Situating Situated Cognition

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During the 1990s, it has become fashionable to talk about knowing and learning in terms of distributed cognition, embodied cognition, and situated cognition. All of these terms imply that knowing (etymologically, knowing and cognition have the same origins) exceeds what can be found in the head. Like many others the reader may ask, "What do you mean, isn't all we know in our heads?" In this contribution, I articulate how and why we understand knowing as situated (which implies embodied and distributed) and what implications this has for education and psychology. Let me begin with the following two examples from my own experience.

Over the past 15 years, I have become very familiar with my word processor. Many people in my surrounding know this and ask me questions about how to do this or that with the software. Sometimes I can provide them with an answer, but more often than not, I cannot articulate in so many words how I do it. However, as soon as I am sitting in front of a computer, I can show how to implement what the person wants to do, or walk him or her through over the telephone, both of us sitting in front of our machines. As another example, consider this. Several years ago, I wanted to call an old friend. At first, I tried to remember her number, but as hard as I tried, it did not come back. Then I was looking for it in different places, but could not find it. Eventually I gave up searching and trying to remember. For some reason, I picked up the phone: my hands began to move over the dial composing a number without looking at it. Through the receiver, I heard a combination of sounds that rang familiar. When I had fin-

ished dialing, I knew I had the right number even before I heard my old friend's voice on the other end.

In both of these instances, I failed remembering something and articulate it in words. In the first instance, it was a practice, a patterned way of doing something. In the second instance, it was a fact, something one can state in so many words. If I had taken a written test, such as those that are used in formal schooling, I would have failed, utterly so, in both instances. That is, my test responses would have been interpreted to mean that I did not know. Fortunately, I did not have to take a test; in fact, virtually all circumstances in which I operate on a daily basis and which show what "I" know have little to do with testing situations.

In both situations, I knew as soon as I was interacting with the computer and telephone, respectively. It was not that these items were just there but my knowing was in the interaction and anyone watching me would have observed it as such. More so, "my" knowing was in the interaction with the two devices. That is, whereas isolating me from my normal environments would have made me look dumb in both situations, operating the devices exhibited patterned ways of doing relevant activities and therefore exhibited knowing. This is what all three terms, embodied, distributed, and situated cognition are about. To understand the patterned actions that you could have seen observing me in the two situations cannot be explained by looking at my brain alone. My knowing cannot be understood by looking at my brain and the computer or telephone. Rather, to understand my patterned actions, you need to look at the interaction (or rather transaction) of Michael and computer (telephone), and at the structure characterizing the two entities involved (device, me). In fact, what is relevant is not the structure these devices have for everyone, but the objective way that they appeared to me in those situations.

I remembered the telephone number but it was not through my conscious thoughts. Rather, I knew the number with my body, or rather, the knowing was exhibited in the patterned actions of my hands and fingers and in the apparently correct outcome of my dialing. Perhaps less evident but equally so, my knowing of how to do some formatting with my word processor is embodied. To articulate how to do something, I have to sit down, take the mouse and keyboard, whisk the cursor across pull-down win-

dows, and select from the options that appear. I know that I know when I am there, and I do not have to memorize any of it. Memorizing is prohibitive, and does not guarantee success to some beginner with the software.

The terms embodied, distributed, and situated cognition do not mean that there is nothing or little in the brain, or, as some critics facetiously said to me, a brain scattered across the environment. All three terms are intended to highlight that to understand knowing (and learning), we need to take into account more than some stuff that might be located in our minds, which we carry around, and which someone else can test us for at any moment. We need to look at a person in the setting. More so, we need to look at the person acting in setting. But it is well known (e.g., just think of divergent testimonials of the "same" event in courts of law) that a setting does not appear to all persons in the same way. That is, to understand *why* a person is doing something, we need to understand "the person acting in the setting as it appears to him or her." Talk about situated cognition therefore means talk about the interactions of people with objects and tools rather than talk about what is in their brains. It is a choice that we make about how we look, and, therefore, we situate situated cognition.

What is being considered in analyzing some phenomenon is called a unit of analysis. Scholars who think about knowing and learning in terms of embodied, distributed, and situated cognition articulate their unit of analysis "the person acting in the setting as it appears to him or her" in different ways. Some prefer to speak of transacting, which implies that person and setting mutually constitute one another or, alternatively, that person and setting stand in a dialectical relationship. To express this in yet another way, dialectical means a chicken-and-egg type situation, where one automatically implies the other. That is, the setting always exists for the person, but there is no person without setting. Other scholars prefer to speak of a person acting in his or her lifeworld, where the latter term denotes the setting as it appears to the acting person.

