable coupling to the surrounding environment, which includes other people and a variety of culturally-shaped tools (Thompson, 2007). "The thing essential to bear in mind is that living as an empirical affair is not something which goes on below the skin-surface of an organism: it is always an inclusive affair involving connection, interaction of what is within the organic body and what outside in space and time, and with higher organisms far outside" (Dewey, 1958, p. 282). The third is the *normative* dimension of the social, i.e. the "rules" of the game or the "norms" of practice. "[W]e live and move and have our being in a space structured by norms" (Brandom, 1994, p. 46). This normative aspect of human life is so pervasive that it hides in plain sight; norms become articulable (for instance by the teacher in the analysis above) only when they are violated (Fehr & Schurtenberger, 2018; Garfinkel, 1967). Norms and rules always have some *deontic* content, that is, they refer to obligations, prohibitions, or permissions that are incumbent upon members of the norm-sharing group to follow under particular conditions, subject to sanction for non-compliance (Ostrom, 2005). Under the pragmatic view, our concepts, and the inferential structures that we build to justify them and that we in turn use for justification of further concepts, rest upon a foundation of norms, rather than on (say) a priori concepts or sensory primitives (Brandom, 2000; Sellars, 1997). A fourth characteristic are the *language-games* (equivalently *social practices* (Bourdieu, 1977; Rorty, 1979)) constituted by the normative activity in which language is caught up. "The word 'language-*game*' [Sprach*spiel*] is used here to emphasize the fact that the speaking of language is part of an activity, or of a form of life [Lebensform]" (Wittgenstein, 2009, p. 15), rather than that meaning inheres in representations according to a model-theoretic correspondence semantics (Dowty et al., 1981). That is, words do not stand autonomously and separate from the use of words in particular contexts; it is only within these contexts and uses that words can come to have meaning at all. The key educational problematic of this theoretical perspective is how social practice can be shared, reproduced, and changed across generations (of teachers and students) (Tenenberg & Fincher, 2022).

As with my gloss of cognitivism, this summary is a gloss of a conceptual web of theory that is as much polyphonic as it is monophonic, a gloss that combines two distinct though related philosophical traditions, the phenomenological and the pragmatic (Bernstein, 2010). Such combining is not unknown among philosophers conversant with both traditions. "Heidegger's phenomenology and Dewey's epistemology are

better off married than living single. Their marriage will permit and require the development of programs of research into the pragmatic and phenomenological characteristics of operationally successful patterns of inquiry" (Blattner, 2008, p. 75). I have pointed out only some high-level family resemblances among many of the philosophers (and their theories) within these phenomenological and pragmatist traditions that can stand in sharp contrast to counterpart notions within cognitivism and that are relevant to the discussion at hand.

3 HELD WITHIN THEORY'S GRIP

What then, do the phenomenological and pragmatist theories have to do with the researcher-theory relation? Charles Taylor has written perceptively of some of the consequences of the phenomenological philosophical perspective (Taylor, 1985, 1989, 1995). He draws our attention to the fact that language is not only representational, a notation for thought that stands for things in the world. "The earlier views [of language], those of Hobbes or Locke for instance, saw language as an instrument, and understood meaning in terms of designation" (p. 9). This representational view of language has been central to cognitive science as pointed out above, visible in the discussion of natural and artificial language comprehension that we see in Pennington, Soloway, and many others. Taylor, on the other hand, asserts that human beings are partly *produced* in and through language because of the language games of which it is a part: "language ... helps constitute our lives. Certain ways of being, of feeling, of relating to each other are only possible given certain linguistic resources" (p. 10), a hermeneutical approach to language whose origin Taylor associates with Herder and Humboldt in the 18th century (Taylor, 1985) and with Heidegger and Wittgenstein in the 20th century (Taylor, 1995). It is this aspect of language, the language games in which language arises and which make language possible, that motivates my use of the term "involved" to identify a key feature of this philosophical perspective.

Another implication is that in carrying out language-games (social practices), their meaning and import, and how we might respond as participants within them, rests upon an implicit and taken for granted *background* that provides "the context of intelligibility of experience" (Taylor, 1995, p. 69). Although some of this contextual background can become an explicit object of thought and discourse, it can never be fully articulated.

