

Thinkers in the Kitchen: Embodied Thinking and Learning in Practice

'The sweets seller is here!' we shriek. The sound of the sweet maker's tinkling bell draws a gaggle of children. He works quickly, moving his hands expertly to respond to our yells—jewelry, cars, bicycles—conjuring them up from strips of candy.

The chorus of voices, babble of languages and jostling bodies all fade into the background as I look at the ring he has made for me. There it glows in the mid-afternoon sun, the shape of a sweet promise resting in my palm, bright colors starting to bleed into each other, as the candy turns sticky. I take the first lick, then the first bite. Ah! The taste of hope fulfilled.

EMBODIED THINKING AND LEARNING IN ARTISANSHIP

There is a quality of attention required in experiencing an activity in which the body is completely involved as when making food and appreciating its taste. This analytic sensory attention that immerses us into real moments in time in other words, real time thinking is central in this discussion of what I have termed *embodied thinking* and learning. This aspect of thinking and learning emerged from my recently concluded doctoral study at the Harvard Graduate School of Education. The study was designed to better understand patterns of thinking in manual work and learning as it happens in real time naturalistic settings as an integral everyday, in-the-'practice' process such as the cooking or weaving techniques a child may learn while being

with her parents, who are engaged in these practices. The body is so obviously implicated in the learning and thinking aspects of manual work that it is a central, motivating theme in this work. While I do not consider learning as a separate discrete activity, as taught in a formal setting such as a classroom, this research has implications for formal learning situations. My interest in thinking and learning in natural settings began with my observations of artisans' work in India, where I was born and raised, and where artisans have always been an integral part of community life. Handmade candies are still vivid in my memories of childhood in my home country. But food vendors who

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uncertainty is palpably present everyday**

crafted delicacies by hand and sold it on the streets such as the sweets maker of my childhood days are fewer now. This is inevitable in the face of rapid economic expansion and growth where small producers and artisans are marginalized or at best encouraged to change their practices to produce objects that will sell in wider markets spanning the globe. The administrators' and policy makers' focus is on directly linking artisan skills to the market rather than on planning with a fuller understanding of artisan practices (1). How do these practices develop? How do artisans learn their craft? Given the close relationship between thinking and learning (Perkins, 1995), what is the nature of thinking that is fostered among artisans? A better understanding of the process of thinking and learning involved in artisans' work is necessary for several reasons. Such a study would enable policy makers to plan appropriate programs to encourage artisanship and support artisan practices. It

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would allow scholars and researchers to examine the physical aspects of thinking—an area that is neglected in academic discussions of thinking and problem-solving. Two critical issues, a focus on the cognitive dimensions of artisans' work and a consideration of the engagement of the physical body that is critical in their work are largely ignored in academic study and policy planning. Rose (2004) remarks that one of the ways we judge each other's intelligence is through the work we do. Artisans' work is largely manual work. Working with the body is so low in our social hierarchy that it makes the person invisible (Ehrenrich, 2001). The body literally slips away into the shadows in academia. Similarly the neglect of the body is reflected in the neglect of the consideration of the complexities and intellectual demands of artisan work in policy decisions and program design.

I began with an understanding of artisans' work as complex. This study was designed to understand how artisans think, what they know, how they organize and structure information, how they solve problems on the job, and how the body is involved in this process.

FOOD AND ARTISANSHIP

I focused on the artisan production of food for several reasons. First, all the stages of food production—growing, harvesting, processing and sharing—can be said to be the first artisan activities that brought communities together. Artisan activities began when people used local resources to meet local needs in the absence of extensive transportation networks in rural areas. Crafts and artisanship originated in small, contained community settings, where they continue to be practiced. Artisans produce enough goods to meet everyday needs and for particular rites and rituals in the

community. Haku Shah, an anthropologist and leading authority on Indian tribal and folk art, writes that not only market forces but also community bonds motivate artisans (Shah, 2002). Across the world since time immemorial communities have flourished because they have come together to create, partake of and celebrate local resources.

Cooking requires specialized knowledge and physical skills and is dependant on work strategies that involve problem-solving

Food producers are among the first artisans to sustain communities through their skilled manual work.