Agency and Structure

Situated cognition can be understood within a framework of agency and structure when these terms are thought dialectically, as two sides of the same coin. First, agency denotes the capacity to act. It is immediately clear that there is no agency without structure: Humans, like all beings, need a material body to act and thereby to display knowing. Structure is everywhere. It is self-evident to most that our bodies are structured and so is the world in which we live. Most people attend less to the fact that our ways of seeing, hearing, feeling, moving, and doing things are structured, too. When we speak to someone, we hear words not inchoate sounds; furthermore, when hear barking rather than a noise, we hear a dog barking rather than another animal. We see trucks as trucks, cars as cars, and wheelchairs as wheelchairs. We do not confuse one type of things for another.

Second, there is no structure without agency. We cannot experience space, time, dogs, trucks, cars, or wheelchairs without having acted in a world of things and people. How do we come to see the world in a structured way?

A number of classical studies exemplify the inseparability of knowing and action. In one study, kittens were initially raised in the dark and experienced light only under controlled conditions. Each kitten from one experimental group was allowed to move around normally, but was harnessed to a carriage that contained a second, matched kitten from the second group. Both groups of animals therefore shared the same visual experience. However, the first group of animals was active, the second group was physically passive. After a few weeks, the kittens were released. Members of the first group behaved normally. Members of the second group behaved as if they were blind: they bumped into objects and fell over edges. The scientists then sacrificed the animals and looked at the brain and found that there was ten times the development in the active kittens that it was in the passive kittens. We can conclude that experiences cause brain growth, but one must actively participate in the experiences for growth to take place. That is, agency leads to structure, both in the world (a kittens recognizes a *material edge* as an edge) and in brains (kittens recognize a material edge as *edge*). The first in each couplet is the material

part of the dialectic, the second is an aspect of the brain—researchers have come to talk about these patterns as schemas.

In a similar vein, the philosopher Maurice Merleau-Ponty suggested many years ago—something recent neuroscientific research verified—that everything we know about the world is the result of our moving around in and interacting with it. Thus, we do not see the roundness of a ball, but in seeing a ball partially, that is, from one side, we know what we will see when we walk around it, turn our head, or move our eyes from left to right. We also know what we would feel if we were to touch it, and how this feeling would change if we were to move our hands over the ball. Remember my knowledge of the word processor? It is not my knowledge per se that counts but my knowing what will happen if I move about within it, constrained and enabled by its structures as these are given to me.

The example with the kittens shows us something else. Structures are not only non-identical partners with agency, but also are dialectical themselves in the sense that they always exist simultaneously as objectively experienced structures in the world and as (mental) schemas. The structures in the world are not only material, but also social. These structures in the world are resources for actions. We therefore speak of them as sociomaterial resources. These resources both enable and constrain what humans want to do.

To see how all of this plays out when we observe real human beings while going about their business, I provide the following example from a seventh-grade science course that I had taught many years ago. In analyzing the episode, I exemplify the situated (embodied, distributed) nature of cognition by showing (a) how hand gestures, body movement, pitch, and orientation are used to coordinate conversations and (b) how hand gestures present ideas not concurrently expressed in words and animate static structures perceptually available to other participants.

Designing the "Elevator Thing"