> It is that of which I am not simply unaware, as I am unaware of what is now happening on the other side of the moon, because it makes intelligible what I am uncontestably aware of; at the same time, I am not explicitly or focally aware of it, because that status is already occupied by what it is making intelligible. Another way of stating the first condition, that I am not simply unaware of it, is to say that the background is what I am capable of articulating, that is, what I can bring out of the condition of implicit, unsaid contextual facilitator ... and make it explicit. But ... the idea of making the background completely explicit, of undoing its status as background, is incoherent in principle ... [since] bringing to articulation still supposes a background. (Taylor, 1995)

The background of context is not only spatial, the surrounding physical environment (including the people involved) that impinges upon whatever is the matter at hand. It is also temporal, the "precedent state of affairs" (Dewey, 1960a, p. 99) that constitutes the history from which the present state of affairs has emerged and that gives this present its meaning and import.

This means that in whatever we might say about theory—either a particular theory or about theory in general—we can never escape the unarticulated background of the language game that is used to describe and understand theory. For example, the language game that includes "cognition," "mind," "schema," and "plan" (and all of the background presuppositions and history of uses of this large conceptual web) is quite different than the language-game that includes "norm," "background," "social practice," and "language game" (and all of its presuppositions and history). So that starting from a cognitivist language-game, as does (Xie et al., 2019), one's resulting theory of instruction for introductory programming (to give just one example) is sensible in relation to this cognitivist background; starting from a phenomenological language-game, as does (Tenenberg & Chinn, 2019), one's theory of instruction for programming is sensible in relation to the phenomenological background.

These language-games are not only dictionary lists or static mental structures; they are *lived*, and people *inhabit* these forms of life. And since theory is constitutive, since it is materialized in a language game, the researcher and the research object are affected in and through the theory that brings them together. "[I]deas are never any good unless they are felt and lived. Otherwise, they are just 'dry letters,' as Dickens wrote. A good deal of theory is desiccated, corpse-like. In her novel *L'Invitée*, Simone de Beauvoir's character Françoise says, 'But to me, an idea is not a question of theory, one experiences it; if it remains theoretical it has no value'" (Hustvedt, 2016, p. 119). We can be changed by the theories that we encounter, irretrievably, irreversibly. If we have *not* been changed by theory, perhaps we have not yet entered into the language-game associated with the theory in the way that we ought?

> To steep ourselves in a subject matter we have first to plunge into it. When we are only passive to a scene, it overwhelms us and, for lack of answering activity, we do not perceive that which bears us down. We must summon energy and pitch it at a responsive key in order to take in. (Dewey, 1960b, p. 171)

Only in encountering these new theories and hence my relation to them, of theories as something that I get involved with, that I get "caught up in," did I see my prior conception of my relation to theory as a *conception*, not the objective reality I took it to be. That is, without quite knowing it, in my earlier research in the cognitivist tradition, I had acquired a conception of the researcher-theory relation—or more to the point, I had been acquired by a conception of theories as tools from which I was separate, a duality of object (theory) and subject (researcher), just as easily put down as picked up. And I as a researcher was to place myself in an acontextual, objective standing in relation to the research objects under investigation so as to get the true and correct view of them, a "view from nowhere" (Nagel, 1986). "One can only see from a certain standpoint … A standpoint which is nowhere in particular and from which things are not seen at a special angle is an absurdity" (Dewey, 1960a, p. 102). What I only later became aware of due to my new theoretical encounters was that in my prior lived existence, first as a computer scientist and then as a computing education researcher, that I already inhabited a form of life. There is no possibility of being "theory-free," to disengage oneself from one's own prior theoretical commitments, even if one is completely unaware of them. Even an increasing awareness of the background theories and traditions through which one has traversed is never sufficient to completely separate oneself from them. "We cannot explain why we believe the things which we most firmly hold to because those things are a part of ourselves. We can no more completely escape them when we try to examine them than we can get outside

our physical skins so as to view them from without" (Dewey, 1960a, p. 100). And there is no possibility of complete escape from the theoretical commitments of one's contemporaries, since any research endeavor only has meaning for a community when it enters into the discourse of the community. So we are always situated temporally within our own histories and spatially with the rest of the research community as it is currently constituted. "[I]t is an illusion to suppose that there is some neutral standing ground, some locus for rationality as such, which can afford rational resources sufficient for inquiry independent of all traditions. Those who maintained otherwise either have covertly been adopting the standpoint of a tradition and deceiving themselves and others into supposing theirs was just a neutral stand-ground or else have simply been in error" (MacIntyre, 1988, p. 367).

