

Cognition as Situational Inquiry: John Dewey Meets Jean Lave

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August 4, 2015

Keywords: Jean Lave, John Dewey, situated cognition, inquiry, situations

0.1 Acknowledgements

Matthew J. Brown would like to thank Nancy Nersessian, Bryan Norton, Mike Cole, Ed Hutchins, Jim Hollan, Lyn Headley, Etienne Pelaprat, Brynn Evans, and the members of the UCSD Pragmatism Reading Group, Laboratory of Comparative Human Cognition, and Distributed Cognition during my time there. Each of these people have exposed me to or encouraged me in ideas that contributed to this essay. Our thanks to Marco Tacca for his help in coordinating the research project mentioned in the final section of the paper.

Primary responsibility for the contents of §1-4 of this paper, including its failings, falls to the first author of this paper, though the other authors have read these sections carefully and provided helpful feedback. The empirical research described in §5 is fully collaborative between all the authors of the paper.

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0.2 Abstract

For John Dewey and Jean Lave, the concept of “situation” figures prominently in their theories of cognition. In comparing Lave’s work on situated learning and cognition with John Dewey’s situational theory of thinking and inquiry and his anti-Cartesian theory of mind, I show that there is a fruitful convergence and complementarity between these two major theorists of mind, culture, and activity. Their work shows that focusing on situations remains an important way of thinking about cognition in ecological and cultural context.

“Thus, a contextually grounded theory of cognition requires a *theory of situations*.” – Jean Lave, *Cognition in Practice*

1 Introduction

Situated cognition is one of a family of theoretical approaches that regards environment, social context, and cultural mediation as central to the analysis of cognition itself, rather than external influences on cognition. Other such approaches include cultural-historical activity theory (CHAT), distributed cognition (DCog), cultural psychology, symbolic interactionism, actor-network-theory (ANT), the hypothesis of extended cognition (HEC), and the cluster of views under the combined heading of embodied, embedded, extended, enactive, and affective cognition (4EA). Although “situated cognition” may first seem to refer to a distinct species of cognition, in fact it describes an approach to all cognitive activity. Situated cognition has received a significant amount of attention lately (e.g., Aydede and Robbins (2009)). Unfortunately, contemporary discussions of the situated cognition theory, for the most part, have neglected the historical roots of the theory and failed to carefully relate it to or distinguish it from related approaches (HEC, 4EA, DCog, etc.), resulting in something of a theoretical mishmash.¹

¹There are of course exceptions to the rule. The essays by William J. Clancey, Shaun Gallagher, David Kirsh, and R. Keith Sawyer and James G. Greeno in Aydede and Robbins

Within this milieu, Jean Lave and John Dewey are already considered pre-eminent thinkers and guiding lights, and both made central use of the term “situation” in their work. I will trace their thinking about situation and cognition, highlighting their convergences and complementarity. On the basis of this historical review, I will argue for a view of cognition as situational inquiry.² Building on Dewey and Lave, we can develop a theory of situations that can, as the epigraphic quotation suggests, ground a contextual theory of cognition.

2 Lave on Situated Cognition in Practice

In *Cognition in Practice* (1988),³ Jean Lave states that the goal of her inquiry is to make “suggestions that transform our conceptions of culture, cognition, and activity in the lived-in world”(xiii). These suggestions involve reconceiving cognition not as something that takes place “in the head,” but rather as an embodied and situated activity. Cognition is thus relocated:

“Cognition” observed in everyday practice is distributed—stretched over, not divided among—mind, body, activity, and culturally organized settings (which include other actors). (1)

Cognition is “distributed” across brain, body, setting, etc., rather than merely *embedded* within them. Thus it would be fair to say that “situated cognition” is a misnomer, insofar as it can be taken to connote only that cognition is embedded in a context. It is not *merely* a matter of what Lave calls “situationally specific cognitive activity”(3), but rather, cognitive activity is

(2009) show much better consciousness of historical roots or the variety of contemporary approaches.

²The astute reader will note the use of “situational” rather than “situated.” This is intentional, for reasons laid out throughout the essay.

³The decision to rely primarily on this older work of Lave’s is deliberate. *Cognition in Practice* is an important historical milestone in the development of situated cognition. It is directly engaged with historical discussions of cognition and cognitive science. In this book, Lave also does a great deal of heavy lifting in terms of innovating theory and methodology. E.g., the concepts of situated learning and legitimate peripheral participation as developed by Lave and Wenger (1991) are less central to the goals of this paper.

situationally specific because the situation itself is a constitutive component of that activity.