In this science course, students learned about the physics of simple machines largely by designing machines themselves, in-
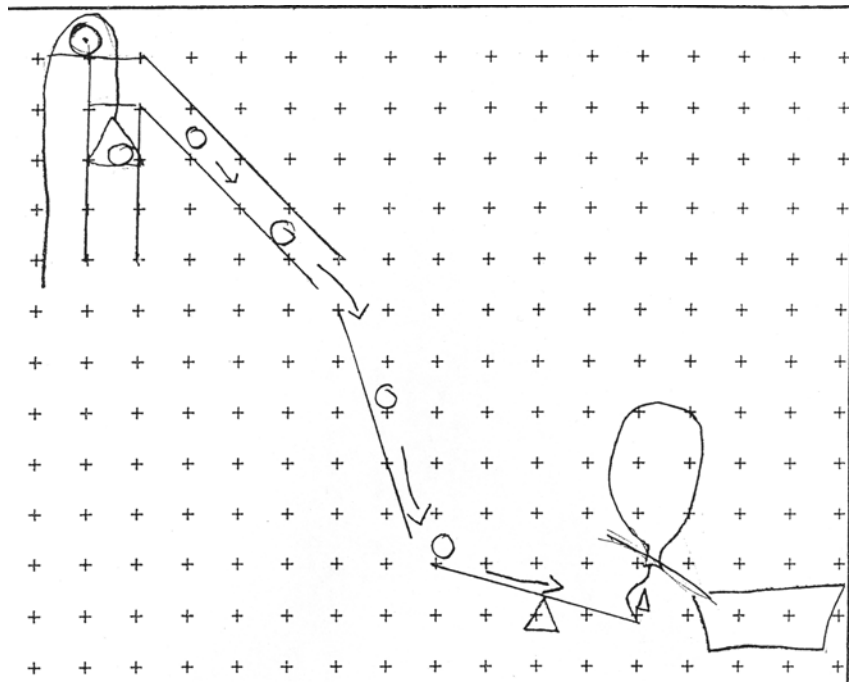
Figure 1. The three girls are focusing on this sketch of a Rube Goldberg machine, deliberating how to implement the "elevator thing" on the left side of the drawing, which they intend to move a ball to the top of the tower, from where it begins its journey to launch a few processes.

cluding the entire process from initial conception to the completion of a prototype. The following episode was recorded while the students designed something like a Rube Goldberg machine, a device that consists of several interacting elements and brings about a desired event only after having completed a number of intervening processes. The three girls (Amanda, Bella, and Leanne) in the episode had decided to make a food dispenser, in which a ball is moved in an elevator up to the top of a tower, then first rolls down a chute onto an inclined plane, and then falls onto and tips a balance. The nail on the other side of the balance pokes a balloon, which, upon exploding, releases the food for the cat that was stored inside it (Figure 1). I begin by providing a gloss of the conversation and then move on to show different aspects of situated cognition in action.

The episode was recorded just when the three girls were deliberating how to go about building what they called the "elevator thing" on the far left of their design sketch (Figure 1). Leanne was just finishing to articulate their next steps by pointing to the elevator and saying that they had to build this part for which she had brought wood (line 01). She finished by uttering a little drawn out "So:?," which ended in a rising pitch as if she was asking, "Do we start?" or "How do we start?" There was a pause, which in fact constituted an opportunity (resource) for another person to take a turn at talking. Here, Bella began to articulate, which turned out to become an alternative to Leanne's proposal of building the elevator from scratch.[1]

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01   Leanne:     I have wood over there to build it. So:?
02               (0.79)
03   Bella:      *[Fig. 2a] Or ⌈(0.40) ⌉
                               ⌊((her hand moves forward to Fig. 2b))
04               *[Fig. 2b] ⌈my brother *[Fig. 2c] (0.22)
05   Amanda:                ⌈°U h  u m°⌋.
                            ⌊((Erects body, orients gaze))
06               ⌈(1.55)                              ⌉
                 ⌊((rH moves to scratch herself))⌋
07   Bella:      he⌈has a parking lot                                ⌉
                   ⌊((rH returns to drawing, stops at tower part))⌋
08               (0.90)
09               um: (0.20)⌈ you can take this part out (0.32)⌉
                           ⌈((repeatedly moves up and down along tower
                           ⌊((Amanda turns gaze to diagram))
10               ⌈then you pull like *[Fig. 3a] this ⌈[*[Fig. 3b]
                 ⌊((hand moves to top, then toward the bottom of tower
                 part))                              ⌊
                                        ((Amanda returns gaze to
                 face Bella))
11               ⌈(0.45)
12               ⌊((Bella's hand retracts to Fig. 4a, up to Fig. 4b))
                 ⌈and then put some  batteries in it]] and it works.
                 ⌊((hand rocks back⌈ and forth))
13   Leanne:                        ⌊((nods repeatedly))
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Bella began to speak, and over the next 11.7 seconds, produced the idea that they could take a part out of her brother's parking lot (lines 04, 07). She did not specify which part, she wanted to take out, but pointed to what Leanne elsewhere called "the elevator

Figure 2. Moving her right hand forward toward the design, Bella (left) indicates intention to take the turn at talk; by withdrawing her left hand from the design, Leanne (right) indicates willingness to relinquish her turn at talk. Amanda (center) exhibits attention to the current speaker, which she make visible to the others by adjusting her gaze direction.

part," allowing us to infer that she meant the lift. Bella then said that they would pull on it in some way (line 10), while moving her hand along the tower part (Figure 3). Finally, she proposed to put some batteries in it (presumably the lift), while making a repeated gesture with her right hand as if she was putting a battery in a horizontal battery receptacle (Figure 4).

