THE QUARTERLY NEWSLETTER OF THE

LABORATORY OF COMPARATIVE HUMAN COGNITION

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THE QUARTERLY NEWSLETTER OF THE LABORATORY OF COMPARATIVE HUMAN COGNTION

Submission of Manuscripts: If your work has important implications for characterizing the way people use their minds and organize their lives, we would like to encourage you to submit a brief (6-15 pages) article for consideration. As a newsletter rather than a journal, this publication provides a forum for discussing issues that are difficult to discuss in typical journal outlets. It is a good place to try out new ideas or report new techniques; authors often get feedback from other subscribers. Please keep in mind when you are preparing a manuscript that our readership is unusually broad (anthropologists, psychologists, linguists, sociologists, educators, and public policy people are all among our subscribers) and avoid jargon that is familiar only to researchers in one field. Also try to keep references to a minimum; it is the ideas, not the scholarly pedigree, that concerns us.

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Introduction

Changing Times

The basic body of papers appearing here were contributions to a symposium entitled "Contextualized Apprenticeship: Extending Vygotskian Models of Social Transfer" at the American Educational Research Association in April, 1989. As a body, they describe the work of an interdisciplinary scholarly collective who are developing a comprehensive approach to the analysis of acculturation which they apply in educational settings. They draw upon a wide variety of modern scholarship within what is referred to variously as a sociocultural, cultural-historical or sociohistorical tradition, where Vygotsky in the USSR and perhaps Bruner and Bronfenbrenner in the USA are iconic figures. Like each of those major figures, the authors mix a concern for basic theory with a commitment to testing those theories in various forms of practice. So, too, do they draw on a variety of research traditions which incorporate concepts and methods not only in the social sciences, but from the humanities as well.

We found the process of reading this work intellectually challenging in a complex way because the ideas expressed are so similar to those developed at The Laboratory of Comparative Human Cognition that it was somewhat disorienting when conceptual divergences appeared. We are, for example, doubtful about precisely this kind of "close in" discourse that this newsletter was designed to facilitate! As we put it in our first issue, in September, 1976, the *Newsletter* began in order to address the intuition that

> ...what seems new at this juncture in the history of the social sciences is an intense and growing interest in understanding the significance of group differences as a problem of basic research as well as a necessary accompaniment to the applications of that research in the areas of mental health and education.

To make progress, we argued, such a research effort would need to be interdisciplinary and comparative: its major challenge would be to create a methodology equal to the complexities of its task.

Given the broad implications of this work and the traditions upon which they draw, we have asked Sylvia Scribner, long time friend of the *Newsletter* who was instrumental in its founding, to add her commentary based on her extensive expertise in the theoretical and methodological bases of Vygotskian research.

It is fascinating in retrospect to note that the only reference to work by a Soviet psychologist in Volume 1 of the *Newsletter* was the translation of an article by L.A. Abramyan that made no references to Vygotsky. Vygotsky's name first appeared in the next year at about the time that the collection of essays entitled, *Mind and Society* was published. Significantly, in terms of the current papers, that initial use of Vygotskian ideas reported on studies of mother-child interaction from the group associated with the Psychosocial Institute in Chicago that was to have such great influence in the evolution of such concepts as the "zone of proximal development" and "scaffolding," used by the current authors.

A dozen years ago the focus of most of the articles we published was on methodological problems of comparative cognitive research growing out of a convergence of concern with cross-cultural comparisons and intra-national population variations including age, ethnicity, educational category, etc. Hence, early issues included articles on ethnographic and microsociological methods of analyzing behavior-in-context (such as Charles Frake's essay on *Plying frames can be dangerous*, or Erickson and Schultz's *When is a context?*, Jean Lave's early work on apprenticeship and schooling, Barbara Rogoff on the use of spot observations, Robert Serpell on culture-specific definitions of intelligence, or Bud Mehan on the organization of classroom interactions.

From the start, these interdisciplinary efforts were focused around problems of inequality; how do differences get transformed into deficits? Is the experimental method itself a contributor to the problems it was seeking to help solve? And if standard social science methods are a part of the problem, what is to replace them?

A good deal has changed in the intellectual emphases of the *Newsletter*, not the least of which is the increased attention given to ideas associated not only with Vygotsky and his students but with other European and Asian thinkers working in a broadly similar intellectual framework. However, as the changing composition of our editorial board over the years indicates, we have also been seeking to widen our representation of international perspectives while retaining our concerns with issues of

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Getting Social About Critical Thinking: Power and Constraints of Apprenticeship[1]

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"Getting Social About Critical Thinking" argues for connecting two domains that have remained relatively isolated within their respective disciplines —research on thinking and the social origins of cognition. Both enterprises have become enmeshed in education. Neither have considered in any serious way the power and implications that an integrated perspective could contribute to education. The role that social activity may play in the teaching and learning of "good" thinking in our classrooms is the fundamental issue that unites both.

As a cognitive psychologist working in education I have been following the Thinking Skills Movement that re-emerged in the early 1980's. Ironically, the current attention and national support for teaching thinking did not come, at least not initially, from affirming a philosophical belief such as "Good thinking is fundamental to every subject matter and skill area" or "Helping students use their minds more effectively is critical to democratic citizenship." These statements and educational talk were prevalent in the 1930's and 1940's (Presseisen, 1986). Then as now efforts were made to cultivate "good thinking" in our classrooms. Nothing much changed then, or at least not for long (Cuban, 1984), and it was back to business as usual.

Today, however, our current surge of interest in teaching thinking came from disillusionment, not from philosophical idealism. The country was dismayed at the result of any number of national reports and commissioned studies on education. The litany of what our students cannot do is a familiar one by now:

> Our students are unable to draw valid conclusions from what they read; they are unable to analyze math and science problems; they cannot apply "basic skills" to everyday problems (e.g., figuring out the change they should get back after ordering two items on a menu); they do a poor job at developing a position on an issue using supportive arguments; they are unable to write an adequate persuasive letter; nor can they understand a newspaper essay.

Even more disheartening are the recent results of the Educational Testing Service report commissioned by the National Assessment of Educational Progress (1989). And, again, nothing much has changed. The study cited these findings to support its pessimistic tone:

- In reading, 61% of 17-year-olds cannot understand complicated written passages, including topics they study in school, textbooks or simple newspaper essays.
- In science, 59% of 17-year-olds cannot apply their knowledge to interpret text and graphs or evaluate whether the design of an experiment is appropriate.
- In mathematics, 49% of 17-year-olds cannot solve problems using decimals, fractions, percents, basic geometry or algebra.

Despite the reform efforts to make thinking a prime focus of education, it is quite clear that the Thinking Skills Movement has not been successful, at least not yet. In fact, our educational system has been quite resistant "to making school the home of the mind," to quote Art Costa (1989).

Speculations about why this resistance occurs are wide ranging. They go from pointing at educational materials, such as drill and skill workbooks, to faulting broad educational and societal values. Paul (1985) has suggested, in fact, that as a society we have not completely embraced the goal of developing good, independent thinkers or, at least, such a goal has not been part of our tradition for mass education. The new challenge for education may be to "...assume that all individuals, not just an elite, can become competent thinkers" (Resnick, 1987, p. 7).

I would like to add my voice to such speculations by first suggesting another reason why the school has yet to become "a home for the mind", a reason that falls somewhere between citing specific classroom practices and faulting societal values; and, second, offering not a solution actually, but a proposition or model to consider what we members of Hawaii Research on Thinking (HaRT) call the "Contextualized Apprenticeship Model." Finally I will highlight the constraints and power of our model.

Non-Thinking in Schools

Why hasn't the Thinking Skills Movement taken a firm hold in our classrooms? Certainly many issues about teaching thinking have been thoroughly debated—like what kinds of thinking to teach or whether teaching thinking should stand alone or be infused into the subject

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matter areas and so on. These are all curriculum type decisions. However, the area less thoroughly debated is instruction. Even if careful curriculum decisions about thinking are made, the actual teaching may fail. Failure, according to Sternberg (1987), has to do with the mental model of teaching and learning that seems to take over whenever we walk into a classroom. Sternberg's message is this: Whatever program we choose, however many or few thinking skills we decide on, without giving up the didactic teaching-learning model of "telling" and the typical teacher-student discourse pattern,[2] thinking, at least "good" thinking, will not happen.

The didactic model is not only prominent in our schools, as Goodlad (1983) and others have so devastatingly documented, it is also a dominant teaching-learning school schema of many parents. As Levin (this issue) has documented, parental enacting of such a school schema affects not only children's learning at home but also parent-child relations. Thus it is important to ask what it takes to "give up" this dominant, didactic transmission model.

In his personal struggle to understand adherence to this model, Paul (1989) described it as an addiction: There are significant and substantial reasons for stopping. It is wasteful, ineffective, produces inert knowledge quickly forgotten. But becoming conscious of an addiction and its harmful effects is not enough to stop. The problem with "giving up" didactic teaching is that we do not know what to do instead. No positive instructional approach automatically "kicks in," so to speak, to take its place. As part of my research I have observed a Thinking Skills program in action in secondary classrooms in Honolulu and have interviewed teachers who have tired to "give up" didactic teaching. Unfortunately, what they had to guide them was only a general notion that teachers should talk less and students should take the lead. Obviously such an unformed mental schema of teaching and learning is too vague to guide either the teachers' or the students' actions and talk. Neither party was pleased with the resulting state of affairs. The students' critique centered on their dissatisfaction with "too much freedom" (indicating insufficient scaffolding) and "we never got anywhere" (suggesting little reflecting back on what had taken place).

Need for Alternative Models

What seems lacking, then, are well articulated alternatives to didactic instruction. Until this happens, teaching thinking will not take hold. Fortunately, some models are being developed such as our Contextualized Cognitive Apprenticeship model. I will describe its "prototype" form and refer you to research by Bayer (this issue) and Jacobs (this issue) for what it looks like in classrooms at the college and elementary level.

Model Development

In developing our model, two questions guided HaRT's multidisciplinary research group:

(1) What would an expert-novice apprenticeship look like if its purpose is to develop thinking situated within an activity?

(2) What theory would guide the development of our apprenticeship model?

I will briefly address each question and then describe our cognitive apprenticeship model.

Empirical Guide

The first question is an empirical one and directed us away from anthropological descriptions of traditional job-type apprenticeships with its product-as-goal orientation. Instead, we looked to the developmental literature on mother-child interaction, particularly research on cognition and language development. It seems that many mothers have this uncanny knack of situating learning or contextualizing cognition. They place themselves and their children in real activities that have significance and meaning for both of them. For example, when a mother picks up a picture book to read, she doesn't announce that a lesson, say in rhyming or concept naming, is about to take place. The mother and child simply sit down and "read" together. Learning is a by-product of such engagement. This learning in a natural context, for us, is a better empirical guide for both the cognitive and the contextualized features of our model than the job apprenticeship descriptions used by Collins, Brown and Newman (1987). Although the distinctions between their job-type apprenticeship model and ours may be more a matter of degree than kind, they are nevertheless non-trivial.

Critical Distinctions

The two important distinctions between our model and Collins, et al. (1987) "traditional" apprenticeship model deal with (1) learning sequence, i.e., how complex, cognitive learning takes place in time, and (2) the notion of cognitive ownership which concerns the role of the

Table 1

Distinctions Between Apprenticeship Models

	Distinction	Apprenticeship Models	
		Traditional Job-Type	Cognitive-Contextualized
1.	Type of Cognitive Learning Sequence	Ordinal—Clear Linear—Incremental	Recursive—Messy Spiral—Spurts
2.	Ownership and Transformation	Agenda predetermined; Expert's thinking is transformed as little as possible	Agenda negotiable; Expert's way of thinking becomes uniquely the novice's

Table 2

Instructional Dialogue Between Teacher (T) and Child (C)
(Quoted from Palinscar and Brown, 1984)

TEXT: The water moccasin, somewhat longer than the copperhead, is found in southeastern states. It lives in swampy regions. It belongs, as do also the copperhead and the rattlesnakes, to a group of poisonous snakes called pit vipers. They have pits between their eyes and their nostrils which, because they are sensitive to heat, help the snakes tell them when they are near a warm-blooded animal. Another name for the water moccasin is "cottonmouth." This name comes from the white lining of the snake's mouth.

Day 1 C: What is found in the southeastern snakes, also the copperhead, rattlesnakes, vipers—they have. I'm not doing this right.

T: All right. Do you want to know about pit vipers?

C: Yeah.

T: What would be a good question about the pit vipers that starts with the word "why?"

C: (No response)

T: How about, "Why are the snakes called pit vipers?"

C: Why do they want to know that they are called pit vipers?

T: Try again.

C: Why do they, pit vipers in a pit?

T: How about, "Why do they call the snakes pit vipers?"

C: Why do they call the snakes pit vipers?

T: There you go! Good for you.

TEXT: One of the most interesting of the insect-eating plants is the Venus's flytrap. This plant lives in only one small area of the world—the coastal marshes of North and South Carolina. The Venus's flytrap doesn't look unusual. Its habits, however, make it truly a plant wonder.

Day 11 C: What is the most interesting of the insect eating plants, and where do the plants live at?

T: Two excellent questions? They are both clear and important questions. Ask us one at a time now.

teacher-expert in relation to the novice-student and the cognitive goal. (See Table 1.)

Learning sequence. In a traditional apprenticeship, such as tailoring or weaving, the steps for producing the product are ordinal and follow a set sequence. First you do this, then this... and so on. The novice may do the simplest part of any one of these steps, but to become an expert she must learn the ordered sequence to produce the product. To paraphrase Lunsford (1989), wouldn't it be nice if our students learned that way—one step, one step, one step and then, there they are, at the top of the cognitive ladder. If this were true, then a "task analysis" could list the steps and we, educators, would just need to follow them.

However, from all that we know about complex cognitive tasks, learning occurs in messy chunks with fits and starts. It is recursive, moving more in the form of a spiral than a straight line. For example, reflect back on how you wrote your last paper or article. My own writing process and those of other authors (Graves, 1983) do not lend themselves to neat step-by-step task analysis; nor to specifying ahead of time the exact look and content of the end product. The same is true when we try to teach thinking.

Ownership and transformation. The second distinction deals with ownership and transformation, i.e., who has psychological ownership of the cognitive product and has the product been simply reproduced or has it been transformed.