Cooking is a food production activity that has been practiced for centuries. In fact Wrangham and Conklin-Brittain (2003) controversially claim that cooking appears to be a key feature of the environment of human evolutionary adaptedness. However, it is accepted that cooking goes back more than 5000 years. (2) It is a ubiquitous activity, spanning the globe. Defined as the practice of making food safe and appetizing for consumption, cooking is a core food production activity, whether it is done at homes or in factories. It requires specialized knowledge and physical skills and is dependant on work strategies that involve problem-solving.

I selected baking, a specialized cooking technique, as an example of artisan work in this study. Although foods such as baked goods are increasingly being manufactured in large-scale facilities the practice of artisan baking continues in countries like Italy where baked goods are integral to the diet. Baking involves natural (3) and learned bodily processes that range from the simple to the complex. Many of these processes and skills, such as the use of tools, the expert hand movements required to wield a knife or an icing comb, are required in other

manual work as well. The presence of tools is important because tools mediate the process of thinking in real time. Connections can be drawn from the study of baking tasks and bakers' work strategies to other kinds of tasks that require the use of the body. The micro movements of

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kneading, swirling, stirring, twisting are likely to demand a pattern of thinking and problem-solving that are the same in many artisan processes such as embroidery work, carpentry etc.

THE RESEARCH STUDY

This study was conducted in two phases between 2003 and 2007. A pilot study was undertaken at G Case Baking Company, an artisan bakery in the United States. A second study was subsequently carried out in the Piedmont region of Italy. I identified this area because the artisan production of food, particularly baked goods and sweets, continues to flourish there.

The second phase of the study began with my visit to the University of Gastronomic Sciences in Pollenzo. The University had agreed to host me as a visiting scholar and assist me in setting up a research relationship with food artisans in the area. I spent part of the fall semester on the Pollenzo campus, then moved to Bra, where I visited local food artisans. I made my observations in two *pasticcerie*, confectioners' shops or bakeries, one in Bra and the other in the neighboring town of Alba. Data collection included video clips, photos, interviews with participating bakers and conversations with local residents.

LITERATURE REVIEW: CONTEXT, COGNITION AND EMBODIMENT AS INTERSECTING CONCEPTS

The research questions and the analytic model came from a review of the scholarly literature (4) in which the mind and body were discussed in relation to thinking mainly through a cognitive science lens. An initial review highlighted three key terms: *situated learning*, *situated cognition* and *embodied cognition*. These terms reflect the distinct shift in the cognitive science disciplinary paradigm. Thinking is no longer considered to be the solitary, internal, 'in the head' process best demonstrated in Rodin's sculpture *The Thinker*. Cognition or, broadly speaking, the ways we perceive, understand and act effectively in the world has increasingly come to be understood as embodied and situated or 'in the world'. But the meanings of *embodiment* are highly nuanced and continue to be debated in scholarly literature.

I worked on the construct of embodied thinking over the course of this study by reviewing the literature, constructing an analytic model based on the meanings of embodiment and definitions of thinking. I then refined it by analyzing data collected first through the pilot study and then the study in Italy. The construct highlights a view of the body as thinking and acting in real time to accomplish task-related goals. By this I mean the physical gestures, senses, artifacts and physical movements in space that are used for the successful completion of tasks. The focus here is on *functional patterns of thinking* that are largely physical. Functional patterns of thinking refer to a general pattern of goal-directed thinking. For example, consider bakers' ways of estimating and measuring when baking. This is a functional pattern of thinking because bakers need to solve the 'problem' of measuring and mixing specific amounts of required ingredients to achieve



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goals and obtain results, in this case baked products. Bakers may calculate mentally or they may estimate by ‘eye-balling’ the amount needed or may save wrappers or boxes to remind themselves of the amount already measured. Estimating visually or by saving wrappers is considered a physical pattern of thinking because it involves a visual analysis as in the active, analytic use of the eyes or a deliberate use of artifacts, as in the saving of wrappers. These examples give a preview of the nature of the analysis and findings that I now discuss.