With the "Or" (line 03) Bella announced an alternative what Leanne had just proposed. It was a contrast to what has been proposed before, when Leanne had asked for the materials. Bella was responsible for bringing a pulley, and this responsibility was inscribed into the diagram, at the bottom, where they noted the materials needed and who was supposed to bring them. Subsequently, Bella admitted that she did not bring a pulley or even have one. The two other girls talked about the chute, the pipe-shaped part leading away from the top of the tower. The "or" sets up a difference, a contradiction with what they had done or were presently doing. In this episode, Bella then develops a different idea, it takes shape in her talk and action, but at the same time retains its ephemeral nature, for talk and gestures "vanish" as soon as they have been produced, they recede into the past, increasingly so, unless it is reproduced in subsequent actions and talk.

Although this episode may appear straightforward, it is rife with complexity and shows just how much human beings need to know to communicate about something, to take turns at talk, to understand what someone else is talking about even if they do not say it. Situated cognition researchers therefore might ask questions such as, "How did the girls know when to talk?," "How did
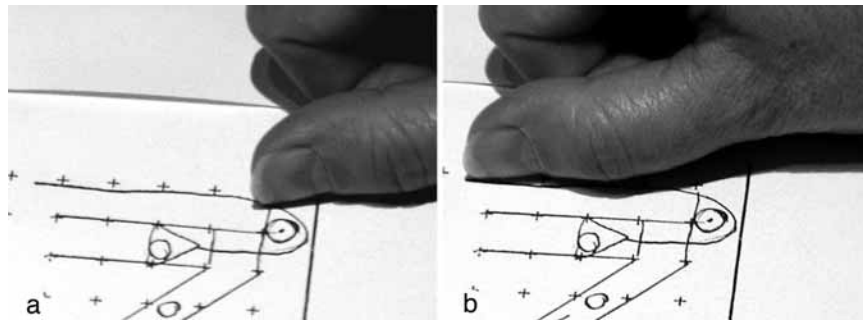
Figure 3. Bella's iconic gesture animates the elevator, which expresses knowing in action that her speech does not make available to her peers.

they gain and maintain a turn at talk?," or "How did a speaker know that others were listening and being attentive?" Researchers may also ask, "How did participants know what a speaker was talking about?" The answers to all questions will involve the relation between the girls and their situation, both in its material and social aspects.

Gaining and Maintaining Turns at Talk

When we talk, others normally listen. Changeovers occur when the current speaker has stopped, when there is a pause, so that someone else can begin speaking. Thus, the pause after Leanne had stopped speaking (line 02) allowed Bella to begin (line 03). Bella not only uttered "Or," but also moved her hand forward placing her finger on the tower part of the design. She thereby indicated in two ways that it was her turn: by beginning to speak and by moving her hand forward toward the design (Figures 2a–b). Leanne acknowledged the change of turn by retracting her own hand, which had thus far rested on the tower part (Figures 2b–c). That is, even without having to think and say, "Oh, I am giving up my turn at talk," Leanne's change in body position articulates this situation.

By uttering "Or," Bella had announced an alternative design possibility, which means that others would normally wait until she had completed describing the possibility. But whenever there is a longer pause, others can take it as an opportunity (resource)

Figure 4. After Bella stopped to point to the paper, Leanne raised her gaze, acknowledging listening (a–b). It also allowed her to see the gesture showing how the batteries were oriented (b–c). She acknowledged understanding by nodding (b–c).

for taking a turn and for talking themselves. Making some noise or producing a gesture, which most often occurs unconsciously, indicates to others that the speaker wants to continue. The noise or gestures are resources that may have the outcome of constraining the listeners to continue listening. One such occasion was apparent when, after a conversationally long 0.90-second pause (line 08), Bella produced an "um:" that was drawn out, before she continued talking (line 09). In one sense, her hand was still on the drawing, an indication that she had not yet abandoned her turn at talk, so that the "um:" constituted an added resource for indicating (likely without being consciously aware of it) that she was intending to continue.