In a typical job apprenticeship model, the novice follows the expert's agenda; the focus is on the end product and the end product is determined by the expert. The expert "owns" the process and the product. Consider, for example, the study by Palinscar and Brown (1984) which Collins, Brown and Newman (1987) have used to illustrate their apprenticeship approach in education. The students were to learn the structure and form of typical, teacher-type questions, literal ones where the answers are directly in the text. Note in an excerpt from their study in Table 2 that the exact words to use were given to the child when he was unable to formulate a teacher-type question.

The teacher initially modeled the question and had the child repeat it. The teacher provided extrinsic rewards through praise and labeled the questions as "important." The teacher-expert's scaffold technique is teacher-model, student-imitate, teacher-evaluate or reinforce, a fairly common instructional pattern. After a few sessions the child was able to ask these literal teacher-type questions quite well. But such questions "belong" to the teacher-expert, even though they were spoken by the child. Thus, their value and usefulness to the child outside the culture of the school are doubtful.

In direct contrast are the instructional interactions that took place in Jacobs' study (this issue). Both the scaffold technique and type of questions are radically different, as is the desired outcome. The children were scaffolded by the teacher into forming questions that have meaning and importance to **them**. These questions were far from the literal, factual type. They expressed wonderment and puzzlement; they motivated because they require reasoned opinions, not preset "right" answers already in front of them. Their goal, often times, was knowing what is not known: "I don't know that. I'll have to find that out." were statements the children often made upon completion of an instructional interaction. Instruction began with sharing what is known. Movement was toward the unknown. Teacher scaffolding was via public and shared reflection on the efficacy of the student generated questions—their purpose and function. The questions here belong to the children, as does the goal. The children own them.

In the Palinscar and Brown study (1984), the goal and agenda are fully predetermined and belong to the teacher-expert. The goal was to get the student-novice to produce a product that looks exactly like the expert's; a goal that is typical of job type apprenticeships (Greenfield, 1984). There is no transformation. It seems like the more traditional the culture—and school is a traditional culture—the more emphasis there is on maintaining, unchanged, the traditional ways. Thus, by learning how to ask themselves teacher-type questions, the children in Palinscar and Brown (1984) study learned the rather rigid role of "student" in the traditional culture of the school. In other words, the goal is enculturation as students, not thinkers; the agenda is the scope and sequence of facts established as the curricula, not inquiry into why these facts are important or how they came to be.

In contrast, a contextualized apprenticeship interaction places the child in a more negotiating stance: What the task activity is and what the outcome will look like are negotiable. In Adams' mother-child research (1987), for example, many of the three-year-olds would not accept a web-footed, flightless, marine animal, (namely a penguin) as a bird. The mothers had to negotiate, and they did—by using various kinds of verbal hedges like—"Well, it's sort of like a bird, a strange looking bird for sure." Eventually, of course, we do want our children to classify penguins as

birds. But in terms of critical thinking, we want our students to "go beyond the information given" in Bruner's classic sense. Transformation is desired. I will discuss the constraints on transformation shortly. (See also Brandt, 1987).

Theoretical Guide

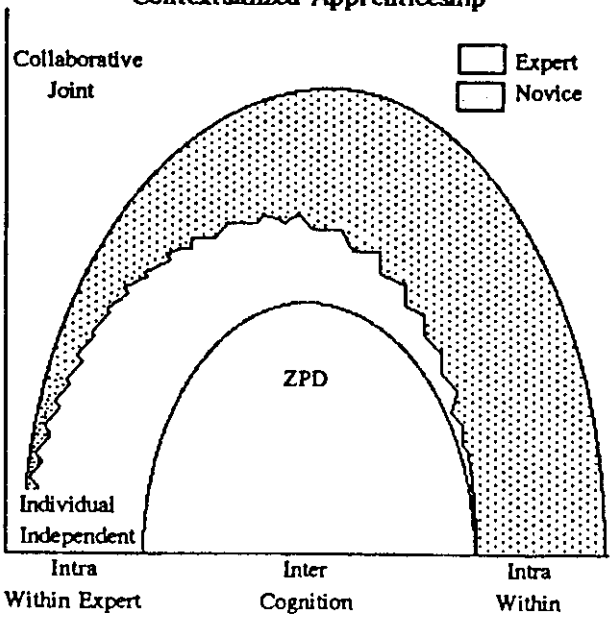
Turning to the second question about theory, our model rests foresquare on Vygotsky. We took seriously his two key theoretical principles: one, that the origins of all higher cognitive processes are first social; and, two, his now famous "Zone of Proximal Development" or ZPD. Both of these principles have strong implications for psychology and education. We, psychologists, were told a long time ago that "We are a funny lot, thinking that what's most interesting about the mind is inside the head."[3] We haven't changed. We continue to think that "cognitive stuff" (be it skills, processes, concepts, meaning) is **always** located in someone's head; never "out there" between people. Now, however, Vygotsky's view of the development of higher mental functions suggests that we look **outside** the head; that mental functioning occurs first between people in social interactions. It means that "dyads or groups as well as individuals...think and remember" (Wertsch, 1984, p. 2) and it means that social moment-to-moment interactions create cognition. Only later is it internalized within one head or mind. This "in the head" location as THE place for cognitive things no longer has privileged status (Newman, Griffin, & Cole, 1984; Rogoff, 1982). That is why the didactic transmission approach is failing so many children in our schools: The expert cannot simply give cognition away. The transfer must be interactive, social and jointly created.

Prototype Apprenticeship Model

The prototype schematic of how this social transfer is accomplished is depicted in Figure 1. The Y axis represents the boundaries of the ZPD with the Individual/Independent being the actual developmental level of the novice upon entry into the social, instructional interaction. Movement is toward the Joint/Collaborative—the proximal developmental boundary that is jointly created by expert and novice.[4]

On the X axis is the social transfer of cognition that goes from the intrapsychological or within one individual (in this case the teacher-expert) to interpsychological or between the novice and the expert, and back to intrapsychological, now within the former novice.

Figure 1
Contextualized Apprenticeship



The arch is the ZPD with its width jointly determined by the instructional context as well as the skills and abilities of both the novice and the expert. The uneven jagged line illustrates the dynamics of the expert-novice relationship and the changing role that the expert plays in scaffolding the novice at different moments in time. As you move from left to right, note that the overall scaffolding of the expert emerges and then disappears. In a three dimensional picture this arch would extend upward into a spiral with learning and instruction continually beginning with the novice's new internalized, independent level.

Vygotsky (1978) only talked about half of this arch (the inter to the intra) and then only in the sketchiest way. For educators concerned with higher order thinking skills, the role of the expert needs to be fully drawn. Wood, Bruner and Ross' (1976) one-on-one tutoring studies provide some detail. Bayer (this issue) and Jacobs (this issue) add to the sketch by describing how this prototype looks in typical classroom settings.

Power and Constraints

This final section contains our current thinking about the constraints and power of our neo-Vygotskian model and apprenticeship metaphor. We fully expect to modify and refine these ideas to reflect our on-going research and discussions.

Constraints on Transformation

Transfer in this model is inherently social in two respects.[5] First, it is movement from within one individual to within another, so that the transfer *process* is constructed through social interactions and is socially mediated. Second, the *thing* which is transferred is also social. As Wertsch, Minick and Arns (1984) stated:

> ...the very processes or relationships that are involved in social interaction are eventually taken over and internalized by the child to form individual cognitive processes. This transition is the cornerstone of what Vygotsky termed the "general genetic law of cultural development" (p. 157).

Thus, the type of transfer we are concerned with is quite different from the traditional transfer concept in psychology and education. Our current focus is not transfer across tasks or materials but transfer between people. How this social transfer is successfully accomplished is the crux of our research explorations.

This model of social transfer is not a copy theory. The novice does not simply internalize an isomorphic copy of the external social processes. As Vygotsky (1962) asserted, "it goes without saying that internalization transforms the process itself and changes its structure and functions" (p. 163).[6] What existed externally between people becomes transformed as it goes underground. The constraints on the *degree* of transformation would vary depending on at least three broad factors:

1. The social expertise of the expert. How competent is the expert in socially and jointly externalizing the cognitive activity and meaning of the task? The expert must become self-conscious and take her internalized cognitive and idiosyncratic history and make it public. How well the expert can also co-construct the social context which has meaning for the novice so that there is mental engagement should influence the extent of transformation. The less the expert takes into account the novice's perspective, the less likely the novice will become actively engaged and therefore the less likely any important transformation will take place. Repeating, copying, mimicking or disruption and non-participation are the likely outcomes. For example, Levin (this issue) found that some mothers were very ineffective in creating an apprenticeship social context to assist their preschool children in learning school-type things, such as letter, numeral and color names. The result was frustration, anger, and consequently little learning, even of the mimicry type. Yet these same mothers with household-type tasks in which learning was highly contextualized were highly successful.

In my own experimental study on memory strategies (Brandt, 1986), part-Hawaiian children essentially chose to do a different task. I had not established what Wertsch (1984) calls "intersubjectivity." We did not share a common goal. I had set the agenda as well as the means of accomplishing it. Only after I decided to step out of my experimenter role and create a "real" social context with the children, did they begin to take part.

2. What our novice is like. We assume that prior experience and knowledge of the novice will influence the degree of compliance or acceptance of the expert's interpretive view. To use an example from Adams'(1987) research mentioned earlier, the mother-child dyads negotiated what to call certain animals during joint picture book reading. For one picture a child would accept "spotted dog" but would not call it "Dalmatian." This type of transformation could be seen as incomplete transfer from the adult-expert perspective. We, however, prefer to view it as a riser in the scaffold. To use an adult example from personal experience, a college teacher who was academically socialized during the Behaviorism era has a great deal of emotional and intellectual investment in maintaining the behavioristic view of learning. Attempts to scaffold Vygotsky's social origins perspective were problematic. It appeared as if extensive prior knowledge of a different sort may block effective negotiations for social transfer.

In the former example, the novice-child's limited prior knowledge led to a negotiated interim outcome. In the latter case, the novice-adult's extensive prior knowledge and commitment precluded transfer. The role that emotional commitment and other non-cognitive factors play in successful social transfer need to be explored.

3. The nature of the task. Of particular interest is the degree of cultural or personal commitment the expert has in accomplishing a transfer that is an exact duplicate of a product, process or performance. The expert, as the embodiment of sociocultural knowledge, skills and values, would construct the social context in ways which would ensure that tolerance levels for change are not exceeded. Most teachers in our schools could serve as models of how to constrain transformations within narrow limits. A non-school example comes from Greenfield and Lave (1982) who studied the Zincantecos in southern Mexico. This cultural group has a small set of specific weaving patterns that are taught to the young girls. Devia-

tions from those cultural patterns or "errors" are prevented by the expert during the assisted and joint weaving task. The intent is not transformation of the product nor fostering creativity. Creating new patterns is not the goal; preserving tradition is. Transformation tolerance would also be relatively low if the accurate transmission of the oral history of a cultural group was the task. John-Steiner (1985) has documented just the opposite in the artistic and scientific task domains in our Western, European culture. In those apprenticeships, the goal was generativity, to deviate from what came before. Thus the task alone is not the key consideration here. The task must be viewed as contextualized and to do so it must be embedded within cultural values and personal intent.

Power of the Model

Currently, our contextualized apprenticeship model serves us well for it allows for individual differences, respects cultural differences and permits sociocultural change. The apprenticeship metaphor appears to be a powerful one. It has provided us with an effective way of viewing learning and development which holds across the five disciplines represented in the HaRT project; across methods ranging from interpretive text to experimental design; across ages beginning with infancy to adulthood; and across cultures—European, American and Pacific Islander. It recasts how learning and development occur and thus focuses our eyes on the shared and the social. It is an active model in the traditional constuctivist sense while being absent its rigid stage approach. It is also a caring model in the feminine tradition of Noddings (1984).

In addition, the metaphor explicitly recognizes the domain specificity of knowledge on the part of both the expert and novice. In other words, an expert in one task may be a novice in another. The important point, however, is not that this metaphor is compatible with information processing type research with adults (e.g., Chase & Simon, 1973; Larkin, McDermott, Simon, & Simon, 1980), nor that it is in harmony with what Bransford, Sherwood, Vye and Reiser (1986) call the "new look" in developmental theory. The significant value of the apprenticeship metaphor is that it forces us to look at the learning activity in context; to focus on how the expert establishes and orchestrates a social context which fosters successful transfer, and to treat such orchestration as complex. It is precisely this sizable portion of the instructional relationship that is either neglected or missing in most research on expert-novice problem solving (e.g., Chi, Bassok, Lewis, Reimann & Glaser, 1987) and in research on thinking skills programs. For example, a recent report (Herrnstein, Nickerson, de Sanchez & Swets, 1986) describing a massive study on teaching thinking skills in Venezuela had only one sentence dealing with expert-novice transactions:

> The teacher received continual feedback from the students; the typical student shifted from a somewhat passive classroom mode to much more active involvement with the flow of material more like a *natural social interaction outside the classroom* [emphasis added] (p. 1289).

Here we are given only a tantalizing glimpse of an apprenticeship situation. Admittedly, capturing and analyzing thick descriptions of the expert-novice dynamics are difficult. Yet such descriptions are crucial if we want to understand the social transfer process, i.e., how and why it has varying degrees of success.[7]

In fact, powerful understanding could result if two forces are combined in future research. One force is embodied in the Thinking Skills Movement with its knowledge from cognitive psychology, cognitive science, philosophy and artificial intelligence. It contains static knowledge about *how we currently think and what "good" thinking is within a domain* but whose origins are unexplored. The other force is the one sketched by Vygotsky, elaborated on by developmental psychologists, and articulated in our apprenticeship model. This contains dynamic knowledge about *how we become "good" thinkers or how we came to think the way we do.* Finally, such joining of forces may help us deal with the seemingly intractable problem of inert knowledge (Whitehead, 1929), an all too common outcome of our institutionalized educational efforts. Active knowledge, knowledge that has meaning and use, is precisely that which, we believe, is created and internalized during the contextualized apprenticeship process. HaRT plans to continue exploring the implications and applications of our model within typical instructional settings.