The relocation of cognition from the mind/brain to the situation goes hand-in-hand with a shift of units of analysis for cognitive science to “the whole person in action, acting with the settings of that activity”(17). The study of persons acting in settings that Lave recommends and pioneers is multimodal, interdisciplinary, and multilevel. Early on she refers to her project as " a ‘social anthropology of cognition’ rather than a ‘psychology’"(1), but in fact, she is relying not only on the methods of anthropology, but also experimental psychology, political economy, and social theory, among others. This same sort of approach of studying the phenomena of cognition by pursuing multiple empirical and theoretical methods of inquiry simultaneously is often a hallmark of situated cognition and related approaches, and is exemplified by later authors like Cole (1996) and Hutchins (1995a).

Lave’s view of cognition is driven by extended exploration of the cognitive activity of arithmetic. Her key observation, painstakingly demonstrated throughout the book, is that arithmetic ability is situationally variable:

The same people differ in their arithmetic activities in different settings in ways that challenge theoretical boundaries between activity and its settings, between cognitive, bodily, and social forms of activity, between information and value, between problems and solutions. (3)

In the studies reported in *Cognition in Practice*, Jean Lave and her collaborators looked closely at arithmetical performance across different situations, especially everyday situations like the workplace or the supermarket versus scholastic testing situations (including the school-like situation of common psychological laboratory tests of arithmetic ability). Traditional schooling and cognitive psychology assume that there will be “learning transfer” across situations. Since basic cognitive abilities like arithmetic are considered abstract and general, the idea is that what is learned in school will be applied to whatever situations call for that ability. Instead, what Lave (and many others) have observed is “consistent discontinuities”(66) across different situations. Cognitive psychology has consistently missed, misinterpreted, and failed to account for this variation. A major part of the problem is viewing schooling,

laboratory experiments, and other school-like testing scenarios as context-free activities, taking place in the “non-contexts” of school and lab.

The variability of performance across different situations raises the problem of *ecological validity* of laboratory work (Lave 1980). Like the issue of external validity, ecological validity is a problem of generalizability, but while the former is concerned with generalizing across groups (from sample to population), ecological validity is about generalizing across contexts, from the research setting to the contexts of everyday activity. Regarding cognitive processes as abstract and general, and lab or school as non-contexts, makes the problem of ecological validity invisible. Shifting the focus from the inner mental lives of individuals to situational activities keeps context, and thus ecological validity, in focus.

In contrast to the traditional approach, Lave demonstrates the importance of *structuring resources* in cognitive activity (98ff.). This includes the features or structure of the setting of the activity that make a difference to the activity. Structuring resources include other ongoing activities: if one is reading and knitting simultaneously, knitting is a (potential) structuring resources for reading, in this instance, and vice versa. Lave’s work looks primarily at how shopping and arithmetic act as structuring resources for each other, altering the nature of the arithmetic activities. Further sources of structuring resources include social relationships and subjective experience, including motivation, value, and meaning (124). However, “structuring resource” is not a vague nor a catchall kitchen-sink term. Something is a structuring resource for a particular activity if it is a feature of the situation that affords or reshapes the activity in a particular way. Features of the setting that are not relevant to the activity or do not afford it, are *not* structuring resources. Lave challenges traditional education and the learning transfer paradigm by providing evidence that mathematical test-taking ability (in scholastic or laboratory scenarios) does *not* function as a structuring resources for arithmetic ability in the supermarket (128).

In trying to theorize the context of activity, Lave is led to distinguish between two senses of context: *arena* vs. *setting*. Lave defines the “arena” as “a physically, economically, politically, and socially organized space-in-time”(150). It is the material, institutional, and cultural background of activity. She tells us that “It is not negotiable directly by the individual”(151) because it is, to some extent, fixed above and beyond the individual, the product of physical,

historical, and sociological forces rather than personal and psychological ones. On the other hand, “setting” is the phenomenological reflection of the arena. It is the arena as “repeatedly experienced, personally ordered and edited”(151). The arena is relatively fixed and constraining, while the setting is relatively malleable and subjective, though since the social and individual level are dialectically constituted, there is limit to the fixity of the one or the malleability of the other. Arenas are much easier for the ethnographer to catalog than are settings, which require a careful attention to the way the person interacts with the arena.

Unlike Scribner (Scribner and Fahrmeier 1982), who argues that problems exist in the environment (concretely and objectively) (see Lave 1988, 69), Lave argues that problems require recognition by the problem solver, recognition that *constitutes* the problem *as* a problem. “And if a problem must be recognized in order to exist it is not possible to locate problems exclusively either in settings or in cognitive processing—both are involved”(69). In other words, “‘cognition’ is constituted in dialectical relations among people acting, the contexts of their activity, and the activity itself”(148), where “dialectical” means not merely interaction or reciprocal impacts but mutual co-constitution, where the individual terms only exist in interaction with one another (146). (Dewey captured this same ideas by adopting “transactional” over “interactional” (Dewey 1949).)