So the language and form of life that I carried into the research setting was largely taken for granted, commonsensical, "natural" and "normal": of course people have "minds" with "plans" and "schemas" that "represent" the world and allow their possessor to employ "strategies of reasoning"—this is so obvious that it can in general go without saying (and each term can go without quoting), as so much of normal scientific work need not be articulated (Kuhn, 1962; Roth, 2004). Every choice that I made in an empirical study was determined by my prior habits and perspectives, the language and theoretical presuppositions that structured my actions: the research questions that came into my consciousness, the data sources to collect and forms of analysis that I considered legitimate, the literature that I drew upon to contextualize and interpret my results. In short, everything that I did as a researcher was conditioned by my prior praxis, my inhabitations of theory as I encountered the research objects, habits that I was not even aware of. I thought that I had a view from nowhere when all the time I was situated within the cognitivist form of life—only one form of life among the infinite forms possible—into which I had been absorbed.

It was only as the disengaged conception of theory was under challenge that I noticed how I had been in its grip for so many years.

> Dewey famously argues that our views of thinking and logic have been mesmerized and held captive by disembodied, ahistorical, and overly intellectualized theories of cognition. We tend to fixate on certain concepts, logical principles, and methods of thinking as though they constituted eternal, pure, universal structures of an allegedly transcendent reason. This kind of selective abstraction reinforces the illusion of a pure seat of thought in something variously called "mind," "reason," or "pure ego." (Johnson, 2010, p. 129)

And it was this grip, as much as anything, that was hindering my reaching into and getting caught up in new theories, new forms of inquiry. What my further investigations into these involved conceptions of theory uncovered is that many researchers and theorists see them as foundational for cutting-edge research in the human and cognitive sciences (Caruana & Testa, 2021; Clark, 2008; Engel et al., 2016; Joas, 1993; Thompson, 2007), including what is sometimes referred to as *second-generation* cognitive science, also going by one or more of *embodied*, *embedded*, *extended*, and/or *enacted* (4E) cognition (Newen et al., 2018).

> "[S]econd-generation" … cognitive science … requires a radical rethinking of some of our most enduring conceptions about human thinking and communication. Virtually every key term (e.g. reason, mind, self, meaning, thought, logic, knowledge, will, value) has to be re-conceived. … pragmatism's greatest

> contribution to cognitive science is to construct the appropriate general philosophical context for understanding the empirical results about mind, consciousness, meaning, thought, and values. (Johnson, 2010, p. 142)

4 PRAGMATIC ATTITUDES OF INQUIRY

I have described a developmental trajectory concerning my conception of my relation with theory as a computing education researcher. Initially, in my life as a computer scientist, I knew theory only as it was understood in computer science, concerning the formal, the mathematical, the provable from first principles. I was thus mystified when I first encountered empirical research in programming and software development. We could conceptualize my relation as "untheoried" or "theory-free," for I had little sense of theory as a distinct kind of thing. Only as I pushed further into CER, reading more and undertaking my initial empirical studies, did I begin to see the outlines of theory as a special kind of object in human-oriented research. This was less a self-conscious and articulated sense of theory, but an apprehension of the "aboutness" of the theories, what they were trying to tell me about how it is that the world—our minds, our language, our knowledge—operated. In my view at the time, the theories organized objective truths about psychological reality: individuals have minds, with particular representational content that correspond to objects and events in the world, mental processes for operating on these representations. People are fleshy on the outside, machine-like in the interior; as my first PhD supervisor said, people are "machines of meat." And the disengaged dualities of mind/body, individual/social, and person/world founded what I took to be my disengaged relation to theory: they are tools, to be picked up and put down at will, useful as appropriate to the study *du jour*. As I continued to encounter this theoretical orientation, in study after study (including my own), I came to treat it as something natural. Only as I encountered critiques of this theory did I come to a self-conscious awareness of theory as a special kind of object, and that there was considerable disagreement about just what this object is and what it does for and to the people who get caught up in it. I had not realized that I already "had" theory, or rather that it had me, that I was caught in the grips of it, until I encountered a perspective suggesting that the theory to which I was so firmly attached might not be the only view of the world in the world.