Our research agenda is filled with questions. Most concern the limits or constraints of this social perspective on learning and development: When and where do social negotiations and social assistance help performance and internalization? How does the expert know when to construct a social context and when to simply leave the novice alone? Theoretically, how does observational learning and guided participation fit into this social perspective that presently relies heavily on speech and language as mechanisms of transfer? Are all higher level cognitive processes and concepts socially based, as Vygotsky contends, or are some better acquired by individual, independent efforts? These questions serve us well.

Notes

[1]I would like to thank the members of Hawaii Research on Thinking (HaRT) for serving the dual role of "collaborative expert" and "novice" during the development of these ideas. I am grateful for the need to negotiate meaning across five academic disciplines as well as for the scaffolding provided.

[2]The typical pattern is "teacher questions, student responds, teacher evaluates." The cognitive demand of the question is usually rote recall; the student response is short—a few words; and the evaluation is in terms of right or wrong.

[3]This quote, made to Jerome Bruner by Clyde Kluckhon, is cited in Bruner (1980).

[4]The joint creation of the ZPD means that the upper boundary, the potential development, does not reside solely within the student-novice; rather it is jointly determined by the skills and abilities of the expert (teacher or more capable peer) and the student-novice.

[5]For yet a third sense of the social nature, see Wertsch and Addison Stone (1985).

[6]According to Vygotsky (1962) the structure and function of speech is transformed as it goes underground and becomes internalized. The structure becomes abbreviated and idiosyncratic while the function becomes one of regulating, guiding and planning thought.

[7]Adams (1989) noted that there were large differences in student outcomes in the thinking skills program in the Venezuela project depending on the prowess of the teachers. How the most effective teachers conducted their instruction using the same materials would be most revealing to know.

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University Students as Apprentice Thinkers[1]

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This paper is a "work in progress" report of my ongoing research project which documents the teaching-learning processes in a university instructional setting over a nine month period. One main purpose of this project is to provide a thick description of the social and language interactive patterns in an undergraduate classroom in order to examine the degree to which they reflect and illustrate the theoretical concepts underlying teaching strategies.

Background of the Study

The education of university students who themselves plan to become educators has long been problematic. The crux of the problem concerns the anomaly of the lecture format in education courses when the concepts and teaching strategies discussed stress student engagement, participation, and student use of language as a tool for learning.

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A teaching mode characterized as a social-intellectual apprenticeship process in which the instructor and students engage in collaborative joint activities would appear to more closely model the theoretical concepts and teaching practices being suggested by teacher educators.

What is being reported in this paper are the results of an examination of data illustrating the degree to which the teaching mode within this university class setting represents a shift from the traditional lecture format toward an apprenticeship model.

The participants in the study were 23 undergraduate elementary education majors (of varied ethnicities) who volunteered for a year-long experimental course, *Language in Education*, in which I attempted to model the teaching-learning process as a collaborative activity. This course was the first opportunity for these preservice students to examine strategies for facilitating the language and learning development of elementary students. The participants were thus novices within this context. As instructor of the course, I am in the research role of full participant.

Every class session during two semesters was videotaped, resulting in 49 videos of approximately 80 minutes each for a total of 66 hours. Another 12 hours of video tapes record these university students working with elementary students during their field experiences. In all, 78 hours of video tapes exist as the primary data base.

In addition to the tapes, copies of all the university students' journals, drafts, and final written products were collected as well as drafts and final written products of their elementary students.

Emerging Patterns

The patterns emerging from the data reflect Vygotsky's notion of the social origin of learning. An expert (or more capable peer) initially controls and guides a learner's (apprentice) activity; gradually the two come to share the problem-solving functions, with the learner taking the initiative and the expert/peer correcting and guiding when she falters. Finally, the expert/peer cedes control and acts as a supportive audience (Brown & Ferrara, 1985).

Vygotsky (1978) argued that engaging in these joint activities advances the learner's level of actual development. He suggests that a learner's boundaries lie between his (1) actual development or what he can do independently, and his (2) potential development or what he can do while participating with more capable others; he calls this a learner's "zone of proximal development."

What seems to typify this process is the parent/child relationship (Bruner, 1983). The question is, of course, can this same apprenticeship process work as a teaching-learning model in our educational settings across grade levels? One of the first issues that would have to be addressed is "How would a teacher begin?" After all, in the parent-child apprenticeship, the mother and father know a great deal about their child's levels of actual development because of the intimacy of the home situation. Even in traditional apprenticeships outside the home; e.g., the tailor with his apprentice or the artist with her protégé, the one-to-one ratio helps the expert gain access to the novice's competencies. In classrooms, however, the novices are likely to enter into our classes as strangers and, further, the teacher-student ratio is not 1:1, but, more likely, 1:30 or 1:75. So how can an instructor begin "where the students are?"

The first pattern emerging from the data addresses this question. As within mother-child apprenticeships, the relationship between teacher and student is initially asymmetrical with the teacher guiding the joint activities within a scaffolding structure. This scaffolding structure is used by the teacher at the beginning of the semester to help her (1) to gain access to her students' prior knowledge about given concepts; (2) to build a shared background of knowledge (which can then be used as reference points for discussing new ideas); and (3) to use as a guide for "upping the ante" or for working at the upper levels of students' zones of proximal development.

Scaffolding Structure

The scaffolding structure used in this class, has several components (see Table 1, next page).

As a beginning point, the instructor preselects a major concept/topic that she wants her students to understand. She asks her students to write what they already know about the topic. This focused freewriting (Elbow, 1976; 1981), unlike traditional techniques (such as pretests), elicits from students whatever knowledge they have, including everyday knowledge from living within this culture. For example, to introduce the topic of "learning processes," the students were asked to write a response to the question, "How do individuals learn something new?"

These individual freewrites are shared with peers in small groups; group members are asked to listen for

Table 1

Scaffolding Structure

MAJOR CONCEPT	PUBLIC SHARING OF PRIOR KNOWLEDGE	"BUILDING" ON PRIOR KNOWLEDGE		
		Engagement	Public Sharing	Categorical Scheme
Concept selectd by instructor	Students engage in activities to elicit their prior knowledge about concept. Student's share "pool"/make public this knowledge. Instructor summarizes.	Students look for confirmation of their beliefs in activities which illustrate activity.	Students share publicly their responses which emerge from engagement activity.	Instructor places student-generated information within a categorical scheme reflecting the concept.

Table 2

Predictability of Scaffolding Structure

		"BUILDING" ON PRIOR KNOWLEDGE		
MAJOR CONCEPT	PUBLIC SHARING OF PRIOR KNOWLEDGE	ENGAGEMENT ACTIVITY	PUBLIC SHARING	CATEGORICAL SCHEME
Learning Process	Freewrite Question & Small Group Sharing	"Tool" Demonstrations		
MAJOR CONCEPT Language Variation	PUBLIC SHARING OF PRIOR KNOWLEDGE Freewrite Question	ENGAGEMENT ACTIVITY Student Skit		
MAJOR CONCEPT Talk as a Tool for Learning	PUBLIC SHARING OF PRIOR KNOWLEDGE Freewrite Question & Small Group Sharing	ENGAGEMENT ACTIVITY Student Analysis of their own Talk in Small Groups		
MAJOR CONCEPT Writing Development	PUBLIC SHARING OF PRIOR KNOWLEDGE Freewrite Question & Small Group Sharing	ENGAGEMENT ACTIVITY Student Analysis and Evaluation of own Writing Instruction		

similarities and differences between each member's currently held beliefs regarding the topic. What this sharing does is allow students to "pool their knowledge"; it is an example of peer collaboration early in the semester.

The small groups then share their similarities and differences with the whole class, making the information public. The instructor, in the role of expert or "more capable peer," makes connections between the different groups' beliefs, thereby "painting a picture" of what seems to be emerging as the students' (albeit composite) current theories regarding topic "x."

This shared knowledge is used as an anchor or reference point for negotiating the meaning of new knowledge about the topic. Now the instructor and the students have a starting point.

The next step involves the instructor moving "to up the ante;" build on this shared background knowledge. How is this done?

The students are asked to look for confirmation of their individual/group beliefs in an upcoming activity. They are asked to note discrepancies between their current beliefs and the new information they generate during the engagement acitivty. In other words, the students are looking for the connections they can made between new ideas and their prior knowledge.

These "hands on" demonstrations, early in the semester, typically engage students in activities which tap into everyday experiences and, yet, are related in some way to the topic under discussion. For the topic on "learning," for example, the students were given unnamed objects (e.g., cherry pit remover). Each student had to make a guess as to what the object was and then write down what lead him to that particular guess.

Again, the student responses are shared with the whole class, making them public. The instructor takes their responses and places them within a categorical scheme reflecting the new concept. In the case of the unnamed "cherry pit remover," as individual students made guesses about what it was, the instructor listed them on the board. When asked why she made such a guess, a student said something about "seeing something similar" in her mechanic's garage or in her doctor's office. When asked why the student guesses were different for the same object, the students typically stated that their "experiences" were different. The instructor then connected these student statements to the notion that "learners activate their related-prior knowledge to help them make sense out of a new situation." (Note that it was at this point that the instructor introduced specialized vocabulary by labeling the student-generated information.) This process continues until all the student responses had been placed into the categorical scheme leaving the instructor with only having to "fill in gaps." Thus it was possible, through the use of this scaffolding structure, to begin at the students' actual levels of development and, through guided participation, to help students expand their prior knowledge.

As students assimilate early course concepts, the scaffolding structure content looks a little different. Table 2 shows that while the structure remains predictable, it allows for variability in both concepts and procedures.

Using Shared Knowledge

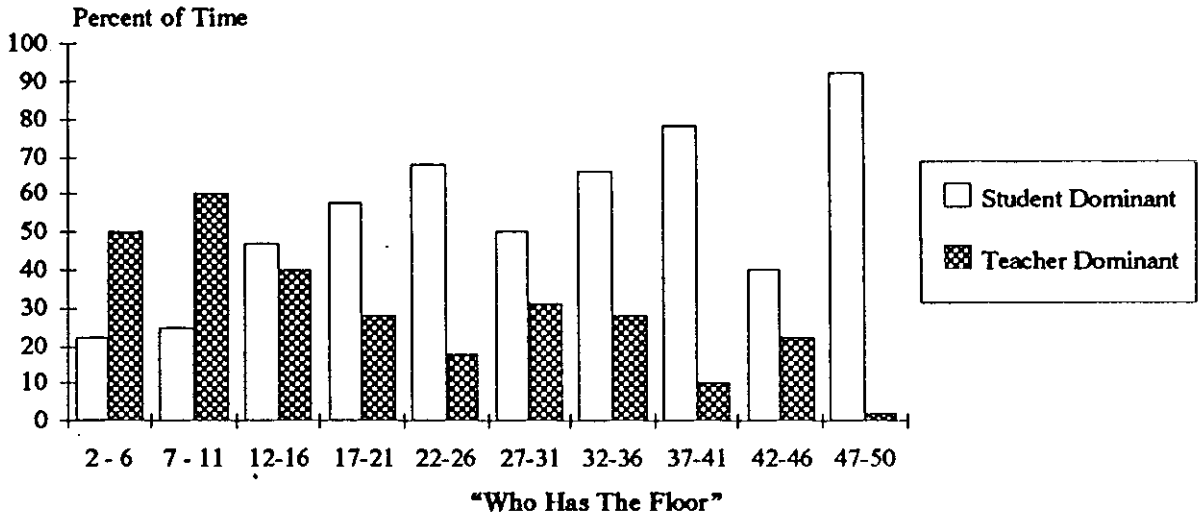
The second major finding is how the instructor used the results of the scaffolding structure process, the shared knowledge, as a common reference point during the rest of the semester to help students assimilate related concepts. In other words, the expanding shared knowledge among the class participants is used as an anchor for negotiating the meaning of new knowledge. One activity from the second class, which dealt with the students' memories of their early writing instruction and their responses to that instruction, was referred to nine times during the first semester; the references occurred in five different class sessions, ranging from the 5th class to the 17th class (see Table 3).

Table 3

Ending on Shared Background: "Memories"
Concept Introduced in 2nd Class

# of References	Transcription	Semester Class Session
#1	Tape 5, p. 2, L 9-29	5th Class
#2	Tape 5, p. 15, L 13-21	
#3	Tape 7, p. 2, L 8-15	7th Class
#4	Tape 11, p. 2, L 3-7	
#5	Tape 11, p. 12, L 20-29	11th Class
#6	Tape 11, p. 14, L 13-17	
#7	Tape 13, p. 3, L 22-27	13th Class
#8	Tape 13, p. 5, L 5-8	
#9	Tape 17, p. 19, L 10-19	17th Class

Figure 1
Social Transfer Across Time



What did this technique look like within a given class session? The following excerpts are examples of the instructor referring back to the "memories" activities when she wanted to tie the underlying concept from that activity, "form follows function" to a new topic.

In the 5th class, the instructor was making the argument that humans learn language because it is a "functional" tool. She connected the previously developed categorical scheme "form follows function" to the new topic, "language acquisition:"

> So learning language is extremely important to us because we get more control over our world. And then we can use it to make sense. So it's very functional. And that word "functional," (moves to the blackboard and writes "functional" on it) you have run into it before already, okay? Remember when we were examining your positive and negative memories? And you would see that the positive memories were the ones in which you were sharing some kind of message with somebody else?...It's because as humans we use language for functional reasons. We do use it to communicate a message, sometimes only to ourselves.

Two weeks later, in preparation for a engagement activity illustrating how student-authors can respond to early writing drafts by focusing on the message first, the instructor again used the "memories" activity as a common reference point to help students make sense of this new idea:

> And this will lead us into our second demonstration today. How do we, how do we typically respond? You shared in your memories how we typically respond to your pieces, and that was the teacher's marking the mechanics and saying things like something was awkward or had a run on sentence or "frag." But you were saying there's very little response to the message. So I'm going to read two, two short paragraphs that come from about third grade, and I'm going to ask you which one engages you more? Which one do you get a reaction? Which one has a clearer messsge, okay?

Transfer of Responsibility

Of course, the intent of using an apprenticeship process within an educational setting is to provide a means by which the novices (learners) begin to assume more responsibility for their learning, finally reaching a point where they are able to carry out tasks, within the specific domain, independently. At this stage of the analysis only the earliest signs of transfer of responsibility are evident. By examining how much time within a class period is teacher-directed and how much time is student-directed, it was possible to notice that the teacher-directed activities decreased consistently after the 10th class session with a parallel increase in student-directed activity (see Figure 1).