Problems and problem solving are central to the way that Lave thinks about cognition. Yet, we find throughout the book a trenchant critique of account of “problem solving” in classical cognitivism. For instance,

... ‘problem solving’ has been given misleading preeminence in cognitive theory. The assignment of unwarranted theoretical centrality to problem solving reflects a failure to comprehend these activities as practices *sui generis*. But the reduction of cognition to problem solving *per se* simply cannot grasp the generative nature of arithmetic practice and its constitution as part of an ongoing activity in context. In the theoretical terms developed here, persons-acting and settings, in activity, together generate dilemmas and resolution shapes. (169)

What Lave is actually objecting to is a particular use of this terminology in the traditional cognitivist approach:

The puzzles or problems are assumed to be objective and factual. They are constructed “off-stage” by experimenters, for, not by, problem solvers. The process of their construction is therefore not relevant to problem-solving activity and not accessible to inspection. Problem solvers have no choice but to try to solve problems, and if they choose not to, or do not find the correct answer, they “fail”... (35)

On the traditional approach, the model for “problems” and “problem solving” are things like logic puzzles and problem sets in math class. Lave rightly points out that this kind of problem is “a specialized cultural product”(43), rather than a suitable foundation for theories of cognition in general. That does not mean that a situational theory of cognition has to give up on the terminology altogether. In fact Lave, shows us how to talk about problem solving in a situational way: “. . . problem solving in the supermarket is a process of transformation; something must first be transformed into a problem by the problem solver. Then the problem, solutions, number and their relations are transformed until a resolution is reached”(59). This way of thinking about problem solving connects very closely with Dewey’s situational theory of inquiry.

3 Dewey on Situation, Intelligence, and Inquiry

Dewey and Lave share a lot of common ground. Dewey, too, was a psychologist and social scientist with a focus on context and culture. He was interested in problems of learning and education, much like Lave. However, in the part of his career where he refined his theory of situations and the situational nature of intelligence and inquiry, he was writing as an academic philosopher long disconnected with his empirical work in psychology and education.⁴ Dewey

⁴In addition to being trained in Hegelian philosophy, Dewey was trained as an empirical psychologist under G.S. Hall and founded psychology laboratories at Michigan, Minnesota, and Chicago. At the University of Chicago, he developed the Laboratory School and did foundational work in empirical education research. He left Chicago in 1904 after a fight with the administration over the running of the Lab School and moved to Columbia, one of the top philosophy departments in the country. At Columbia, his efforts became more

is often known in education circles as a premier theorist of problem-solving inquiry,⁵ and so at first glance might seem to be a part of that problem-solving tradition that Lave criticizes. Instead, we will see a significant convergence and complementarity between Lave's and Dewey's views that is of use to future researchers.

Throughout his long career, two of Dewey's most constant interests were logic and education. The two are tightly linked in Dewey's thought, as he conceives of logic as the study of reflective thinking or the method of intelligence, whose inculcation is one main goal of education. Another term for thinking or intelligence, in Dewey's theory of logic, is "inquiry." Dewey's definition of inquiry is thoroughly situational:

Inquiry is the controlled or directed transformation of an indeterminate situation into one that is so determinate in its constituent distinctions and relations as to convert the elements of the original situation into a unified whole. (Dewey 1938, 108).⁶

This "definition" is far from transparent, but it can be unpacked by explaining Dewey's theory of situations and especially what an "indeterminate situation" is. These, too, have been difficult exegetical projects for Dewey scholars, and there is little consensus on how to interpret these ideas in his work. Reading Dewey in the context of Lave, however, may help us to see more clearly what he was after with his situational theory of inquiry.

What is a situation according to Dewey? It is easier to begin with what a situation is not: "What is designated by the word 'situation' is not a single object or event or set of objects and events"(72), nor is it an objectively defined spatio-temporal region, nor the surface appearance of objects or events in a certain spatio-temporal region. Dewey refers to a situation as

focused on debates within philosophy (such as his debate with Bertrand Russell or the neo-Realists) and on his work in political advocacy (e.g., the founding of the NAACP, his work with the teachers' unions, and the creation of the New School). For more on Dewey's remarkable life, see Martin (2002).

⁵Dewey is grandfather to a host of alternative approaches to education, including those called "problem-based learning," "project-based learning," and "inquiry-based learning." As we shall soon see, Dewey's theory of problems and problem-solving bears more resemblance to Lave's approach to situated learning than to the cognitivist views that she criticizes.