> Given a point of view that determines a perspective on the nature and arrangement of things seen in that perspective, the point of view is, I supposed, the last thing to be seen. In fact it is never capable of being seen unless there is some change from the old point of view. (Dewey, 1960c, p. 260)

In summarizing how my *conceptions* of my relation to theory changed in these three development phases, this might give the impression that I see this relation as primarily epistemological, so that we can change our relation to theory by thinking ourselves to be in a different relation to it. But this is not at all what I intend, for what I am arguing about concerns an objective relation between people (individually and as collectives) and the theoretical objects that constitute theoretical social practices (i.e. the theoretical things we say and do) of the community. So although my *conception* of my relation to theory has changed, my *objective relation* to theory has not: *I have always been involved with theory*, always already affected, always already caught up in theory, even when I had no sense of what theory was, even when I thought that theory was neutral and instrumental, that I could just as easily put it down as adopt it. And so is every other researcher. Or so it appears from the standpoint from which I now speak.

We have always been infected by theory, and there is no cure for it. We can never get free of theory, and we do not want to even if we could. Theory sticks to us, becomes embedded in our beings, in the things we say to one another, and in the things that we make, our instructional designs and tools, our habits and practices. But I can only argue about an involved conception of our relation to theory because I have been dislodged from—with difficulty, with struggle, with lots of argument, backsliding, complaining—one set of theories, those of classical cognitive science, and picked up others, those of phenomenology and pragmatism, and the new forms of cognitive and social science that they are engendering. "It requires troublesome work to undertake the alteration of old beliefs" (Dewey, 1933, p. 30). And this new set of theories is what suggests that language games are constitutive of individuals and collectives, and that these games are always already there, primarily as the unarticulated background of the things that we *do* articulate and make. And now this involved conception of my relation to theory, the theories it depends upon in order to argue for and sustain it, has gotten into the marrow of me, has captured me, and I hope it captures others.

And this is just what new theory, and new kinds of theory, offer to the researcher who is always already caught up in the theoretical language games that have constituted their historical trajectory. Unfamiliar theory can sometimes give us a new perspective, a small detachment from what we have up until this point cherished without knowing that we do so. I urge that those reading this special issue critically encounter what is on offer here, open to the possibility of troubling their own existing theoretical commitments. Our normative binding to theory is one of the key things that make us as individual researchers and as a research community. We have to be willing to take up new theory, which will often require that we put down theory that no longer serves.

> Surrender of what is possessed, disowning of what supports one in secure ease, is involved in all inquiry and discovery; the latter implicate an individual still to make, with all the risks implied therein. For to arrive at new truth and vision is to alter. (Dewey, 1958, p. 245)

There is a subtlety that I wish to bring out from the background in order to underscore the point that I am trying to make. My argument here takes theories as objects and researchers as caught up in deep relations with theory, relations that are largely unnoticed by the researcher; this is, to a great extent, what it means to *be* involved, to be caught up in something. But to make this argument is to take a somewhat disengaged standpoint on the researcher-theory relation. This appears to contradict my repeated assertions that involvement is not optional, and also to recommend the very stance of disengagement that I am trying to problematize. But my purpose in using this rhetorical approach is to ask the reader to "step back" a bit from their normal form of engagement in order to more clearly see it, much as when we can look back at our own past in order to get a better handle on its events and their significance, or when we look upon a terrain from a hillside nearby so as to better see its contours. The new perspective is just that: a *perspective*, a disengagement from one stance *to another*, a *local* rather than a total disengagement, a view from a different somewhere rather than a view from nowhere. Our human predicament prevents us from ever stepping completely away and into an "objective perspective," a phrase as oxymoronic as it sounds. Total disengagement is an impossibility. We are always involved, though sometimes we have to step back a little

from this involvement so as to better recognize it, and in this way to perhaps form new and different involvements.

And that is the whole point of this special issue, its raison d'être: to offer new theory, not simply as disengaged tools but as new forms of involvement. We can close ourselves off to these new theories, tighten our grip on whatever we already have, maintain our current shape in the face of new forces that might chip away at our cherished conceptions that are long past due. "The human spirit will continue its breathtaking adventure of self-reconstruction … [b]ut only if we try hard to see new opportunities, and only if we work hard at leaving old frameworks behind" (Churchland, 1988, pp. 186–187). We need *more* theory, not less, and more theory that troubles our existing conceptions of who we are and what we are doing within a complex encompassing world. In this way we clear the ground for new research, "new truth and vision" that we cannot as yet describe or conceive.

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