In Figure 1, the 49 class sessions are clustered in groups of five with the numbers 2-26 representing the first semester, and the numbers 27-50 the second semester classes. The teacher was clearly dominant during the first 10 classes. She was spending time giving out information, and reviewing and expanding on connections that students

had made in previous sessions. For example, in session four, she began the session by asking for volunteers to do a skit, which she said will help her make a point about an upcoming topic, Language Variation. Shifting then to a review of the previous week's class, she summarized the point of the "tool" demonstration in the following manner:

> We had a demonstration...we discovered that you didn't come up with the same responses. You came up with different guesses for the same tool. And we discussed the reason for that...then (you decided) we have to find out if your hypotheses (guesses) would be confirmed...and you decided you could ask somebody or you could go to the hardware store. . .

The instructor then expanded on the topic by introducing the role a teacher plays in helping students who have insufficient prior knowledge about a concept.

During these periods, the instructor "has the floor" in that she was doing most of the talking. In the first 10 sessions, between 50-60% of class time is "teacher talk." This percentage decreases to about 20% by the end of first semester and approaches 5% by the end of the year.

Meanwhile, the students "have the floor" about 25% of the time during sessions 2-11. By the end of the first semester, however, they are involved in student dominant activities close to 70% of class time, and this percentage increases to over 90% by the end of the year.

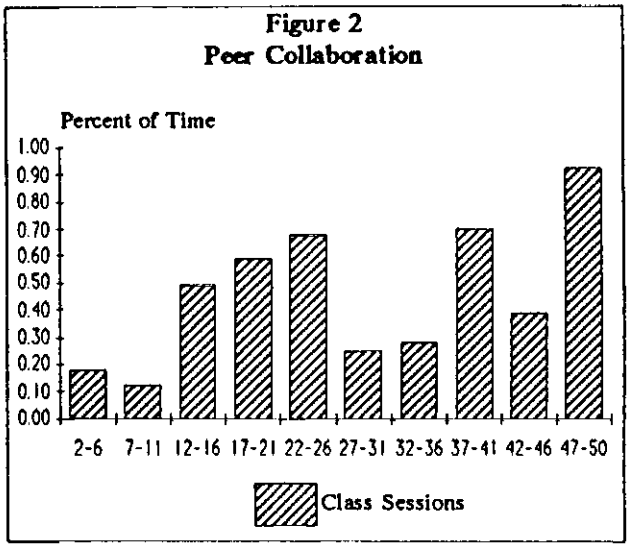
Student dominant activities are those in which students talk, write, or use dramatic activities to make connections between their prior knowledge and new concepts. Peer collaboration in small groups is the primary mode for these student activities. These problem-solving groups tackled increasingly complex tasks as the year progressed.

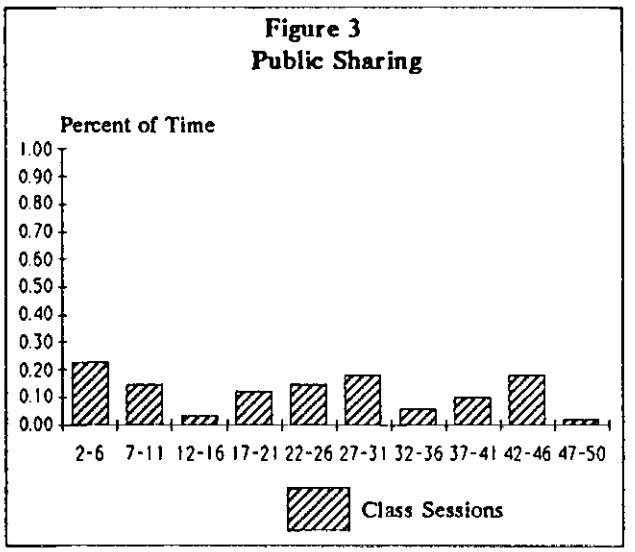
Figure 2 indicates the extent to which peer collaboration was used over the year.

What accounted for the time remaining when neither the teacher nor the students' had "dominance?"

In about 15% of the time, both teachers and students "shared the floor" during Public Sharing (Figure 3).

Here students shared information they generated during demonstrations, and the instructor connected that information to a categorical scheme underlying the topic under discussion; or the students and instructor engaged in





open-ended dialogues, often one or the other seeking clarification or modification of ideas. The main finding, however, is that students increasingly took more responsibility for their own learning as the year progressed.

Conclusions

Because the study is not complete, further analyses will focus on a description of the "moment-by-moment" interactive processes which occurred between participants both during and after the scaffolding structure as well as on an examination of intergenerational transfer between the university students and the elementary students they tutored during their field experiences.

However, early findings are congruent with an apprenticeship notion of the social origins of learning regardless of age of the learner. Findings also add new knowledge to what the processes are within social-interactive contexts that influence qualitative changes in intellectual activity.

Finally, application of findings should raise the issue of the validity of the apprenticeship process as an alternative teaching-learning model within our elementary, secondary, and undergraduate classrooms.

Note

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Scaffolding Children's Consciousness as Thinkers

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Readers may be familiar with the diagram to the right. What it summarizes is a view of social transfer: the expert-to-novice relationship changes over time. Over time, as the novice practices and becomes more skilled, the expert's scaffolding—the modeling and helping—is needed less, and therefore the novice can exert more control and assume more independence.

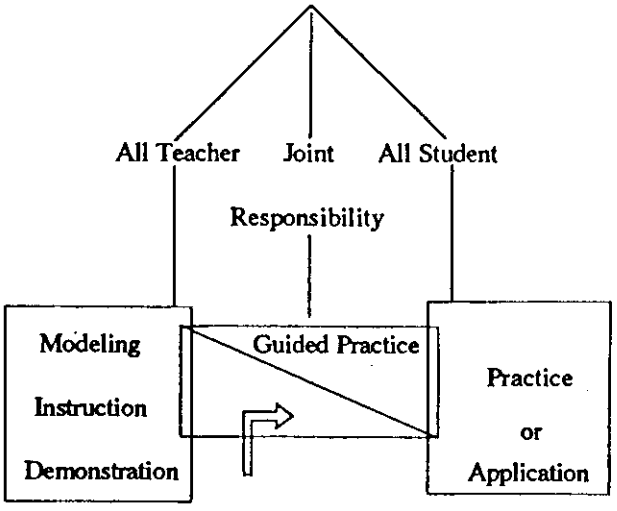
Consider the point at the upper left, the beginning of the time when the expert as teacher would assume her most controlling presence. At this point the teacher would demonstrate, the child perform. As in an audio-lingual approach to teaching foreign language, the child would listen then imitate, or watch and repeat. Consider an example case cited by Collins, Brown, and Newman (AERA, 1988) in their description of cognitive apprenticeship. Children being taught to write expository prose are issued cue cards, each card showing a prompt such as

An important point I haven't considered yet is...

or

I could develop this idea by adding...

The teacher, by placing the cards next to the child at the moment of composing, signals to the child what questions ought to be used in planning what to say next. Later on in the year when the questions are internalized, the scaffolding support in the form of the cards is removed, but in the early moments the prompts are specific, visible, and script-like. Because they are there at the moment of performance, prompt and performance are adjacent in time. First one, then the other.



Gradual Release of Responsibility

Diagram 1

(From J. Campione in Pearson and Gallagher, printed in Cazden, 1988, 104)

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Not everyone accepts this version of scaffolding, especially on the issue of adjacency early in time. Consider the observations made by A. Bayer (this issue) as to when and how much the teacher took the floor. One of the first things the teacher did was give students the floor by having them write and discuss their views in small groups. For Bayer the line of teacher responsibility for task completion is more jagged than Diagram 1 indicates, showing more movement back and forth between teacher and student responsibility. Even at the beginning, when the relationship of teacher and student is asymmetrical in the teacher's favor, student participation is not scripted.

Turning now to the subject of my study, let us look at the teaching practice of one Grade 5 teacher who also does not accept adjacency between prompt and performance in the early stages.

Just a word about method. Bruner (1986, p. 127) among others has pointed out the need for studies of scaffolding in ordinary school settings. We need what Stephen North (1987, p. 35) calls practitioner studies, and especially an understanding, to use his term, of teacher *lore*. *Lore* refers to the rich and powerful body of teacher knowledge about what works. The word *lore* also refers to the style in which such knowledge is passed on, meaning the style of personalized anecdote and oral language.

So I have turned to teacher-told story as my source of information, taking subjectivity for granted as we would normally take for granted the subjectivity of a novel's narrator. I have taken on the role of analyst and critic, looking as critics often do, at the point of view of a central character, in this case the teacher, and also at the words of other characters on the scene, in this case the children. Like a literary analyst I work with texts, working out the interpretive frameworks of the speakers and writers of these texts.

I have worked mainly from two texts. The first is a series of transcribed tape recordings of a conversation with the teacher that took place over a week. In this conversation we make frequent reference to the second text, the recorded voices of four children in this teacher's classroom who have been meeting each other repeatedly in a writing response group. Just back from science camp, each child has selected an environmental problem—ozone depletion, for example. The children use the writing response group to make sense of these complicated problems.

Overall, I work to understand the way this teacher "reads" events in her room and thinks about ways to teach language and thought.

I must add that teacher interpretation is not my only interest since I also hope that I may learn something about good teacher performance in the more objective sense. This teacher is a model teacher in a nationally distributed film on the teaching of writing. Her standardized test scores are remarkable: typically her mixed SES fifth graders score toward the end of the year at the eighth grade level (a class mean on the CTBS combining language with math results). She has taught more than 25 years, and for several of those she has served as a popular mentor teacher. All of these factors make this teacher, Suzanne Brady of Monterey, California, someone whose teaching lore ought to be made available to a wide audience.

Back now to scaffolding. Back to the upper left point of the diagram, the beginning point in time when children don't exactly know what the teacher wants them to do. In the view of many, assisted performance at this point calls for prompting or demonstrating.

Brady would disagree. She says she does not, at the beginning, give explicit cues, suggestions, or demonstrations. As a controlling presence she's in and out, appearing and disappearing, depending on a number of factors, only one of which is the child's amount of skill. Let's consider, for example, what she does to encourage good question-asking in the children's writing response groups. When the children for the first time respond to other children's writing in groups, she says only to take turns responding, to ask questions, and to be cooperative. On principle, she does not suggest questions, does not hand out response sheets with questions printed on them. So at the moment of low skill, she also diminishes teacher control.

The reason for the low profile has to do with ownership. "Children," she told me, "don't know that questions are theirs." The point is that children need to figure this out. Telling them what to ask prevents the teacher from conveying a sense of ownership. After spending several years sitting in on writing group meetings, Brady now never sits in. The interaction and the questioning is not really theirs unless they run the group without her.

Brady takes the floor, however, at the next step. She assembles the whole class in order to discuss their meetings. She asks them which questions were helpful and which ones didn't help; she sums up and repeats the emerging conclusions. So she affirms the basic values of helping other writers in a classroom community, and she also negotiates with the children by inviting their definition of good question. By the end of the meeting the co-

constructed meaning of "good question" has set direction for future small-group meetings.

By the end of the meeting there is more scaffolding, not less, than had previously been the case. Coming out of the meeting, the children have a spelled-out, if still rudimentary, set of principles for asking helpful questions. Scaffolding is now in place. The interesting point is how it got there: by way of negotiation. Negotiation as a process is valued by Brady even at the expense of somewhat shaky beginnings for the small groups.

What we begin to see is that scaffolding may not fit neatly with a time-line pattern of teacher responsibility for task completion. Brady's insistence on the children's ownership of questions means that low teacher control may be necessary when skill itself is minimal. For her the prompt should not be adjacent to the performance, not when unskilled children are learning to ask good questions. The next group meeting, the next performance, is still several days off. She won't say, just before this meeting, "Remember to ask such and such questions."

When I looked carefully at Brady's own language, I noticed her teaching emphasis on a factor intervening between prompt and desired performance. I call this factor "constructed intentions." Consider Diagram 2, opposite page, which shows Brady's view of the dynamics of construction: it shows what scaffolding consists of and what is being scaffolded. At the center of the diagram, the object of scaffolding, is the children's consciousness. Instead of scaffolding *activities*, which are shown on the left, or desired performance, shown on the right, Brady scaffolds the children's consciousness of themselves as thinkers. The *desired performance*, consisting of public acts of questioning, puzzling, and wondering, is seen by Brady as the outcome of the conscious intentions. So the children's intentions are carefully nurtured, carefully scaffolded. The means of doing so are negotiating, reflecting, and re-conceptualizing, all of which are carried out in whole class discussion.

Conceptualizing and re-conceptualizing intentions is the teaching agenda for the beginning of the year. "This year," she says, "we'll learn about being smart, clever, and intelligent." Then whole-class negotiating leads the class to construct meanings for these words. "Smart" is taken to mean recall of information, a word linked with school. "Clever," they decide, is succeeding at things not ordinarily taught in school, such as knowing how to ride the bus and remembering to clean up your desk. "Intelligent" is linked with problem-solving thinking, to which the children attach a slightly mysterious coloring. They say intelligent thinking is thinking about what's going to become of you in the future or coming up with something nobody has thought about before.

Re-conceptualizing occurs repeatedly. Says Brady, "When we're learning something, I say, 'well, is this smart, clever, or intelligent?' or I'll say, 'Boy, are we intelligent.'" Homework is re-conceptualized as work done at home, depending on whether the child can construe the work as thinking. When the child asks, "Does cooking count as homework?" Brady answers, "Where are you learning when you cook?" The child figures that she's doing "a half of something" when she measures out ingredients, and this must be math. Games count too, as well as brainteasers that children assign themselves. The message to the children is to re-conceptualize themselves as builders of their brains and to re-envision what they do both inside and outside school.

Modeling is part of the scaffolding, but the modeling of question-asking is not separated into a lesson on critical thinking. Neither is it accomplished by prompting. The modeling is situated in on-going lessons. Says Brady:

> To get them to ask questions of each other in response groups is something you have to keep talking about. Otherwise they don't know what a question is. So when they ask a question, I'll say, "Now that's a good question," always pointing it out. Like if you're talking about the explorers, and they say, "Why did it—Why were they—Why didn't they—Why did they die of beriberi? Why didn't they just take orange juice (laughs) or Vitamin C pills?" then I'll say, "Now that's a good question!" And I repeat it. Or I will ask myself questions: "Well, now, why did the Native Americans come across that land bridge? Now that's a good question." And so they get the idea about, first of all, that it's a question, and, secondly, it's a good question because it has something to do with what we're talking about.