A striking example how gestures are used to maintain a turn occurred after Bella had apparently completed the description of her design alternative (line 10). That she had completed articulating the idea was also visually apparent when Bella was pulling her hand back from the drawing that was the focus of the three girls' attention. If we look ahead, we see in fact that the battery idea (line 12) was almost like an afterthought. Therefore, the lengthening pause (line 11) became a resource for others to start talking. When Bella moved her hand forward again (line 12), it became a gesture that can be experienced in the same way as if she had said, "Don't start, I am not yet finished." Neither Amanda nor Leanne began, thereby providing Bella with the opportunity to propose an addition to the lift idea, namely operating it by using the batteries rather than the hand operation that she had earlier described (line 10, Figure 3).

Exhibiting Attention

Under normal (most) circumstances, participants in a conversation do not tell one another explicitly that they are listening and paying attention. Saying so would in fact interrupt the current speaker and take the turn at talk away from him or her. However, there are other ways to exhibit attention, some of which can be seen in this episode. For example, Amanda had oriented her upper body and her gaze toward Leanne (Figure 2a). When Bella began to speak, Amanda moved her body upward and turned her head, so that she was now facing the speaker (Figure 2b). However, when Bella returned her hand to the diagram (line 04), Amanda shifted her gaze, watching where Bella pointed and moved her hand that enacted pulling. When Bella was done with this part of her explanation, Amanda reoriented herself to face Bella. In both cases, Amanda made her attentive listening available to Bella: she looked at the speaker and then followed the hand that pointed and moved about. If Bella had had not been present, or if the girls had been in a telephone conference call, Amanda could not have shown attention in this way. Making some noise at a volume lower than the current speaker, often "Uh um" (line 05), is another way of exhibiting attention. Listeners also nod their heads in the way Leanne had done (line 13), visible in the difference between Figures 4b and 4c. This nodding could also have meant agreement, which might even have been the case. But immediately after this episode, Leanne critiqued Bella's idea, and thereby exhibited that she was not in agreement. All of these ways usually are unconscious, but they are structures in the setting that allow speakers to know that others are listening even without thinking about it. Attention is exhibited with and through the body (cognition as embodied), and it is available to others there in the setting (cognition as situated and distributed).

What Did Bella Talk About?

Our (Western) culture is almost obsessively preoccupied with language—which has led the philosopher Jacques Derrida to call it logocentric, centered on language. However, in much of everyday

life, words are only a small part of what it takes to experience a situation as meaningful. To understand others, we need to be attuned to not only the words others say but to their gestures, body positions, voice inflections, current activity, objects and events, and so on. Gestures play an important role in our knowledgeable everyday behavior, in part because they articulate explicit links between the current speaker, talk, and the surrounding world. Thus, a speaker may be pointing at something or in some direction, and thereby establish a link between what is concurrently said and some thing out there. In the present situation, Bella pointed to the diagram (line 03, Figure 2b), and, more specifically, to the tower part of the diagram. This gesture therefore is a resource for the listeners to make a link between what she was going to say and the tower part. That is, although Bella continued by saying "my brother" (line 04), one knows that she was talking about the tower. She then moved her hand away from the drawing to scratch herself (line 06), but then pointed to the tower again while saying that he had a parking lot. Because of her pointing, the audience is attuned again to the tower part rather than to the brother or his garage, though the relevance of the latter is implied. This became clear from the next part of her presentation.

Bella said that her brother had a parking garage and that one "can take this part out" (line 09). This statement is contradictory. She was pointing to the drawing not to her brother's parking garage. But she said that one could take some part out of the parking garage, although she pointed to the drawing when she said "this." Yet taken as a whole, her communication can be understood. She literally made a connection between the two, the tower in their design (which she pointed to) and an equivalent part in her brother's parking garage (which she described verbally) are to become one and the same thing.

Bella actually did not just point but moved her hand up and down right next to the tower, similar to a subsequent gesture that accompanied the end of the utterance, "you pull like this" (line 10, Figure 3). Moving gestures trace out a path, and this path resembles some entity or event. Such gestures are called iconic (from the Greek for "to be like"), because they depict some object, for example, in the setting. Thus, to know which object the gesture is intended to make salient, listeners need to be attuned to the setting.