⁶Subsequent references to are to *Logic: The Theory of Inquiry* (Dewey 1938) unless otherwise noted.

a “contextual whole” and an “environing experienced world,” a “field” or background in which observation occurs (72-3). In a letter to one Albert G.A. Balz, subsequently published as an exchange in *The Journal of Philosophy*, Dewey gives a concrete description of a situation:

“Situation” stands for something inclusive of a large number of diverse elements existing across wide areas of space and long periods of time, but which, nevertheless, have their own unity. This discussion which we are here and now carrying on is precisely part of a situation. Your letter to me and what I am writing in response are evidently parts of that to which I have given the name “situation”; while these items are conspicuous features of the situation they are far from being the only or even the chief ones. In each case there is prolonged prior study: into this study have entered teachers, books, articles, and all the contacts which have shaped the views that now find themselves in disagreement with each other. (Dewey 1949, 281-2)

So a situation includes but is not identical to a diverse set of objects and events. What constitutes them as parts of a particular situation is that they “have their own unity.” In virtue of what do the things and events listed above have their own unity? They are all *relevant* to the dialog between Dewey and Balz. In general, at the center of every situation is some *activity* or *practice* that constitutes it as a situation. The horizon of a situation is not defined by spatial or temporal distance but by relevance to that practice or activity. Dewey’s view of a situation as an “environing experienced world” rather than a spatiotemporal surround is echoed in the ecological sense of “environment” in the psychology of J.J. Gibson (1979). Gibson characterizes the relevance criterion in terms of what is “ambient” for the organism, which is distinct from mere spatial nearness or causal influence (though Gibson’s sense of what is “ambient” seems primarily or entirely biological, leaving out the cultural).

A situation is a “world” not in the totalizing that Kant contrasts the world of experience with the world of things-in-themselves, but rather it is a world in virtue of its peculiar kind of practice-centered unity. It is in this sense that we talk about “the world of baseball” or “the corporate world.” The situation has a unique “pervasive qualitative character” that is *felt* by those who are in that situation, but is also a feature of the objective interactions of the

components of the situation (agents/organisms, objects, events, background). A particular committee meeting, for example, could be a particularly tense, anxious situation, and that quality is not only felt by those in the situation, it can be seen in the way that the committee members hold themselves, how they speak and interact, the slow progress of the meeting, the frequent disagreements, etc.⁷

These pervasive qualities of situations are important for unpacking Dewey's opaque definition of inquiry above. When Dewey refers to an "indeterminate situation," he is attributing the pervasive quality of indeterminacy to the situation. A situation described as "indeterminate" is indeterminate "with respect to its *issue*"(110), that is, it is indeterminate with respect to possible outcomes and responses of the practice or activity that defines the situation. By contrast, a determinate situation is one where expectations and reactions of the actors are clear. In a fully determinate situation, habit rules the day. The appropriate reaction to an indeterminate situation, by contrast, is inquiry. Which is not to say that it is the only possible response: e.g., the actors in an indeterminate situation could keep their heads down and muddle through blindly until the indeterminacy goes away, or they could remove themselves from the situation and take up some other activity. However, only inquiry aims to *resolve* the indeterminacy with an eye towards preventing it from coming up again.

For Dewey, this idea that "a problem must be recognized in order to exist"(Lave 1988, 69) was also crucial. He captured this with the distinction between an "indeterminate situation" and a "problematic situation":

The unsettled or indeterminate situation might have been called a problematic situation. This name would have been, however, proleptic and anticipatory. The indeterminate situation becomes problematic in the very process of being subjected to inquiry. The indeterminate situation comes into existence from existential causes, just as does, say, the organic imbalance of hunger. There is nothing intellectual or cognitive in the existence of such situations, although they are the necessary condition of cognitive operations or inquiry. In themselves they are precognitive. The first result of

⁷For more on Dewey's concept of "situations," see his essay "Qualitative Thought" (1930); Burke (1994); Burke (2000); Burke (2009a); Burke (2009b); Browning (2002); Brown (2012, §5).

evocation of inquiry is that the situation is taken, adjudged, to be problematic. To see that a situation requires inquiry is the initial step in inquiry. (111)

To be the subject of an inquiry, a situation must be recognized as problematic. The conditions of a problematic situation are “objective” features of the interaction between agent and environment (the situation), but they become a problem when they are recognized as such.

At this point, Dewey’s account of situations allows us to draw a distinction that is important but difficult to draw in Lave’s theory: that between skillful coping and problem-solving, between habitual practice and deliberate, reflective practice, between non-cognitive and cognitive activity. It is important to draw this distinction *not* because cognition or reflection is more important than coping and habit, but because it would be a mistake to over-intellectualize practice (Dreyfus 2005; Scheer 2013). Furthermore, key to understanding the nature of cognition is seeing it as a response to a breakdown in habitual, skillful practices (Koschmann, Kuutti, and Hickman 1998). Dewey’s distinction between determinate, indeterminate, and problematic situations is his way of drawing this distinction.