Then she says, as a P.S.,

> They might be thinking, "When is it time for recess? And I'll say, Well, that's a question. It's not a *good* question, but I'll answer that question."

So for Brady the conscious intention to be a good questioner should be constructed in a public and deliberate way.

Elements that play into the construction of intentions are listed on the left side of the diagram. The unit on the brain—the drawing and labeling of its parts, the keeping of a brain folder in which children draw their brains and draw in the thoughts at the front of their mind and the back

An Alternative View of Scaffolding

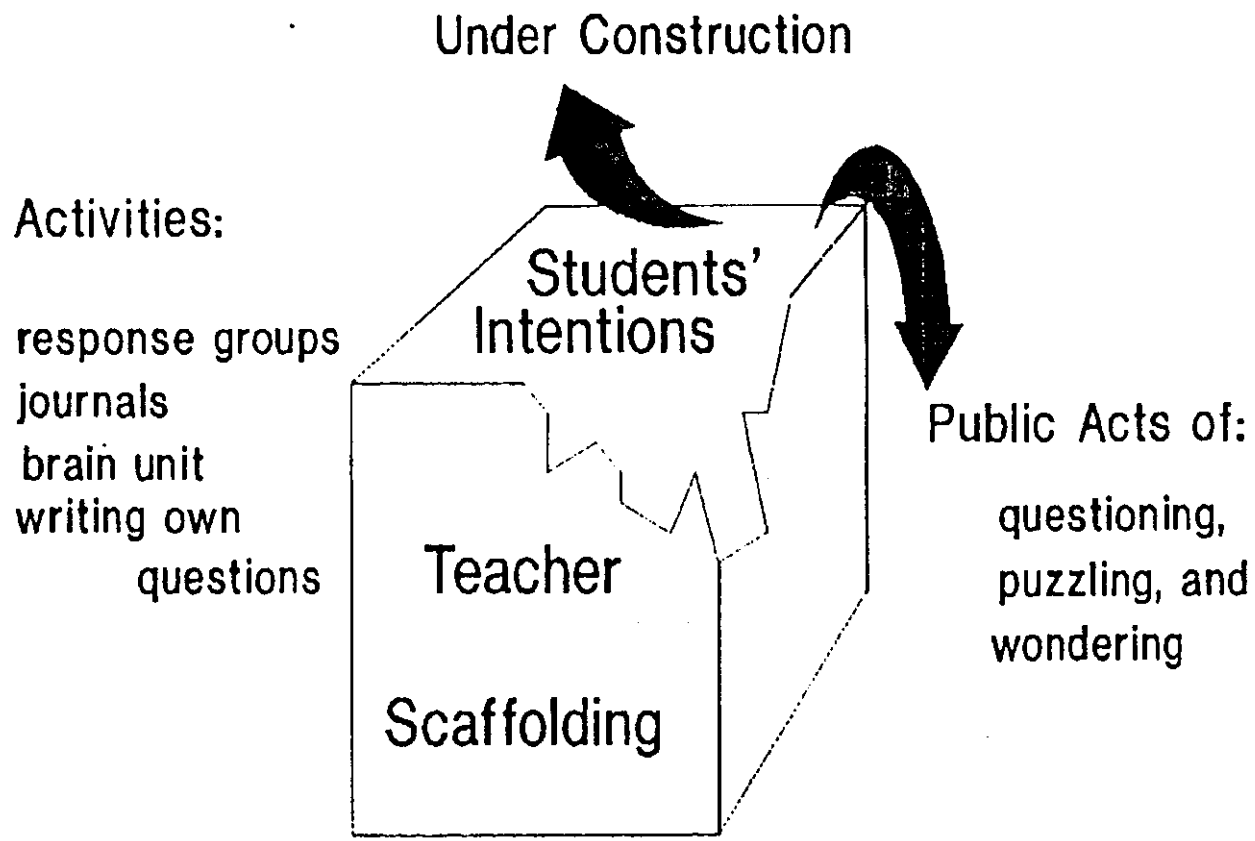

Diagram 2

of their mind—all leads right up to the discussion on *smart, clever,* and *intelligent.* So does the reciprocal teaching of math and the reading/writing response groups, both of which make the work of thinking a social and public event.

The desired performance (on the right side of the diagram) is a fair distance, in Brady's mind, from the activities. Activities, especially at the beginning of the year, may not lead directly to the desired performance. Activities serve intention building, and intention building, in turn, leads to desired performance. Desired performance, in turn, informs the activities: children increasingly carry these out with a conscious sense of themselves as puzzlers, questioners, and curious people. This conscious sense of the self is central for Brady: this is what she teaches. Doing so requires scaffolding, the means of which are negotiation, reflection, and reconceptualizing. Also central for Brady is the caution mentioned earlier: bring the prompt too close to the performance and you jeopardize the emerging intentions.

Teachers of thinking necessarily teach a verbal tradition and associated cultural values. Take, for example, *doubting,* which now has a valued role in Western ways of making knowledge. Doubting is embedded in the discourses of modern academia. When we turn to the children's talk, the tape selected by Brady as showing valuable verbal learning is a discussion in which the children doubt. (See Appendix, next page, for the transcript.)

In this instance the topic is the depletion of the ozone layer, which 10-year-old Larry has chosen to write about. He reads his writing to the response group and answers the first few questions as though the facts were obvious. But as the other children keep on, he stops to consider. First he says, "Well, maybe." Then the doubting begins. He says: "That's what I said in here [looking back at his writing]...well, wait, let me see." As he envisions the greenhouse, which a child has asked him about, his voice grows tentative as he speculates: The layer of ozone is like the..the windows on a greenhouse. How is that? And like if it broke the windows or something, then..." He tries these ideas out, but he's less and less sure that they are right. By the end of his turn he knows there are some things he doesn't know. The long slow "hmmmm" shows an actively puzzled state of mind different from the certainty heard at the beginning.

We can see from Brady's comments about the transcript (see Appendix) that Larry's ability to doubt in public in this way is precisely what she reads in the situation and what she values about it.

> I think they're realizing that there's something missing, but they don't quite know what questions to ask.
>
> They're realizing that they didn't really know much about it, so they're searching around for who does have this information, who does know, do any of us know?
>
> Part of the time they're saying, "I don't know. I'll have to find that out."

This was a group of children that Brady had identified, on listening to their taped language, as a successful group. Larry was to her a particularly good example of a child who has become conscious of himself as a thinker, developing a curious mind in a classroom that valued question asking. Curiosity, seen in this way, has a particularly Vygotskian quality: curiosity is a state of mind developing directly from a public and social act.

Brady is interested in ways to put children's consciousness of themselves as thinkers at the center of her curriculum. For her such consciousness has a social origin, meaning that desired acts of thinking are first public enacted through classroom talk and writing. Significant for Brady is that one child listens to another or reads the other's writing. Teachers likewise need to be conscious of themselves as thinkers. In line with the arguments of Bruner and North, one role for researchers is to ensure that teacher lore be made available. Teachers, like students, need to hear each other's voices.

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APPENDIX

Brady Talks About Group Talk

I think they're realizing that there's some—something missing. But they don't quite know what questions to ask.

You can really listen to the questions—when they are searching for questions to ask—in their voices.

Part of the time they're saying "I don't know. I'll have to find that out."

They were realizing that they didn't really know much about it, so they're searching around for who does have this information, who does know, do any of us know?

And then there was that aha! kind of question Larry asked [not in this transcript but later].

The questions generate the curiosity which generates more questions.

Larry and His Writing Group: Larry Journeys from Certainty to Doubt

[Hyphen indicates a child speaker other than Larry.]

Larry: (reading his paper):
The problem is that all the air pollution is ruining the atmosphere. And bad things could happen. The climate could change. A lot of people could get skin cancer, and it could hurt sea life. The sun's rays could break the earth's layer of ozone which protects the earth.
—What does the ozone layer protect the earth from?
Larry: It protects it from the sun's rays. (as if obvious)
—And who is dealing with this problem and where?
Larry: The earth. The whole earth is dealing with the problem.
—Didn't this...didn't the whole earth..
Larry: No, no, no.
—get sun stuff? I mean isn't scientists or somebody looking at this problem to see how to solve it or something?
Larry: They all are! (with insistence)
—Everybody is, right?
Larry: Everybody, yes!
—OK. Is there one main person or a group of people who are pursuing the [unclear] to this problem?
Larry: I don't think so. Well, maybe scientists. [pause]
—OK, you should explain what ozone is.
Larry: It's, it's—to protect..what protects the earth from the sun's rays, but—(as if to self) that's what I said in here. Well, wait, let me see.
—You said that..you just said that the sun's rays could break the layer of ozone.
Larry: Yeah! well..when..when the, ahhh..the climate gets too hot, uh, wait.
—You mean when it gets hot..
Larry: Yeah! (as if "That's it!") The sun, like, gets too close. From all the pollution.
.....
—Why is the..is the house called Greenhouse?
Larry: Because the..the Greenhouse, hmmm (clears throat)...the Green (clears throat again). The article's called "The Greenhouse Effect," but because...like, the o-..the layer of ozone is like the...the windows on a greenhouse. How is that? And like if it broke the windows or something, then...
—OK. And why could hurt sea life, the sea life?
Larry: Because, like, uh (clears throat) if that happened, the umm water could rise, like about four inches, and all the (clears throat) some of the..uh, sea life could like wash up onto the land or something, or all the, all the, the sun could get too hot and the water too hot or something, and like if the fish or something swam, it would be covering houses and stuff, so there could be some chemicals and stuff that get into the water. Hmmmmmmm (softly).

Classifier as Apprentice

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The notion of cognitive apprenticeship provides a theoretical loom for weaving together some phenomena of classic interest to cognitive and developmental psychologists: categorization, lexical acquisition, maternal labeling, the role of typicality in object classification, and an emerging focus on the role of interactive routines in cognitive growth. The fabric thus created shows that classification processes are inherently social, first, because individuals' categories evolve in the medium of social interaction and, second, because the form and diversity of human activities determine which classification strategies will be employed in different situations. In addition, this weaving together shows that categorization strategies are acquired in apprenticeship interactions and that more complex classification schemes are added to children's cognitive repertoires as they are gradually apprenticed into adult activities.

Children and other novices learn important skills and ideas by participating with adults (or others more expert) in joint activities. Many of these activities are highly routinized and predictable in their occurrence and form, particularly in early childhood. While those working in the Wittgensteinian tradition prefer the term "language-game" (Adams & Bullock, 1986), these routines have been given different names by different researchers: Watson-Gegeo (1975) and Snow & Goldfield (1983) call them "routines;" Kaye (1982) refers to them as "frames;" Bruner (1983) prefers the term "formats;" and Slobin (1985) describes "scenes." In related work, Nelson (1978) has called the cognitive representations of these activities "event structures" or "scripts." Although these terms have somewhat different emphases, there is widespread agreement concerning the importance of stable, predictable, interactive routines as frameworks for language learning and cognitive growth in young children. In addition, most stress the contribution of both teacher and learner—of both the expert and the novice. In general the model is one of "guided reinvention" (Lock, 1980) or "guided participation" (Rogoff, 1986), not passive transfer. However, while much of the research in this area has focused on the formal structure or grammar of these activities (for example, the rules of turn taking in a particular game), few have focused on the semantics of these activities and the content transferred within them.

Words and linguistically mediated concepts acquire meaning from their roles in different activities. That is, the so-called structure of categories themselves depends on the activities in which those categories are used. Categories do not emerge solely from the properties of objects, nor do they emerge spontaneously in the minds of individuals—they are created or recreated in the interaction between the past apprenticeship history of the individual and the demands of the current situation. For example, the FDA-approved organization of food groups used by the nutritionist in his work does not necessarily correspond to the organization of his kitchen shelves. The latter are less likely to be organized by food groups and more likely arranged according to different functional considerations, such as perishability, type of container (box vs. bottle) or ethnic origin (Chinese vs. Mexican). The taxonomic organization of foods is appropriate to the activity of educating people about nutrients or to eating; the "everyday" organizations are more appropriate to preparing food. Neither the taxonomic nor kitchen-based organization is superior—they are simply different categorization strategies which coexist in the mind of the individual and which are employed in a manner which fits the current activity.

Children start out, in effect, with idiosyncratically organized mental shelves. They are quickly apprenticed into activities which help bring conventional order to their thoughts. Words and labeling routines are important parts of these early language-games, and numerous routines become well established during the preschool period. These early labeling games help children establish "basic level" categories (Rosch, Mervis, Gray, Johnson, & Boyes-Braem, 1976)—classification schemes which maximize distinctions between objects at what Brown had originally described as "the level of usual utility" (Brown, 1958). The formation of these everyday categories is a starting point for later category evolution.

This process rests, of course, on a firm biological substrate. Children, like other animals, come equipped with a nervous system designed to detect patterns and regularities, and the physical world provides that nervous system with ample opportunities to exercise its potential. Nonetheless, in people the process of category formation is not permitted to occur unescorted: Parents carefully guide the formation of even basic categories and ensure that children's labeling patterns come to match those of other members of the culture. Once basic categories are established, their evolution proceeds through differentia-

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tion of the category into subordinate subtypes and integration of separate categories into taxonomically organized hierarchies (see also Mervis, 1984).

Category evolution, however, involves an additional process which does not require the transformation of existing categorization strategies, but the addition of competing classification schemes, some of which may be based on or derived from earlier schemes. Everyday classification schemes do not disappear when their members are organized differently for another purpose. Instead, new classification schemes appropriate to new language-games are added as children are apprenticed into new activities. With schooling or school-like instruction, a scientifically sophisticated thinking system is created—a system which is subsequently activated and employed in psychology experiments. Thematic organization is not replaced by taxonomic organization, but yields to it in a variety of settings.