The study of thinking, specifically identifying and categorizing the process of thinking in a bakery where the action is fast-paced is challenging. The multitude of tasks and the various people, materials and tools involved further complicate the scenario. Using an analytic model that integrated aspects of Cognitive Task

Analysis (CAT) with a view of *thinking as problem-solving*, I analyzed bakers’ work strategies to identify patterns of thinking. The analysis shows that baking work is thoughtful work. The classic markers of thinking—problem-solving and decision-making—are evident. Typically, bakers have to overcome the *problem* or challenge of working with *live* ingredients. The ingredients—the flour, butter, sugar etc.—are ‘living’. Both theoretically and practically, the physical environment constantly has an impact on the ingredients and transforms them. Baking tasks, once set in motion, require immediate, quick, continuous actions that involve problem-solving and decision-making in real time. I now discuss how bakers face these challenges and the pattern of thinking that emerges from a study and analysis of their work strategies.

DISCUSSION

'Vai, vai, vai con due mani!' Go, go, go with both your hands, the *pasticciera* urges me. Bakers have to keep moving, use their fingers, both their hands, all their senses, in the bakery. Indeed, they have to be present—mind and body—to attend to the unfolding tasks. In this instance, I was working with chocolate, a delicate ingredient that needs to be handled carefully, especially when being heated. A minute here or there and the texture and flavor of the chocolate would change. This is true for many other baking tasks as well. Bakers, therefore, adopt strategies that involve using both the hands, indeed the body and the tools that amplify the body.

UNCERTAINTY, MEASUREMENT AND THE BODY

Uncertainty is a defining feature of typical baking problems. Unarguably, uncertainty is an intangible but certain reality in life in general. Within the enclosed space of a kitchen, uncertainty is palpably present everyday because of the physical and material nature of the work. The same is true for example, in farming where farmers depend on Nature—that is to say, on the living and self-regulating properties of the ecosystem in which they work.

Bakers rely on measurement, a process that is a response to uncertainty. Measurement can best be described as uncertainty reduced to a quantity. It involves setting a standard unit of measure that then serves as a fixed point against which comparisons can be made. This process of standardization brings about certainty. It ensures that bakers make products of uniform quality on a daily basis, despite the inconsistent, unpredictable overall situation. The first form of standardization is the recipe. This is a written or unwritten task structure that minimizes uncertainty about how the task

is going to unfold. The standard units of measurement in a recipe are objects of everyday use in a bakery, such as cups, teaspoons and tablespoons. Often small quantities of ingredient are expressed in bodily terms such as 'pinch of salt' or in the terms of action ('sprinkle sugar'). The recipe is simply a plan of action, a route map for implementation that reduces the uncertainty of the work situation. Once the work starts, bakers have to attend to tasks as they unfold.

The aspect of uncertainty comes literally alive in the tasks. The live action foregrounds subtle qualities that it is difficult to express as numerical quantities. Indeed, even in a fairly standardized setting such as an industrial food production facility the uncertainty that is apparent is similar to the one faced by artisan bakers. The study showed that a baker's way of overcoming task-related uncertainties was to seek out and record needed information in bodily ways. For instance, the necessity for the hands to be sensitive to pressure and temperature was clearly evident when bakers used the icing bag. The amount of pressure the baker exerts in relation to the temperature and texture of the icing and the icing bag determine the successful completion of the task of decorating a cake. In order to complete the icing task for instance, the 'standard' unit of measuring the amount of force needed to squeeze the different kinds of icing was recorded in the baker's body, as were other units of measurement that estimated the distance from the hands to the work area and so on. Bakers did not use a special tool to measure the pressure in an icing bag or a ruler to measure the distance of the hands from the cake.

Bakers need to be alert to the situation and rely on their visual and kinesthetic senses for many a baking task. For instance, the same sensitivity to pressure and texture is needed when frosting a cake or even when working with dough. Take, for instance, the



process of making *cannolini* shells. The dough is wrapped rapidly and evenly around both ends of the baking rods. The even wrapping is critical to ensure that the *cannolini* shells are uniformly baked. An observer might assume that this is an easy task requiring only a modicum of practice. But when you have the opportunity to handle the delicate dough, you quickly realize the need to be particularly sensitive to the amount of hand pressure needed to wrap the dough evenly. Furthermore the body has to be positioned in a way that renders the task easier. The bakers I visited

always made sure that their work table was clear and that only essential items such as the required ingredients and tools were available. A clear, well organized space enabled them to move easily. It was clear that they were aware of the position of their bodies and how they were moving in space. This was particularly true when the bakers were working together as a *squadra*, or team, as often happens. They had to be aware of each other's position, for instance, when working together to lift a long plank of wood loaded with cake tins or when passing cake tins for loading into the oven.