The bulk of Dewey’s works like the *Logic: The Theory of Inquiry* and *How We Think* (1933) are focused on examining the nature of inquiry in general and the particular forms that lead to successful inquiry. The details of this analysis are not important here, except to say that Dewey reinterprets traditional logical notions like deduction and induction, subject, predicate, and copula, affirmation and negation, and propositions in terms of embodied and situated activities rather than pure reason. (Useful discussions of the details of Dewey’s theory of inquiry can be found in Hildebrand 2008; Dorstewitz 2011; Brown 2012.) What, then, is to be gained from regarding inquiry as a situational activity rather than a disembodied, rational one?

First and foremost, if inquiry is the transformation of a situation from indeterminacy to relative determinacy, the result of inquiry is not just a change in mind but a change to a situation—to settings, practices, and tools. Problem-solving activity is not something that takes place “in the head,” but rather in the world. As such, it is at least partially observable, amenable to study via “cognitive ethnography” (Hutchins 1995b, 371) and “laboratory studies” (Latour and Woolgar 1986; Cetina 1995), rather than an unobservable

operation of the brain, accessible only via experimental probing. If we want to understand a cognitive process, or if we want to intervene on it, we have to do so with full awareness of the situation on and in which it takes place.

Furthermore, we have to be situationally specific about the result that inquiry produces. Our various inquiries seem to produce a diverse set of results: ideas, beliefs, theories, inventions, designs, plans, policies, legal judgments, etc. For Dewey, these results all involve modifications to the practices and activities that define a situation. If we want to understand, say, a theory produced by a scientific inquiry, or the plans produced by a practice inquiry, we need to understand them relative to the situation that produced and warranted them. Likewise, if we want to understand a learned practice, skill, or habit, we need to look developmentally-historically at the situated inquiry that produced it. (This is Vygotsky's problem of "fossilized behavior" (Vygotsky et al. 1978).)

Before closing the exegetical discussion of Dewey, let me bring out some further fundamental issues. The term "cognition" has a slippery meaning over the history of the sciences of the mind. There is an older tradition according to which cognition is just one of many types of mental activities, along with affection and conation or perception and action. Dewey opposed such distinctions, arguing for a view of an integrated, coordinated sensori-ideo-motor circuit rather than distinct capacities (Dewey 1896). Among some contemporary psychologists, philosophers, and cognitive scientists, "cognition" has grown to encompass any mental activity whatsoever, or anything the brain does (beyond autonomous function), thus rendering it practically synonymous with "human psychology" or "mind."

Dewey emphasized the role of cognitive and non-cognitive elements of experience, although he did not accept a strict distinction between cognitive and non-cognitive faculties of the mind. Following Dewey, we could restrict "cognitive activity" to that of inquiry, where explicit thinking is required, in contrast to habitual activity, where skillful coping suffices. Among the non-cognitive experiences Dewey was keen to mark off from cognition are absorption in a smoothly-functioning skillful activity, experiences that are simply had or enjoyed, such as a cool, thirst-quenching drink of water, or the culminating moment of an aesthetic experience, as in the ineffable quality of appreciating the work of a master painter. Such experiences contrast with the activity of thinking, which is explicit and reflective inquiry, occasioned by a breakdown in habit, practice, expectation, and enjoyment.

In this sense, thought or cognition is explained by Dewey's situational theory of inquiry. That theory is embedded in his broader anti-Cartesian theory of mind that forms one of the central discussion in *Experience and Nature* (1925).⁸ Chapters 5-7 focus on questions of the relation of mind to body, of psychological to biological processes, of the emergence of language and communication out of more basic forms of social coordination, of the emergence of thinking out of language, of the emergence of selfhood out of social processes. Dewey's picture of mind is, first, of a continuous biological evolution of abilities to differentially respond to stimuli to maintain and further the organism, and second, the deepening of that ability by reference to representations or meanings founded in social needs of communication and conjoint action.

Mind and selfhood, for Dewey, emerge out of simpler organic forms of plants and animals, even physical objects or atoms. "[Mind] is an agency of novel reconstruction of a pre-existing order"(168). An individual having a mind is not the same as an "individual mind" – our minds are constituted by "a system of belief, recognitions, ignorances, of acceptances and rejections, of expectancies and appraisals of meanings which have been instituted under the influence of custom and tradition"(170). Subjectivism as a conflation of the creative, constructive power of inquiry with the possibility of detached, private reverie (175). But reverie is not the same as thinking; thinking is inquiry, the transformation of a situation.

Selfhood emerges not because there is some private inner space that is the seat of mental activity, but because selves as nodes or focal points in networks of activity identify and take responsibility for elements of that activity:

To say in a significant way, "*I* think, believe, desire," instead of "*it* is thought, believed, desired," is to accept and affirm a responsibility and put forth a claim. It does not mean that the self is the source or author of the thought and affection nor its exclusive seat. It signifies that the self as a centered organization of energies identifies itself (in the sense of accepting their consequences) with a belief or sentiment of independent and external origination. (179-180)

Dewey thought that to be an individual, a self, was a kind of achievement, made under certain evolutionary, historical, and socio-political circumstances.