For example, a penguin—the quintessential example of an odd bird—is not actually an unusual creature if the activity involved is naming polar animals, zoo animals, or popular cartoon characters. Penguins may, in fact, be core examples of these categories, whereas the prototypical robin-like bird would certainly be a most unusual example of any of them. Adults are able to shift quite readily between these different classification systems. Thus, the status of particular exemplars vis-a-vis a standard representation of the category BIRD is caused by the activity of naming birds, not by the physical features of the object per se. The so-called structure of the category is determined by the activity of classifying animals according to taxonomic lineage. It is one of several classification strategies, but by no means the only one or the best one (see also Storm, 1980). Thus, learning various organizational schemes for particular sets of concepts is a form of acculturation that goes hand-in-hand with learning to participate in the particular language-games that require the use of those concepts.

Children may not be familiar with these fine-grained rules of reference, that is, with the particulars of the language-game in which they are novice participants. Those more expert in this domain recognize this lack of expertise when the novice's patterns of word use are discrepant from those of the expert. For example, adults implicitly recognize that children are novices in the rules of reference when they call all animals "dog." That is one way we recognize inexperience in children when their word use is unconventional. It then becomes our job as adults, or experts, to shape the child's labeling patterns to match our own. Thus, we teach children that birds have different names, especially when there are a lot of them around, and that some things that don't look like birds are in fact birds—at least for the purpose of some language-games.

This perspective on classification moves Vygotsky and Wittgenstein's insights regarding the relations between language, thought and human activities to the center of investigations of categorization. For example, when category evolution is viewed as a social process, it becomes important to shift the focus of our research from an over reliance on the physical qualities of objects to a different set of questions. For example, how do the form and content of children's categories come to resemble those of adults? This question demands both descriptive and explanatory answers, and calls for research mapping the gradual convergence of child (novice) labeling and classification strategies on adult (expert) categorization schemes. Once this convergence process, which occurs over macrogenetic time, is documented, it becomes necessary to explore the social medium and linguistic strategies which guide and support the transfer process during microgenetic time. In addition, when classification schemes are understood to have a functional basis, it becomes important to consider how changes in context influence labeling patterns and other convergence mechanisms. Finally, having determined that categories evolve to meet both cultural and situational norms, it becomes necessary to understand how different degrees of experience with particular language-games influence cognition. The sections which follow briefly review research relevant to each of these points.

Macrogenetic Convergence Between Child and Maternal Labeling Patterns

Adams and Bullock (1986) present cross-sectional, mini-longitudinal data showing gradual convergence between children's and adults' names for animals. In their study, one-, two- and three-year-old children and their mothers participated in a two week study of picture book reading. The picture books presented animals from six different animal categories in several different arrangements. Each category included nine exemplars ranging in typicality. Some animals were highly representative of their categories and were considered prototypical. These are animals which would normally be labeled "dog," "cat," "bear" and so on; these exemplars were called basic level exemplars. Some animals were typical members of their category, but have specific names that can be used when the language-game at hand requires it. These are

animals like "blue jay," "chickadee," "terrier," "appaloosa," and so forth; these were called typical exemplars. The third group of animals for each category was atypical, at least in relationship to that category. For example, the BIRD category included a penguin and a peacock, the DOG category included a Newfoundland and a Pekingese, the CAT category included a lion and a tiger, and so on. These peripheral members of the category were refered to as atypical exemplars.

Results from the study show a clear pattern of socially guided convergence on maternal patterns of naming. Conventional names for basic level category members ("dog," "cat") are the first to be mastered by children, followed by names for atypical exemplars ("lion," "penguin"), and finally those for typical subordinate members of the category ("blue jay," "palomino"). These shifts in labeling strategies were evident across age and during the two weeks of at-home reading.

This internalization process is not a passive one. In this experimentally constrained task, labeling is a basically closed routine with each participant labeling each animal once. Once children have sucessfully internalized the generic, everyday name for the animal they are given more and more responsibility for providing the accepted name of the object while the mother moves on to supply more sophisticated names for the same or other objects. For example, once the generic names of the animals have been mastered, a three-year-old child will lead in reading the page, pointing to each of several dogs and saying "dog," "dog," "dog." The mother will accept these labels and occasionally repeat them, but once the child has finished, she will return to each object and relabel it with a more specific name, saying for example, "This one is a Dalmatian—Dalmatian-dog. This one is a police dog—he's called a German shepherd." The child is then encouraged to repeat the new, more sophisticated name for the object. This withholding of complex information until the apprentice has reached an appropriate level of expertise is characteristic of apprenticeship processes in general (Kaye, 1982).

Microgenetic Transfer Mechanisms

In addition to more sophisticated labeling strategies, parents and other experts make use of other social and verbal mechanisms to guide the evolution of the child's categories in immediate, microgenetic time. While the relative influence of different social mechanisms—such as affection, sensitivity, and flexibility—on the effectiveness of cognitive apprenticeships is largely unexplored (see Adams, 1987), linguistic mechanisms have received somewhat more, albeit insufficient, attention (see also Stone, 1989). These verbal mechanisms include anchors, in which the old label is appended to the new label (e.g., "Dalmation-dog"); modifiers (e.g.,"A zebra is a striped horse."); hedges (e.g., "A penguin is sort of like a bird."); and statements of class inclusion (e.g., "A penguin is a kind of bird."). Mothers' use of these linguistic forms as teaching devices is clearly related to both object typicality and the different language-games created by different labeling contexts (Adams, 1986; Adams, Sartore, & Bullock, 1990).

Hedges, for example, were used most frequently when an exemplar's relationship to the category was atypical or peripheral. It was not unusual for mothers to say, "A leopard is sort of like a cat" when the leopard appeared in an array of felines and the goal of the mother's utterance was to expand the boundaries of the child's CAT category to include large felines. Such statements were rare when the leopard, or similar exemplar, appeared in an array of taxonomically unrelated animals. (Presumably, they would also be rare if the category evoked had been zoo animals). Similarly, anchors ("Dalmatian-dog") were more likely to be used when the animal was a fairly typical member of the category and when it appeared in an array of taxonomically related exemplars. Thus, not only is the introduction of new information delayed until basic labeling skills are well-established, but the specific linguistic mechanisms used to guide category evolution are highly sensitive to discourse context or language-game.

Cultural Experience and Cognitive Change

In a subsequent study, Adams (Adams & Ohmer, 1990) focused on the relative impact of two different language-games on children's classification strategies. Mothers and their three-year-old children participated in a study which again included pre- and post-test laboratory sessions, separated by two weeks of home picture book reading. The books presented members of the same animal categories in one of two organizational schemes, making what had been a within-subjects variable in the first study a between-subjects variable in the second. Again, the representatives of each category ranged in typicality from generic (e.g., a plain brown bird) to highly atypical (e.g., a penguin).

In one book, given half the dyads, the animals were arranged taxonomically, that is, according to taxonomic family membership. All members of the category CAT appeared on one page, all members of the category BIRD

on a second page, and so on. This arrangement, plus the appropriate title, "Animal Families," created a language game in which parents introduced fairly complex information about the taxonomic inter-relatedness of the different animals. Explanations like, "A penguin belongs to the bird family" occurred frequently in this book reading condition.

In the books given to the other dyads, the animals were arranged heterogeneously, that is, one animal from each category type appeared on each page. This arrangement is more like traditional labeling study, which presents children with a variety of fairly typical objects from several different categories. In this study, animals were presented on each page according to their degree of typicality. That is, prototypical members of each category appeared together, typical members of each category appeared together, and atypical members of each category appeared together. This condition creates a somewhat different language-game—one in which simple names suffice and there is little reason to discuss the family membership of atypical exemplars.

In addition to two laboratory reading sessions, the pre- and post-test sessions included a card-sorting task. In this task, children were asked to sort the animals appearing in the books by category. During the post-test version, this spontaneous card-sort was followed by an elicited imitation version of the task in which the more scientifically correct, taxonomically-organized scheme was demonstrated to each child. This assessment was designed to provide a measure of representational skill level within each child's "zone of proximal development" (Vygotsky, 1978/1934) or "optimal level" (Fischer & Pipp, 1984). In addition, mothers were administered an adult version of the card-sorting task during the post-test session. This maternal measure was used as the adult standard for the organization of the categories; it was the cultural norm upon which we expected children to converge. It was expected that children assigned to the taxonomic book would show the greatest between-session convergence on the adult network, because the language-game it creates is most condusive to this kind of learning. Most of this transfer was expected to take the form of the integration of atypical animals into their taxonomic categories.

Cluster analyses of the card sorting data supported these hypotheses. Children exposed to the "Animal Families" book became more conventional classifiers during the two week period than those exposed to the control book. Their convergence on the scientific organizational scheme took the form of greater willingness to include peripheral exemplars in core categories. Both groups showed marked "improvements" in classification skills (i.e., they sorted the cards more taxonomically) when the more adult, scientifically based categorization scheme was modeled for them. That is, experience in the "Animal Familes" language-game and the scaffolding support provided by having the "correct" organization modeled for them helped children internalize a body of cultural knowledge.

The results of these studies demonstrate that basic cognitive skills, like categorization, are significantly influenced by social factors, both in their acquisition and in their use. Children are apprenticed into activities which lead them to acquire culturally shared ways of speaking and thinking about objects. This transformation of a novice thinker into an expert thinker occurs over moments, days and years. This process is influenced by individual differences in ability and temperament, but, when viewed over time, retains a fundamentally social core. It is this historical and evolutionary perspective on thinking which makes the apprenticeship perspective so powerful. For, as Vygotsky argued, it is only by examining the history of a behavior that its social origins can be discovered.

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Culturally Contextualized Apprenticeship: Teaching and Learning through Helping in Hawaiian Families

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An adequate account of teaching and learning must examine, rather than assume, the cultural meaning of collaboration, both within and outside of teaching and learning activities. This paper develops a culturally contextualized model of cognitive apprenticeship, using examples from the domain of children's activities in contemporary native Hawaiian families. In this case, such an examination helps account for parents and children employing an apprenticeship model to teach and learn some skills, but not others.

In her review of children's household work, Goodnow (1988) argues that an adequate explanation of the socialization of children into work must address the principles or schemata that parents and children bring to the interactions, and how they negotiate the arrangement of work. As she points out, household activities do not neatly fit into the discussion of leading activities typically considered in neo-Vygotskian accounts of adult-guided learning. They fit neither the leading activity of formal schooling, with tolerance for early attempts and errors, nor the leading activity of work for economic value, in which an apprentice produces specific skills or products and is discouraged from early attempts and errors. Wertsch, Minick, & Arns (1984) and Rogoff (1984) among others suggest that the distinctive feature of household chores is the subordination of the child's learning activities to the adults' ongoing work objectives. Unlike school-related tasks, household chores may be characterized by less parental patience and sensitivity, more likelihood of the adult taking over tasks not correctly done, and less eagerness on the part of children to learn.

The lack of fit between household tasks and the commonly described leading activities should lead us not to isolate a new leading activity, but rather to call into question a generalized conception of the role of expert and novice in various teaching and learning activities. In addition we must question the notion of a generally shared

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conception of independent and collaborative work, both in learning to work, and in skillful work.

This paper examines how children learn both home chores and home schoolwork, in terms of the cultural models (Quinn & Holland, 1987) that adults have about these learning interactions. A cultural model of knowledge transfer describes, among other things, social participants with their goals and cognitive skills engaging in culturally organized activities. This inquiry assumes that the study of culture and cognition must examine seriously the organization of social relations in which cognitive activity takes place (Cole, 1985). Cultural understandings can shape the process of skill learning by the meanings attached to expertise—the goals, conceptions, and social interactions in which skillful performance is believed to be appropriate.

The analysis contrasts the different kinds of expertise that native Hawaiian mothers display in teaching and learning interactions with their preschool-age children at home. Mothers' narratives reveal variations in perceived competence, depending on whether the household task is believed to be home or school-based. In addition, they value these activities differently. Apprenticeship occurs in domains seen as relevant to the household and family functioning, and in these domains, the social transfer of knowledge is culturally codified as mutual helping. By contrast, apprenticeship is little used in teaching school-related skills at home.

Connecting the social world to the domain of thinking has become an attractive approach in research on cognition. Derived from the writings of Vygotsky, the social origins perspective on learning and development has adopted "apprenticeship" as a metaphor for social transfer as a mechanism for learning. If the transfer of knowledge is social, then learning how to perform tasks also entails learning ways of thinking about, or interpreting those tasks. (John-Steiner, 1985 among others). In this latter sense, a learner is apprenticed into a meaning system, into relevant ways of thinking about tasks. An understanding of the talk that people engage in when describing how learning takes place provides insights into how this meaning system, as well as the content knowledge of the specific task, is socially organized and socially transferred.

The narratives were collected as a part of a multidisciplinary effort to develop preschool programs to enhance the school success of native Hawaiian children, who as a group have not fared well in school. We conducted interviews with low income, ethnic Hawaiian families whose children were considered "educationally at-risk." Over a three year period, 102 parents of four-year-old children were interviewed, of whom 18 participated in a year long series of intensive interviews, averaging a total of 12 hours per family.

The Contemporary Hawaiian Family

Several features of contemporary Hawaiian family life find expression in teaching and learning activities. The Hawaiian family ideal is generational, with a clear separation between different age groups. This is manifested through kin terms and the ways in which everyday activities are organized (D'Amato, 1986). Within Hawaiian families, children are expected to participate as members of a sibling group that functions as a unit fairly independent of adults, and deferential to them. Within the large social world of contemporary Hawaiians, children and adults occupy separate niches which overlap at critical points. In addition, members of Hawaiian families are expected to show generosity, make reliable contributions to the family and to have a commitment to the family above individual achievement (Jordan, 1981). It is not surprising, given Hawaiian family organization, that helping is frequently used to describe the typical social interaction that adults and children share. Traditional Hawaiian *'ohana* (family) values stress *laulima* and *kōkua* (co-operation and helpfulness) to one another (Gallimore, Boggs & Jordan, 1974; Boggs, 1985). Hawaiian parents generally believe that children learn household chores best when the learning is embedded in these on-going activities, through mutual helping. The responsibility for seeing that young children learn how to do household chores rests with a wide network of people: older siblings and cousins as well as parents, grandparents and other older family members. Helping is multidirectional. Adults help children, older children help younger children, younger children help older children and adults. How does this cultural model of children's household work organize the social transfer of cognitive skills among Hawaiian children?