The iconic gesture accompanying the utterance "this part" served to make the tower figure; this movement actually turned out to be better than simple pointing, which is inherently under-specified in terms of its aim, and could be a general or specific pointing. The moving gesture, however, paralleled the tower and therefore made its shape more salient. It made it more apparent that she wanted others to attend to the vertical aspect of the tower rather than to the triangular elevator or the pulley on top (Figure 1). In line 10, Bella said that the parking lot part would allow them "to pull like this." However, neither her peers nor we would understand what she was saying, unless we attended to her gesture, formed when the thumb followed the line from the top toward the bottom of the tower configuration (Figure 3a–b). The gesture made the situation a dynamic one, as we can literally see the movement of a hand pulling down on the string, which, mediated by the pulley, would bring the triangular elevator and ball up to the beginning of the chute.

In this situation, it is quite evident that we need to attend to sound (words), the movement of the hand (gesture), and the diagram, which are in the setting. I don't have to think, "I am seeing Bella's hand pulling on the string," but the pulling is out there, immediately apparent to everyone who is attentive. For speaker and audience, cognition therefore becomes situated, because it is not just something happening in their heads, but also something involving their bodies and things in the world that matter. All of these are resources in the setting for making sense, therefore need to be included in the analysis of knowing—so that it makes sense of speaking of cognition as situated.

Interaction is a Coordinated Action in Situation

Social interaction involves several people. Like a dance involving two or more individuals, interaction requires coordination. Both interaction and coordination imply a phenomenon that goes beyond the individual human being, and especially beyond the human mind. To understand what is being communicated (in words, gesture, body position, and setting) and how it is communicated, we need to attend to the situation as a whole. We cannot under-

stand an action by itself, but have to see it as both a response to a previous action and the antecedent of a subsequent action. This is why cognition is situated not only in a material but also in a social sense. Take the following example.

While Bella was developing the alternative design, or rather, the particular implementation of the "elevator" part, Amanda and Leanne provided her with evidence that they were attuned to the unfolding design. In fact, when there was evidence that Bella did not continue while attention was focused elsewhere, alignment was signaled. After Bella had uttered "my brother" (line 04), Amanda had turned her gaze from the previous speaker Leanne to face Bella; Leanne was still looking down toward the drawing. Her gaze moved up to meet that of Bella only 0.97 seconds after Bella had completed; the pause was produced long enough until alignment had occurred and was signaled to have occurred. By the time Bella had uttered "lot" (line 07), Leanne was gazing at the diagram as if following the pointing finger, but Amanda was still gazing at Bella. The latter's continuation fell precisely together with the point in time when Amanda, too, had directed her gaze at the diagram. At "this part" (line 09) both listeners were looking at the diagram until Bella had finished the description of what to do with the part from her brother's garage. Both simultaneously moved their gaze to look Bella squarely into the face. Amanda continued to gaze at Bella, whereas Leanne nodded repeatedly (line 13). After the episode presented here, Leanne, still facing Bella, began to talk and Amanda shifted her gaze to the next speaker after having briefly dropped it downward in the direction of the design.

Dialectic of Situated Action

In the forgoing section, we have seen a brief episode from a design activity, which took the three girls from initially sketchy ideas and possibilities via several drawings and many gesturally enacted visions to a completed prototype (Figure 5). We can envision the complexity of human activity if we just think about the fact that the three girls worked for nearly 10 hours, amounting to more than 3,000 episodes such as the one discussed here, one following

Figure 5. Each action during the process of designing a Rube Goldberg machine, made sense because it was situated in the collectively motivated activity, which in-cluded an exposition in the library, available for everybody in the school to visit.

the other. However, without the overall activity of designing the Rube Goldberg device, the individual actions make no sense. Bella's talk about her brother's garage, a part of which they could use here made sense, because all participants were attuned to the motive of the activity, the production of Rube Goldberg machines. This motive existed at a collective level, others in the class were doing it too; Amanda, Bella, and Leanne concretely realized the motive in their own project, the cat feeder. Being in this classroom, therefore, contextualized each action in the collective motive. In this way, each action was further situated in a social way. This is what gives an action its sense, the connection it has to previous and subsequent actions, for reasons others can understand, and for whom actors produce resources to help others understand.

Actions are not only socially situated in the group and materi-ally situated in the world: they are also situated in the body of the person who acts. That is, when the students uttered words and sentence fragments, they just produced them without doing much planning ahead of time; when they used gestures and oriented

their bodies, they, as any other individual, did not plan such movements but unconsciously moved. Actions are situated in our bodies of which we are, most of the time, not even conscious, but without which there would not be an action at all. Yet although components of actions are produced unconsciously, they are properly sequenced and coordinated with the actions of others and the surrounding material structures.