⁸Parentetical citations from this point forward will be to this work.

It is what happens when a “living body” becomes a “body-mind” in virtue of being, as Dewey says, “implicated in situations of discourse, communication and participation” (217). It is because we enter into certain kinds of activities with others that we become selves that takes responsibility for our thoughts. Lastly, Dewey emphasizes the centrality of cultural artifacts to mind and knowledge:

Pendulums, lenses, prisms, yard sticks, and pound weights and multiplication and logarithmic tables have a great deal more to do with valid knowing, since they enable the organism to partake with other things in the effecting of consequences, than have bare consciousness or brain and nerves. (261)

These artifacts, the tools of the engineer and the scientific laboratory, are prototypical constituents of cognition and knowing. Here Dewey allies himself clearly with the idea, common to Lave (Lave and Wenger 1991, 101-3), Vygotsky, Activity Theory, Hutchins, and to some extent Andy Clark (2008), that the role of artifacts is central to understanding the higher-level cognitive abilities of humans.

There is significant overlap between the ideas of John Dewey and Jean Lave about the situational nature of cognition (see Table). Both emphasize the distribution of cognition across brain, body, environment, artifacts, and social relationships, and on that account, propose shifting to a wider unit of analysis for the study of cognition. Both emphasize the contextual or situational specificity of cognitive skills and results. They share a critique of the traditional approach to the notion of “problem solving” that was taken up in classical cognitive science, and they share the idea that problems require both situational conditions and phenomenological recognition of a problem *as* a problem of a certain kind. They share an understanding of the dialectical or transactional nature of the categories used in analyzing activity and cognition. Lave shows us how to use the resources of social anthropology along with more traditional experimental methods to better capture the wider unit of analysis. She provides the valuable distinction between arena and setting, missing from Dewey’s account, as well as the notion of “structuring resources” as a way of understanding the multifarious forms of mediation that take place in cognitive activity. Dewey provides the important distinction between cognitive and non-cognitive, inquiry and habitual activity, lacking from Lave’s

account. (The same sort of distinction provided by phenomenologists like Dreyfus (2005), but given a more functional definition.) Finally, he provides biological and philosophical foundations for a view of cognition as situational, problem-solving inquiry.

Major concerns	Lave's resources	Dewey's resources
Contextualism	Ecological validity	Situational specificity
Distribution of cognition across boundaries	Dialectical character	Transaction
Wider unit of analysis	Structuring resources	Relevance to situation
Objective and subjective sides of situations	Arena vs Setting	Pervasive quality (<i>not distinguished</i>)
Cognitive vs Non-cognitive	<i>not distinguished</i>	Habit vs. Inquiry
Unique contributions	Anthropological methods	Biological foundations

Table 1: A comparison of Dewey's and Lave's theories of situations and situational cognition.

4 Nine Theses on Situational Cognition

In order to combine these insights from Dewey and Lave into a theory of situations and situational cognition, we can articulate nine theses:

1. Cognition is a situated activity, and its forms and results are specific to the particular situation that it arises in. Generality or learning transfer are special, hard-won achievements, not the default assumption.
2. Cognition or mind is not bounded by a disembodied mind/brain, but distributed across a situation, which includes brain, body, activity, physical and cultural environment, cultural artifacts, and social relationships.
3. A situation is defined by some activity or practice and is constituted by all of the structuring resources that have a relevant impact on those

activities or practices. What turns out to be so relevant is not a given.

4. Cognition is a form of problem-solving inquiry, which seeks the transformation of a problematic situation into one that is relatively unproblematic.
5. A situation is problematic in virtue of both objective indeterminacy or conflict among the constituents of the situation, as well as recognition by the inquirers that it is problematic in some particular way.
6. Cognitive activity should be distinguished from non-cognitive, habitual activity, which is generally the fossilized result of some cognitive activity and can only be fully understood in reference to its situationally specific origin.
7. The context of an activity should be analyzed according to the dialectical or transactional categories of arena (the relatively fixed features of the context) and setting (the experienced, personalized meaning of the arena).
8. The appearance of individual independence of mind is a social-cognitive achievement, wherein a node of activity takes responsibility and identifies with some belief or cognitive achievement, rather than a biologically given capacity.
9. The study of situated action and cognition requires a mixed methods approach and multiple levels of analysis. Experimental research is possible, if carefully done, but it must be supplemented by largely qualitative research done “in the wild.”