In their descriptions of how children learn specific chores at home, Hawaiian parents mention children's helping as the characteristic feature of these activities. Hawaiian preschoolers frequently use helping to justify participating in an activity with older people. Although four-year-old children do not, in fact, make a substantial contribution to household function, they are expected to be oriented toward this goal, and the assistance they provide presages their later real contribution to family functioning. Helping is valued above the actual assistance

received, which, in the early stages of learning, is minimal. In fact, being able to help others is described by parents as their goal for desiring a child to learn. Given this value on helping, apart from the aid received, it is not surprising that any cognitive skill that can be acquired while helping is likely to be frequently practiced and supported. From the parents' point of view, having young children offer help is an especially effective context for learning. All of the parents interviewed noted that their preschool age children want to help them and other family members with household chores. Children's socialization emphasizes both individual autonomy (self-reliance) and family solidarity. As D'Amato (1986, p. 218) put it, "In a generational system, the duty of the parent is not so much to do for children as it is to equip children with the means of doing for themselves."

Learning Household Chores Through Guided Participation

The term guided participation, as elaborated by Rogoff (1984) both integrates the actions of the participants and highlights the mutuality of that activity. Like the concept of apprenticeship, the notion of guided participation focuses on the teaching-learning interaction, rather than on the materials, the lesson, or either the teacher or the learner exclusively. The more experienced person socially facilitates the cognitive development of the less experienced person in a variety of ways. The expert tacitly or implicitly structures the learning of the novice. The expert provides bridges between what the novice already knows and the new situation or new information. The expert assigns the novice to activities and serves as a partner in participation. Experts control the distribution of materials, and experts make themselves available as a reference for skillful performance. The process is one of mutual influencing, however, with the novice playing an important part in shaping the interaction. The novice gives signals, creates opportunities for teaching to take place. The novice not only acquires information, but also seeks information and sends cues signalling the need for assistance. In an ideal formulation of guided participation, patient experts encourage eager novices to learn through a responsive scaffolding of task learning.

Among Hawaiian families, household chores, in classic apprenticeship style, are modeled, with the novice taking on manageable aspects of the task, under the supervision of the expert. Children do not much engage in "pretend work." A survey of children's possessions (Levin, Brenner & McClellan, forthcoming) found very few toys which were child-sized versions of adult materials such as dishes, brooms, or stethoscopes. Teachers at the preschool which these children attended commented that the preschoolers had to be "taught" to use the materials in the "home area" of the classroom, which included non-functioning, child-sized sink, stove, refrigerator, iron, plastic food as well as occupational uniforms and associated tools. Teachers interpreted this inexperience as a sign of the paucity of the children's home experiences. From our observations in the children's homes, we countered with the suggestion that what the children lacked was experience with non-functioning child-sized versions of the objects, and that their experiences with "the real things" were quite extensive. Since pretend work is rarely given, the consequences of children's actions in helping are real. If a child does not carefully clean the rice before cooking, the family must eat unclean rice. If a child tosses the garbage next to the trash bin rather than in it, people will judge the family harshly.

Hawaiian parents and older children monitor closely younger children's attempts at helping around the house. The strategies that they employ follow the model of apprenticeship or guided participation. They correct children's errors, they scaffold tasks, and they work collaboratively with children in the production of household chores. These aspects are all illustrated in the following narratives about four-year-olds learning to cook.

> Like last year, and all summer long, she's been wanting to get in the kitchen and mix. So I would bring out the big plastic bowls and show her how to put cups of pancake batter and add water, you know, whatever the mix called for. She always wanted to throw everything in, whatever I had pre-measured. And she goes, "Next time, can I measure?" I said, "You don't think it's hard for you to take these things out?" And she said, "No. I can try." "Okay." So the next time we made pancake, or even brownies like that, she would help take out the mix...She did good. I just don't want her near the oven. "Can I put it in?" "No, Mommy does it, okay. Cause it's really hot." "Oh, that's okay. I can grab the not-hot-pot." She calls it, 'not-hot-pot towel,' or something like that. And I said, "Why is it a not-hot-pot towel?" And she said, "Because it's not hot, the pot, when you hold the towel."

> Cause he see me when I (laughs) for put rice in the rice pot, he always say he like play with the rice. I said, "Don't play with it." "That's okay. Let me put inside the pot." I fill 'em up the cut, he put 'em in the rice pot. I mean he get one small chair or the stool and I rinsing the rice. He over there watching me. Only one time, I made him help me with the rice. I made him, "Come I show," I said, "Kalani, come here. I show you how cook rice." So when I put the water in, I grabbed his hand. I made him clear the rice, you know,

and I dumped out the water. All over 'til was clean...So put in the rice pot. I made him press the button. I said, "Good. You wen' cook rice today, yeah?" "I can cook rice." I said, "yeah."

Children's help is not just accepted or expected. Parents also highly value their children taking the initiative in offering assistance. Children who do not volunteer to help before being asked are considered to be lazy, and parents talked at length about "what went wrong" in the child's socialization that the child was not helpful. One mother detailed some of the ways in which her 10-year-old daughter helps her.

> She's my big helper. That kid, I cannot believe. She helps me carry the groceries upstairs. She can carry a case of soda or a case of juice up the steps. And that's about eighteen steps. And the other day, her and her friend was downstairs and I was carrying up all the things. I had the 25 pound bag rice. So I told her, "You think the both of you can carry that 25 pound bag rice?" And she said, "Yeah ma. Yeah. We can carry 'em." And then I see my daughter walking in the door carrying it by herself. And I went, "You carried it all by yourself?" She said, "Yeah." I said, "Oh, Janie, I no like you carrying heavy things." You know, she might hurt herself, huh. But sometimes when we walking, you know, if I go shopping like that. She automatically, she knows. She just grabs the bags and she starts going up the steps. Run back downstairs, grab two more bags, and I look at her and I feel so good inside, because she's trying to help. And the other one, [a four-year-old], so lazy!

In one family, the eldest child, a seven-year-old girl, according to her parents helped out by cooking rice, frying eggs, making coffee and generally being competent supervising herself and younger children in the kitchen. As her mother says, "That's one good thing about it. They say, "Mom, that's okay. You can sleep. We get 'em. Yeah, you can rest Mom." Other chores that four-year-old children were regularly taking on included making their own bed, cleaning their room, taking out garbage, setting the table, washing dishes, supervising younger children, helping in the garden and yard, and caring for pets. The expectations for early contributions to household functioning are mirrored in early expectations for young children's self-reliant behavior. One study of Hawaiian families (Jordan, 1981) found that Hawaiian children were expected to perform 16 of 20 self-care behaviors on their own one year or more earlier than a Mainland Caucasian sample.

Learning School-Related Skills at Home

In addition to narratives of children learning to perform household chores, adults related tales of their preschool children learning school-related, usually literacy, skills at home. These narratives about the teaching and learning of school-related skills sound quite different from those of skills involving chores. With few exceptions, when the learning task is school-associated, the descriptions of such interactions are brief, with very few details provided. Rather than stories about interaction, they tended to outline aspirations, or mention materials, or relate a parent-child confrontation. To be sure many narratives about school-related learning mention that children learn only "when they are in the mood." Otherwise, there are few signs of responsive structuring of activities or joint participation. The teaching-learning interactions stop when children balk at being forced to "learn," or when adults reach the limits of their expertise for responsive teaching. What characterizes school-related learning in these homes was the abandonment of apprenticeship, in favor of a didactic, non-responsive mode of teaching and learning. Some examples from the narratives illustrate these points.

> On his own, he cannot make letters, buf if I help him, he can because I'm helping him. [How do you help him?] I have him hold a pencil, the pen in his hand, and I just grab his hand and I make him with his own fingers make the "K," "A"...his name.

> He has an activity book at the grandma's house that grandma bought him. Just the kind with alphabets you trace or you follow. The hard part, well, the aunty teaches him because it's at her house, the grandma's house. So with the simple stuff she know he can do, like circle the matching pair, and then she tell him what matches and he circles, that kind of stuff.

> [How do you think she's going to learn how to (say her ABC's)]? By me helping her. [In what way?] Teaching her. Sitting her down at the table and showing her what the ABC's like. What they look like, how they sound. But it takes time. I mean you have to be really patient. I mean sometimes it gets, I mean just sometimes you don't have patience and you like scream at 'em. But you have to have patience. And it takes pretty long to do it.

> If [the father] reads it to her, he's not gonna, he just goin' read 'em and that's it. He not goin' ask her questions about the pictures and stuff. He doesn't get into details with her. She ask him all kind questions and he getting all irritated. He's not patient. Well, I not that patient either, but I'm not as bad as him.

The Cultural Meanings of Expertise and Collaboration

The successful transfer of cognitive skills through apprenticeship typically requires the expert to have sev-

eral kinds of knowledge. Specific skill knowledge is a necessary but not sufficient component. In addition, an expert must be able to envision how the particular skill fits into a larger configuration of skills and performances. This knowledge enables the expert to create a responsive social context for learning by scaffolding tasks. It is generally thought that with these two types of knowledge, the expert can create an effective learning environment with the novice.

Hawaiian parents express confidence and display competence in the domain of household chores. They describe in detail the complex organization of household tasks among family members, and their role as the director of these activities. When asked about their recollections of their own learning of household chores, all but a few of the mothers mentioned that they learned these skills in childhood. If they did not, it was either because they were the youngest children in large families, and thus spoiled, or because as children they had been lazy. The ability to work hard in the service of the family is held in high esteem, both for children and for adults. One mother expressed some concern that, by teaching her daughter to take on chores, she herself was giving up some of the responsibilities which made her feel a valued part of the family. Successfully contributing to the completion of household chores provides the context in which Hawaiian family members can show generosity, make reliable contributions to the family functioning and express their commitment to the family above individual achievement.

In contrast, the narratives of the Hawaiian parents portray a sense of inadequacy about their own ability in performing literacy skills, and a deep ambivalence about the value of literacy and school success in the Hawaiian community. As competent adults in the Hawaiian community and high school graduates, these parents neither feel comfortable with their own level of academic expertise, nor highly value that expertise in themselves and other "good" Hawaiians. These goals and self-conception disrupt the social transfer for literacy skills. This combination makes for non-responsive teaching-learning interactions and for ineffective learning of school-related skills in Hawaiian homes. One mother recounted why she found it hard to read to her four-year-old daughter, a child who, according to the mother, asked a lot of questions.

> I try to quickly get into another book before she asks questions 'cause she get me hung up in the question I can't answer. And I get so embarrassed. And so my [nine-year-old] son turns to look at me like, "Come on, Ma! Come up with those answers real quick!"

Several parents mentioned that they planned to take classes to increase their own skills so that they could help their children with homework. Even those who felt comfortable assisting their preschool children with their emerging school skills believed that in a few years their children's school skills would outstrip their competence. This issue of expertise is particularly problematic in a society which is organized generationally. When an adult outstripped in performance by a child, seniority is violated, resulting in disharmonious relations. Children who "show off" by virtue of displaying more knowledge than others, especially adults, are strongly criticized as being "big head."

Contrasting the narratives of how children learn to do chores and how they learn school-related work at home points to another factor that may facilitate or hinder the successful transfer of knowledge. There has been little attention in the discussion of apprenticeship about social transfer of those skills that, while adequately mastered by experts, are not highly valued by them. Even those low income Hawaiians who have achieved some school success express mixed feelings about the value of literacy and school achievement, especially as it detracts from the ability to contribute to family life. Thus in low income Hawaiian homes, children learn literacy skills from parents who are ambivalent about the value of literacy for success in the Hawaiian family and community.

Thus in the Hawaiian case, learning to perform household chores fits the model of apprenticeship learning. Adults perform these tasks with expertise. The skills form a component of the definition of the valued Hawaiian family and community member. The mutuality of the learning activities is reinforced by the value placed on helping, and the value of helping can be enacted even before one is fully competent. Literacy learning is a less likely candidate for apprenticeship. Parents express little confidence in their own competence in the domain, and an even more frail self-concept when it comes to teaching their children more than rudimentary aspects of literacy. Without the expertise, the interactions are non-responsive and brief, and the social transfer is disrupted.

In addition, literacy is less likely to be learned through apprenticeship because, in these families, literacy is not believed to be inherently social. In contrast with household chores, early literacy skills are not seen as fitting within the helping framework. Parents have no expectation that young children can in fact help the family with their emerging literacy skills. Even when fully developed, these skills are less highly valued since the rewards of

literacy are usually awarded to the individual rather than to the group. However, this is not to say that no apprenticeship-like relationships characterize the learning of literacy skills at home. Notable exceptions appear in narratives describing older child—younger child interactions. Older children are most successful taking the role of expert when the the interaction had a social as well as an academic goal. Older children are charged with the responsibility for supervising younger children, both in work and in play. Parents explicitly discuss this role as grooming the older child to become "head of the children," a relationship which may continue through adulthood. Thus increased responsibilities bring the older child both respect and affection from younger children. As one mother described the interactions among her three children:

> He's in fifth grade, and you know, he loves to read to them. In fact they remember a lot when they hear it from the brother. They try to get close. I'm glad...I always try to remind him that you do have a place here and your place is at the head of the children now. Which means you should watch them and help them and teach them. That'll make them love you more. They'll be able to follow you whenever you want them to follow you. They'll accept whatever you have to say to them.

Implications for a Model of Apprenticeship

What does this say about a culturally contextualized view of parents and children, teaching and learning? An analysis of the narratives suggests that learning through apprenticeship works best when the expert believes the skill to be an integral part of the valued self. In addition, it appears that apprenticeship learning is supported in particular kinds of social contexts. First, the joint production that characterizes apprenticeship is facilitated where mutual helping is an inherent part of the skill performance, apart from its role in skill acquisition. Second, it is expedited where mutual helping is a valued component of that particular skill, apart from its value in the teaching and learning of the skill. And third, it is more likely to occur where mutual helping generally characterizes the appropriate relationship between the interactional partners, apart from that particular teaching-learning activity.

Finally, I propose we rethink the notion of apprenticeship in another way. In the classic conceptualization, the outcome of the teaching-learning activity is that the former novice, having acquired the skill knowledge, can perform the task independently. Certainly aspects of the teaching-learning activities provide for metacognitive learning. As Rogoff (1984) notes, if parents teach with subtle cues, they are teaching children to attend to cues with readiness and interest. Hawaiian parents and other family members teach children how to perform household chores through collaborative work. One consequence is that children acquire increasingly competent skills. A second outcome is that children learn to value joint participation, or working together. For contemporary Hawaiians, I suggest, the goal of joint participation is not simply novices' eventual facility with and enjoyment in independent action. Rather the goal is expertise and satisfaction in working with others. A culturally contextualized model of apprenticeship takes into account the meanings attached to the process. Within Hawaiian families, apprenticeship is shaped by the cultural meanings attached to collaboration, independent action, and knowledgeable performance, in both acquiring and displaying expertise.