This way of understanding actions as situated allows us to understand meaning in a new way. Meaning is not something that is attached to things, or put down in writing during a test, but is something happening as people act, each action being grounded simultaneously in the social and material setting and in the body.

Knowing is Situated Action

People continuously act. Each action produces an outcome, which can be a word, sentence, gesture, artifact, and even a pause. Each outcome is a resource for subsequent actions by the same person or by others in the setting. From this perspective, situations continuously unfold, operated upon by the human beings present. They use these resources not only to produce a design, or to make available to one another some idea, but also to manage the conversation itself. Cognition is situated because people are always oriented toward their setting, and without the setting and motive of the activity in which they participate, there is no way of understanding what is going on. It is the situation as a whole that allows us to understand, and it is the situation as a whole that we draw on to make our own understanding available to others.

If, however, we attend to many things other than words while attending to others, communicating, and speaking, then cognition is inherently situated. It is situated not like an object that is placed somewhere, but in that all action is transaction in an irreducible unit. This unit cannot be broken down into a person, on the one hand, and his or her lifeworld, on the other. Person and lifeworld presuppose one another, they are, in other words, dialectically related. All knowing is inferred from action, even by everyday folk as they attempt to understand others; and because all action is situated, all knowing is situated. Acknowledging this fact is an in-

stance of situating cognition in the situation, which has led me to the title of this contribution—situating situated cognition.

Cognition is not just situated, a phenomenon out there. To be consistent with the approach advocated here, my own work is situated, taking cognition as its object. My writing, my analysis therefore actively situates cognition in situation, but is itself a form of situated cognition that cannot be understood unless we take into account the entire setting that includes me, computer, camera, VCR, Internet, word processor, library, and so on. My concrete analyses of one episode exemplify how situated cognition itself becomes situated.

Glossary

Agency A term that denotes the fundamental capacity to act. Agency stands in a dialectical relation with structures, with which it forms a unit. Without agency, there would not be structures recognized by and acted toward by human beings.

Dialectical relation A relation is dialectical when it is based on the identity of non-identical things, two things that are prerequisites of one another, like a chicken and the egg. A chicken comes from the egg but the egg comes from the chicken. In theories of situated cognition, the object of a person's attention is both material and mental. It is therefore *one* object that simultaneously appears twice, as material out there and as perception inside body.

Gesture Gestures come in many forms and have many functions. Gestures that are used for pointing are called deictic gestures; an example was found in Figure 2b. A gesture that depicts something is an iconic gesture, because it resembles something else in an image-like fashion, something else it is said to stand for. Thus, in Figure 3, the thumb moved up and down the drawing, thereby standing for the pulling motion required to get the elevator with the ball moving up in the tower. Although they do not say in the way words do (to linguists, body language is an oxymoron, because there is no grammar for body movements), gestures are a central aspect of human communication.

Resources Resources are the structures in the world surrounding a human being. Resources can be social, as in the pat-

terned ways that we greet other people, or material, such as the characteristic shapes of the things surrounding us in everyday life.

Schema Structured aspects of the human body that make us perceive and act in the world in the patterned ways we do. These structures are experience-dependent and therefore are different for different individuals, though they are more similar within a culture than between cultures. Seeing the left part of Figure 1 as an elevator is possible because of the schemas that the girls and we have developed through experience. Schemas are part of a dialectical unit together with social and material structures that characterize the world in which we find ourselves.

Structure A term that denotes the second part of the agency | structure dialectic. Although structures constitute a unit, we can associate them with the world surrounding the person (resources) or with the body (schema).

Further Readings

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Notes

[1] The following transcription conventions have been used: (0.41) – time in seconds; [ ] – bridging consecutive lines indicate beginning and ending of overlapping speech; °Yea° – degree signs enclose speech with lower than normal volume; *ten* – italicized utterances were stressed; u:m – each colon indicates an extension of a phoneme by 0.1 seconds; *[Fig. 2c] – the asterisk aligns speech and video offprints in a figure, here Figure 2c; ((rH moves)) – double parentheses enclose descriptions of actions, here the movement of the right hand; and .,?! – punctuation is used to indicate speech features, such as rising intonation heard as a question, or falling intonation to indicate the end of an idea unit (sentence).