5 Analysis of team problem-solving

Before concluding, I want to comment on the way in which the resources Lave and Dewey provide, for thinking of cognition as situational, problem-solving inquiry, bear on the analysis of team problem-solving. It is easy to read the formulations from Lave and Dewey above as referring to the activity, learning, or cognition of an individual person, though their activity is now bound by the situation rather than the skull or central nervous system. In principle, though, the resources that Lave and Dewey provide work equally well in the analysis of team performance, allowing us to analyze the collaborative problem-solving of a team as a cognitive activity. This sort of suggestion is explored in detail by Hutchins (1995b), who applies the resources of computational cognitive

science to team activities to analyze socioculturally distributed cognition. How can we apply the lessons we've distilled from Lave's and Dewey's work to the case of team cognition?^ [For more on team cognition, see

First, it is important to ask, when is it valuable to study team cognition? It is important to do so when the phenomenon of interest is generally a product of some form of group collaboration rather than individual performance (Thesis 1). For instance, we are engaged in a study of engineering ethics.⁹ Because engineers commonly work in design teams, rather than working start-to-finish on individual projects, we believe it is more valuable to study how engineers work together to wrestle with ethical problems than it is to focus on their individual ethical knowledge or decision-making ability (Thesis 2). Likewise, when considering engineering ethics education, it is important to recognize the collaborative and situated nature of engineering work, and focus on educational activities that reflect that kind of work, rather than exclusively designing ethics education around the context of, say, the typical philosophy classroom readings and exercises, which may or may not act as a structuring resource in actual practice (Theses 1,3).

Second, we must recognize the situated nature of team cognition. Team cognition is not solely defined by the shared cognitive goal and the steps necessary to achieve it; a variety of other situational factors act as structuring resources for that activity, such as the individual goals, attitudes, and capabilities the team members bring to the activity, the background cultural understanding and collaboratively built micro-cultural understanding that the team shares about their activity, the tools and resources that the team builds on, the setting in which the team works, etc (Thesis 3). In our research, we have chosen to focus on teams of undergraduate engineering students working on senior design projects, as well as research laboratories that include graduate research assistants, to understand (and perhaps improve) their ethical problem-solving processes (Thesis 4). With respect to the ethical problem, some of the relevant structuring resources include the main research or design project they are primarily engaged in, the laboratory space and conference rooms where they come to work—including various tools, resources, furniture, etc.—the culture of the discipline, department, and laboratory, and the individual needs and aspirations of the students or lab members (Thesis 5).

Third, the study of team cognition requires mixed methods attuned to

⁹ *Citations withheld for anonymous review.*

the unit of analysis and the situational nature of the activity (Thesis 9). Anthropological-type methods figure centrally, here, including ethnographic observation, qualitative content analysis of discourse and written documents, and in-depth interviews. Surveys of team members to assess the attitudes and knowledge they bring to the project, or develop in the course of the project, can provide helpful supplementary information. Experiments will also prove valuable, as Lave shows, though the most useful, relevant experiments in this case will intervene on teams rather than individuals, to suss out changes in team dynamics and performance. In the case of our study of engineering ethics, we have pursued cognitive ethnography and laboratory studies approaches, including video recording and digital ethnographic analysis, in order to study team ethical cognition in action. We have also experimented with the undergraduate teams by temporarily adding non-engineering students, enrolled in a philosophy course, into the team, to see whether they can act as a beneficial structuring resource for the team's ethical decision-making.

6 Conclusion

Jean Lave and John Dewey were two of the pioneering theorists of situated cognition, or, as I have argued we should call it, situational cognition. Their work is broadly compatible and in many ways complementary. From them, we can draw a valuable framework to aid in our analysis of cognition as situational, problem-solving activity, as well as human activity more generally. This framework is at least as promising for the study of socially distributed or team cognition as it is for the study of individual cognition and learning. I have focused in this essay on matters of theory and intellectual history. The next step is to put these ideas into practice in empirical research and pedagogical practice.

7 References

Aydede, Murat, and Philip Robbins. 2009. *The Cambridge Handbook of Situated Cognition*. New York: Cambridge University Press.

Brown, Matthew J. 2012. "John Dewey's Logic of Science." *HOPOS: The*

Journal of the International Society for the History of Philosophy of Science 2 (2) (Fall).

Browning, Douglas. 2002. "Designation, Characterization, and Theory in Dewey's Logic." In *Dewey's Logical Theory: New Studies and Interpretations*, ed. F. Thomas Burke, D. Micah Hester, and Robert B. Talisse, 160–179. Vanderbilt University Press.

Burke, Tom. 1994. *Dewey's New Logic*. University of Chicago Press.

———. 2000. "What is a Situation?" *History and Philosophy of Logic* 21 (2): 95–113.

———. 2009a. "Browning on Inquiry into Inquiry, Part 1." *Transactions of the Charles S. Peirce Society: A Quarterly Journal in American Philosophy* 45 (1): 27–44.