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ANALYTIC SENSORY ATTENTION: THE SENSES AND THINKING

One *senses* a bakery from around the corner or when passing it on the street. The experience is heightened when one is immersed in it for long hours. Some may argue that, de facto, the immersion ‘numbs’ or desensitizes the individual, which could well be the body’s system of coping, yet an experienced baker will be immediately roused out of this ‘numbness’, if there is something different about the smell, the taste, the sound or the touch of the materials. His or her bodily knowledge that was built through concentrated attention in the first place will now alert he or her to the changes in the situation. For instance, recent studies at the University of California, Berkeley, have shown that when one is paying attention to and perceiving a scent, a part of the brain is activated that is otherwise quiet when that same scent is there, but you don’t *notice* it (Herz, 2007, p. 16). This clarifies the aspect of critical sensory engagement required in seemingly routine work. The worker has to *notice* the

changes in the situation. Then, having noticed the changes, it is necessary to adapt to it in order to accomplish the task. The senses not only enable the gathering of information but also the real time analysis of the situation. The senses enable the estimation, comparison, evaluation, judgment and adaptation necessary for goal directed actions. The *embodied* senses used actively and analytically, either individually or in conjunction with tools, are central to thinking and learning in physical work. The analytic attention that involves focusing the senses is evident from the baker’s bent back and the posture of attentive immersion in the task at hand as he or she releases a stream of sugar from the fist or icing from an icing bag. The quality of attention needed here is best described by comparing it with the idea of a moving panorama where, in front of an expansively wide view, the viewer gets the sensation of moving with the view. Similarly, when working in a dynamic space, the field of attention has to include the space and the viewer moving at the same time. The worker attends to a wide

area of moving elements while moving at the same time. This kind of attention requires both attending *to* and *with* the body, a distinction Csordas makes in his delineation of the term '*somatic modes of attention*' (Csordas, 1993, p. 138). His objective is to elaborate on embodiment as a paradigm or methodological orientation in anthropology. Drawing from his work, I use the distinction of attending to and with the body in this discussion.

Manual work requires an awareness of one's body. The structure of the work, its cognitive demands require being present *in* one's body. For example, what happens if we 'forget' to pick up a glove before touching a hot tray? In not attending to the fact that our skin is sensitive to hot surfaces, our 'self' has in effect slipped out of the body in a manner of speaking, and the result is a burn blister. The burning brings us back into the awareness of our bodies. In this sense, we have to attend *to* our body, be aware and attentive. Attending *with* our body is a skill that we develop. It is any technique of the body that recedes into the horizon once the technique is mastered (Csordas, 1993, p. 139). The baker, for example, or anyone whose job requires an acute discriminatory sense of smell, develops a particular sensitivity to it. Picking up a glass of wine, a skilled sommelier can identify the different smells entrapped within the glass. An experienced baker can walk over and turn off the oven knowing that the *cannolini* shells are baked by the smell emanating from the oven.

The same quality of focused analytic attention is necessary when using a tool. For example, when using an icing bag, bakers continuously shifted and changed positions in relation to the feedback they were receiving in real time and what their bodies already knew about the amount of pressure needed to squeeze the filling out of the icing bag. On the one hand, the standard unit of measurement is fixed in

the body but, on the other, it is re-calibrated in relation to the situations over time. The practice of the craft sharpens and increases the baker's way of bodily recording task relevant information. It increases familiarity that then helps the process of making comparisons that are needed in decision-making. This process of thinking and making adjustments in real time increases bodily knowledge in a skilled manual activity such as baking.

EMBODIED THINKING AND LEARNING

The process of thinking, learning and knowledge generation in skilled manual work such as baking is an inextricably linked, continual, generative process. The body, tools and space are dynamic repositories of this process, which is continually configured and re-configured into new patterns. The quality of physical analytic attention enables this process of real time thinking and is the basis of the related process of learning termed *embodied learning*. This learning process involves real time adaptation—bodily recording and comparing of task relevant information such as units of measurement in the body, the related physical adaptation of tools and space—that is critical in all baking-related tasks. Embodied thinking and learning are enabled by the tasks that serve as an anchor linking mind and body. Csikszentmihalyi, who introduced and popularized the concept of 'flow' writes, 'When goals are clear, feedback relevant, and challenges and skills are in balance, attention becomes ordered and fully invested' (1997, p.31). This enables the experience of 'flow', best described as a sense of effortless action. Experienced bakers who are skilled at the art and craft of problem-solving may well be experiencing the sense of effortless action. This study shows that focused engagement is a

definitive marker of embodied thinking. The process of embodied learning or learning in real time is marked by simultaneous micro-level adaptations.

Artisans, artists or those who work with their bodies are famously reticent about articulating the process by which they produce a particular object or 'work'. One explanation often is that you just *know* it. This leads to considerable ambiguity and confusion about the concepts and words used to describe their work process. Artists often end up being understood as having 'intuitive' knowledge or an innate talent. Manual workers end up being understood as obviously inarticulate because of a lack of formal education. While this may be true, a close observation of skilled work shows that workers are actually engaged in real time non-symbolic thinking. This process of thinking is implicated in their learning. Consider the example of decorating cakes without a template or instructions, or even the simple example of sprinkling sugar on pastries. Both require attentive engagement and real time rapid decision-making.

An immersion in the work leads to moments of understanding that enables them to build their repertoire of skills in increments. While working, workers could well be asking themselves, does this work? Does this work better? How much time do I have? Will I be able to finish this in time if I use this strategy or that strategy? The practice is the learning.

EMBODIED THINKING AND LEARNING: IMPLICATIONS

The understanding that learning is a dynamic, real world, everyday physical activity holds the promise of energizing existing school curricula, which continue for the most part to be based on an understanding of learning as an in-the-

head, solitary process. Researchers into situated cognition—for example, Brown, Collins & Duguid (1989)—teachers who promote peer learning, collaborative classrooms and programs that view 'learning as doing' are allies in the movement to bring the body into learning. The direct implications of the findings are for training programs designed to teach artisanship—vocational training programs, for example. The study shows the importance of apprenticeships with experienced workers who can support thinking and learning on the job. This has been the traditional way of learning among artisans, but vocational training programs designed to meet professional standards and licensing regulations can compromise direct experiences.

The constructs of *embodied thinking* and *learning* provide a framework for research in topics that focus on the body, spanning a range of disciplines from philosophy to neuroscience. The constructs can contribute to research in mind, brain, body and their inter-relationship, especially to studies that investigate the quality of attention. The analytic attention required in artisan work is a rich area of study for *mindfulness* researchers. Finally, by acknowledging the body in thinking and learning, we acknowledge each individual, including a majority of the poor for whom their bodies are, in many a way, their only resource. This acknowledgment can change social development and human services programs, making them more inclusive by emphasizing individuals' existing resources, and their capacity to think and make decisions that impact their lives.

NOTES

- 1) The word 'practice' is used in the sense of an engagement as in 'to perform (an activity) or exercise (a skill) repeatedly or regularly in order to acquire, improve or maintain proficiency.' (*Oxford English Dictionary*)
- 2) Elizabeth Pennisi reporting on Wrangham's research writes that most anthropologists agree that cooking fires began in earnest 250,000 years ago. (*Science*, 283: 2004-2005, 1999)
- 3) I use the word 'natural' in the Vygotskian sense of the 'natural' as distinct from the 'social' and, therefore, learned. Wertsch writes, 'Natural development produces functions in their elementary forms, whereas cultural development converts elementary into higher mental processes'. (1985, p. 24)
- 4) For a complete review of the literature, see the original dissertation study, Patel (2008), 'The Thinkers in the Kitchen: Embodied thinking and learning in practice'. Harvard Graduate School of Education, Cambridge, MA.

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