———. 2009b. "Browning on Inquiry into Inquiry, Part 2." *Transactions of the Charles S. Peirce Society: A Quarterly Journal in American Philosophy* 45 (2): 157–176.

Cetina, Karin Knorr. 1995. "Laboratory Studies: The Cultural Approach to the Study of Science." In *Handbook of Science and Technology Studies*, ed. Sheila Jasanoff, Gerald E. Markle, James C. Peterson, and Trevor Pinch, 140–167. Thousand Oaks, CA: SAGE Publications, Inc.. doi:<http://dx.doi.org/10.4135/9781412990127>.

Clark, Andy. 2008. *Supersizing the mind: Embodiment, action, and cognitive extension*. Oxford: Oxford University Press.

Clark, Andy, and David Chalmers. 1998. "The Extended Mind." *Analysis* 58 (1): 7–19.

Cole, Michael. 1996. *Cultural Psychology: A Once and Future Discipline*. Belknap Press.

Dewey, John. 1896. "The reflex arc concept in psychology." *Psychological review* 3 (4): 357–370.

———. 1925. *Experience and Nature*. Ed. Jo Ann Boydston. *The Later Works of John Dewey*. Vol. 1. Southern Illinois UP, 1988.

———. 1930. "Qualitative Thought." *Symposium* 1 (January): 5–32.

———. 1933. *How We Think: A Restatement of the Relation of Reflective*

- Thinking to the Educative Process*. Ed. Jo Ann Boydston. *The Later Works of John Dewey*. Vol. 8. Southern Illinois UP, 1986/2008.
- . 1938. *Logic: The Theory of Inquiry*. Ed. Jo Ann Boydston. *The Later Works of John Dewey*. Vol. 12. Southern Illinois UP, 1991.
- . 1949. *Knowing and the Known*. Ed. Jo Ann Boydston. *The Later Works of John Dewey*. Vol. 16. Southern Illinois UP, 1990/2008.
- Dorstewitz, Philipp. 2011. “Dewey’s Science: A Transactive Model of Research Processes.” In *The Continuing Relevance of John Dewey: Reflections on Aesthetics, Morality, Science, and Society*, ed. Larry A. Hickman, Matthew Caleb Flamm, Krzysztof Piotr Skowronński, and Jennifer A. Rea, 223:205–224. New York: Rodopi.
- Dreyfus, Hubert L. 2005. “Overcoming the myth of the mental: how philosophers can profit from the phenomenology of everyday expertise.” In *Proceedings and addresses of the American Philosophical Association*, 79:47–65.
- Gibson, James J. 1979. *The ecological approach to visual perception*. Boston: Houghton Mifflin.
- Hildebrand, David L. 2008. *Dewey: A Beginner’s Guide*. Oxford: Oneworld.
- Hutchins, Edwin. 1995a. *Cognition in the Wild (Bradford Books)*. The MIT Press.
- . 1995b. *Cognition in the wild*. Cambridge, Mass.: MIT Press.
- Koschmann, Timothy, Kari Kuutti, and Larry Hickman. 1998. “The Concept of Breakdown in Heidegger, Leont’ev, and Dewey and Its Implications for Education.” *Mind, Culture, and Activity* 5 (1): 25–41.
- Latour, Bruno, and Steve Woolgar. 1986. *Laboratory life: The construction of scientific facts*. 2nd ed.. Princeton, NJ: Princeton University Press.
- Lave, Jean. 1980. “What’s Special about Experiments as Contexts for Thinking.” *The Quarterly Newsletter of the Laboratory of Comparative Human Cognition* 2 (4). <http://lchc.ucsd.edu/Histarch/oc80v2n4.PDF>.
- . 1988. *Cognition in practice: mind, mathematics, and culture in everyday life*. Cambridge: Cambridge University Press.
- Lave, Jean, and Etienne Wenger. 1991. *Situated Learning: Legitimate Peripheral Participation. Learning in Doing: Social, Cognitive and Computational Perspectives*. Cambridge, UK: Cambridge University Press.

Martin, Jay. 2002. *The education of John Dewey: A biography*. Columbia Univ Pr.

Shear, Joseph K., ed. 2013. *Mind, reason, and being-in-the-world: the McDowell-Dreyfus debate*. Abingdon, Oxon: Routledge.

Scribner, S., and E. Fahrmeier. 1982. "Practical and theoretical arithmetic: Some preliminary findings." Industrial Literacy Project, Working Paper No. 3. Graduate Center, CUNY.

Vygotsky, L. S., Michael Cole, Vera John-Steiner, Sylvia Scribner, and Ellen Souberman. 1978. *Mind in society: the development of higher psychological processes*. Cambridge: Harvard University Press.