Note

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The Social Transfer of Cognitive Skills in Kwara'ae

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Rogoff & Wertsch (1984) have argued that the development and organizational properties of individual thought processes are affected by the structure and organization of the situations in which they are learned and practiced. One source of situational variation was suggested by Leont'ev (1981), who argued that each stage of a child's development is associated with a particular leading activity, that is, an activity especially important for developing the skills associated with that stage. He, and later Griffin & Cole (1984), identified play, formal schooling, and work, in that chronological order, as the primary leading activities in Western societies for the development of socially valued cognitive skills.

Differential organization of activities suggests the possibility of discovering systematic variation in the social transfer process. However, two arguments made by Neo-Vygotskian activity theorists need to be examined empirically: 1) that leading activities are chronologically ordered, with a particular sequence; and 2) that there is a one-to-one relationship between leading activity and the development of specific cognitive skills. Cognitive apprenticeship is shaped by culture, which John-Steiner has described as "a tradition to maximize learning" (1985). As Paula Levin argues (this issue), cultures differ in child socialization goals, and in theories of how children learn, what they learn, and which strategies will accomplish the learning. These differences affect how interactions and tasks are defined and organized, and the moment-to-moment microstrategies used in expert-novice interactions. In the United States, for example, we strongly believe in fostering creativity and individual performance in children, both of which are closely tied to our emphasis on the importance of negotiating meaning with children, and of encouraging them to tranform learning content. Yet, elsewhere negotiation and transformation may be highly constrained, and a value placed on maintaining traditional modes of expression and knowledge. This does not mean that children will therefore fail to develop important cognitive skills.

These points are illustrated by contextualized cognitive apprenticeship among the Kwara'ae, a Pacific island society where my husband David W. Gegeo (a native-speaker of the language) and I have conducted research on children's language acquisition and socialization for several years. Our data base consists of 240 hours of ecologically-valid tape-recorded adult-child and child-child interactions, collected as part of a longitudinal cross-age study in nine families in four villages, from 1981-1989.

Two arguments frame this presentation: First, the notion that leading activities are chronologically ordered does not hold in the Kwara'ae case because children experience them simultaneously rather than sequentially. Secondly, the assertion of a one-to-one association of activity with cognitive skill is also not supported by the Kwara'ae case because many cognitive skills and types of knowledge are modeled for the child in different ways across several kinds of activities. Thus knowledge and skills are taught and reinforced in an integrated set of quite disparate activities and distinct discourse registers.

Kwara'ae Strategies of Apprenticeship

The Kwara'ae are a Melanesian people of Malaita in the Solomon Islands. Our research has taken place in rural

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villages whose populations are very poor, supporting themselves largely by subsistence gardening.

A primary goal of Kwara'ae socialization is to speed the child towards socially-responsible behavior, work skills, and adult norms of interaction as quickly as possible. Like Hawaiians, the Kwara'ae highly value social cooperation and collaborative activities, although individual performance is also important in certain kinds of contexts (such as public speech- making). From infancy, adults and older siblings scaffold children's participation in work activities with patience and persistence (Watson-Gegeo & Gegeo 1986b). As a result, Kwara'ae three-year-olds are skilled workers in the gardens and household, excellent caregivers of their younger siblings, and accomplished at social interaction. Although young children also have time to play, many of the functions of play seem to be met by work. For both adults and children, work is accompanied by singing, joking, verbal play, and entertaining conversation. Instead of playing with dolls, children care for real babies. In addition to working in the family gardens, young children have their own garden plots. The latter may seem like play, but by 3 or 4 years of age, many children are taking produce they have grown themselves to the market to sell, thereby making a significant and valued contribution to the family income. Thus, for Kwara'ae children, work and play are often fused, and the leading activity of productive work does not follow chronologically after schooling.

The Kwara'ae believe that talk shapes thinking, and that straight thinking leads to behavior, feelings, and relationships that are "straight," that is, consonant with key cultural values. Spontaneous observation and imitation play an important role in children's learning. But Kwara'ae expert-novice interactions emphasize direct, verbally-mediated teaching of many intellectual and cultural skills, especially in the form of verbal routines (Watson-Gegeo & Gegeo 1986a).

The routines co-vary with culturally-defined "ordinary" and "important" contexts. These two broadly-defined contexts emphasize differing skills and strategies for teaching. Yet in most cases, skills and knowledge are reinforced by being presented in both kinds of contexts and therefore in two different sets of routines.

Speech in "ordinary" or everyday contexts occurs in low rhetoric, the informal register of Kwara'ae. The set of verbal routines used in these contexts entertain interactants, and support children's learning of conversational norms, the steps of a work activity, and the content of various knowledge domains; they also model forms of reasoning. With regard to the negotiation of meaning, children are praised for anticipating what comes next in a routine, and for making appropriate or creative transformations of it. Long repeating routines, in which a child repeats after a parent or older child, rehearse and review skills and knowledge acquired through expert-novice joint activities, and often lead to further discussion of them. These reviews allow for the examination and use of skills and knowledge outside the immediate context in which they were originally learned.

"Important" contexts—including public meetings, debate, oratory, court cases, and *fa'amanata'anga* or teaching—are marked by the use of high rhetoric, the formal speech register. *Fa'amanata'anga* literally means "shaping the mind," and is the traditional equivalent of formal schooling. Thus, it is the leading activity most concerned with teaching children to "think straight"—that is, to reason carefully, logically, and in a socially responsible way. Although virtually any topic— techniques of gardening, how to manage one's money, interpersonal problems or crises—can be taken up in *fa'amanata'anga*, correct behavior is often the topic in childhood, and serves as a vehicle for teaching linguistic, metalinguistic, and reasoning skills. This is because of the central role played by *falafala* or culture/tradition in Kwara'ae society, and the fact that despite inroads made by Western schooling and modernization, knowledge—like life—is an integration of the socio-moral with the practical.

Fa'amanata'anga in simplified high rhetoric begins with children as young as 18 months, and continues throughout life. The discourse of these sessions gradually becomes more complex and inferentially demanding as the child moves from infancy through adolescence. The speaker develops the topic or problem of the session through rhetorical questions, narration, illustration, and tightly reasoned sequences of ideas. Argument forms include comparison-contrast, invocation of cultural premises, causal reasoning, syllogisms, and if-then possible outcomes (Watson-Gegeo & Gegeo 1990). These forms of argument and topic development are those the Kwara'ae most use in formal debate, decision-making, and court cases. The session leader is to speak quietly, gently, and calmly, embodying the key cultural values of gentleness, delicacy, and stability (Watson-Gegeo & Gegeo 1986b).

Fa'amanata'anga discourse is described as "heavy words" (that is, culturally important talk) and "important silences," (because speakers pause to allow time for all to reflect). Although addressees may speak if the leader

invites them to do so, sessions are about internal reflection rather than external interaction. As the leader speaks, hearers are to think about what is being said, weighing the speaker's words, considering the meaning, internally arguing against or agreeing with them. The process of negotiating meaning is therefore moved to the intrapsychological plane as one becomes socialized into the norms of *fa'amanata'anga*. Sessions with young children are more flexible, with more interaction through which meaning may be negotiated and the speaker can check listener comprehension.

The examples in the appendix are very short excerpts from two of the 25 *fa'amanata'anga* sessions we have analyzed so far. Both examples, which focus on proper behavior, illustrate argumentation forms typical of fa'amanata'anga, show children demonstrating metalinguistic awareness and their knowledge of argumentation forms, and illustrate negotiation of meaning in a highly constrained context.

As there is not space to analyze the transcript examples in detail, I will summarize the important points here. The first example richly illustrates the modelling of reasoning forms in *fa'amanata'anga*. At dinner one evening, 3-year-old Susuli refuses to eat and refuses to entertain the family with a story, both times saying that she *'aila*—dislikes/doesn't want to. Her father begins to *fa'amanata*, playing on the double meaning of *'aila*—to dislike, and to be lazy. These two meanings are linked, for "not wanting" to work is culturally construed as "being lazy." In refusing to tell a story, Susuli had refused a task—interpreted here as "work"—assigned to her by her father. This point entails another in line 1, the culturally important concept of *source*. The father argues that nothing has its source in laziness. What is produced bears a direct relation to the labor that went into producing it, an important concept for subsistence gardeners.

Susuli's mother contrasts "being lazy" with "being willing" in line 14: women should be willing workers. This abstraction on gender roles is immediately illustrated through a list of work tasks constituting as well as symbolizing woman's work role. As Susuli grows older, the importance of women's work will be explained and extended through another abstraction: women should be willing workers *because* of their role as food-providers and foundation of the family. In this way lessons are carefully graded and adjusted to fit the child's zone of proximal development.

The father initially sets out his argument in high rhetoric syntax, but in line 7, code-switches to low rhetoric with "Okay?", inviting Susuli to ask questions or comment. Susuli demonstrates her metalinguistic awareness and knowledge of reasoning forms in line 8, correctly using the logical reasoning particle 'ira (if the argument up to this point is the case, then...) to challenge her father with an example counter to his assertion that girls shouldn't be lazy—her 9-year-old friend Sango, who is known for her laziness. This segment also illustrates adult collaboration in formulating a lesson.

In the second example, 3-year-old Fo'odara demonstrates metalinguistic skills equal to Susuli when he uses *bani'a* in line 2 to seek clarification of his father's point. *Bani'a* is one of a complex set of endophoric demonstratives used to refer back to earlier points made in an ongoing discourse. In this example, we also see father and son negotiating what they each intend and understand in lines 14-16, & 21-22, including to whom the "lesson" should apply.

In both of these examples, we see that guided learning happens on several levels simultaneously—language structure and use, social meaning and relationships, cultural knowledge, and forms of reasoning. The lessons at all levels are concurrently taught and illustrated in other important activities in a child's life, including work, play, and conversation during rest times. Notice that the kinds of argumentation and discussion occurring in *fa'amanata'anga* teach metalinguistic awareness, logical reasoning, and other higher-level cognitive skills often assumed to be in the province of formal schooling. In comparison to idealized teacher-learner interactions which emphasize negotiation of meaning and transformation of content, fa'amanata'anga sessions are constrained and emphasize authority. Nevertheless, both Susuli and Fo'odara at age 3 years already show impressive metalinguistic awareness and reasoning skills.

Conclusion

In summary, cognitive apprenticeship in Kwara'ae is closely associated with a local theory of human thinking and learning, parents' socialization goals for their children, and important cultural values. Particular skills are not learned exclusively or even primarily in particular leading activities, and leading activities are not necessarily ordered in a fixed sequence.

Finally, we need to be sure not to assume a reductionist view of culture. Even where goals and strategies are widely recognized in a society, what actually happens in interaction may vary greatly from one community, family,

or activity to another. Despite general similarities in expert-novice interactions, specific differences may be very significant for shaping children's development of skills and evaluation of their nature and purpose. Such variation raises questions about what should count as essential characteristics of cognitive apprenticeship, and whether structured models such as the one proposed by Collins, Brown & Newman (in press) are valid.

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Appendix

Transcription conventions: /=sentence/utterance terminal; [=overlapped speech; =latched speech; (.)=half-second pause; ()=translation or amplification to clarify meaning, and information on paralinguistics; [] = analytic commentary; ?=intended question; !=presence of emphatic particle or expression; _____=unclear utterance; {}=probable content of unclear utterance; :=extended hold on vowel. Kwara'ae words given in underlying form.

EXAMPLE ONE—*Irosulia*—Susuli=female 3;3 yrs.; Fena=male 1;9 yrs.; Talia=female 1;9 yrs. During dinner in the family kitchen one evening, the mother urges the children to eat so they can bathe and go to bed. She tells Susuli to eat; Susuli replies *'aial* (*'aila*=dislike/don't want to). The father suggests in that case, tell us a story. Again Susuli replies "I *'aial* that, too." The father immediately begins to *fa'amanata*:

1	fa	I say that nothing has its source in *'aila'anga* laziness)*
2		A bad thing is this *'aila'anga*/
3		*'Aila'anga* don't you say it (.) from your [{mouth}/
4	mo	[Tell the story of the (.) crab and the rat/
5	Su	E:::(=No)
6	fa	*'Aila'anga* for a female child, being 'aila is a bad thing/
7		You are a female child, don't be saying *'aila'anga*, okay?
8	Su	*'Ira* (if the argument up to this point is the case, then:), what about Sango?/
9	fa	And Sango says *'aila'anga* (=is lazy) and her father smacks her, too/
10		Strikes her/ (3 sec.)
11		Do you think your friend's father let her behavior go by?/
12	mo	Don't say *'aila* (be lazy)/
13		You are a woman/female, your body should not be inflexible/
14		Be very willing (to work)/
15		Work in the potato garden/
16	fa	Okay, Fena?/ (responding to boy's soft whine)
17	mo	Work in the house/
18	Fe	M' uh uh (yes)/
19	fa	(Make the) fire/
20	Fe	Uh? (what?)/
21	mo	If you're *'aila* (and) you're a female child, that's just bad/

EXAMPLE TWO—*Alafolo*—Fo'odara=female 3; 2 yrs.; Faleka=male 1;7 yrs. After dinner in the evening, the father and mother *fa'amanata* their two sons about what the boys should do the first thing every morning, and that they should always ask their parents permission before using something. The father discusses where and how

they should play, especially that they should not to strike other children. He concludes this cycle with:

1 fa: Child-striking is bad/
2 Fo: *Bani'a* (=that which you just said) child-striking is bad?/
3 fa: Yes, [bad/
4 mo: [Yes/
5 fa: If you strike someone's child- chi:ld, he (the person) will be angry/

(After recapitulating these points, the father tells the boys they and other children should play together in love. Then:)

6 fa: Don't- don't take any child's thing and run away with it/
7 No, it is *aabu* (forbidden)/
8 Fo: It is *abu mala* (much forbidden) (same intonation contour as father)/ [grammatical error]
9 fa: *Aabu liu* (very forbidden)/ [correction - short form]
10 Fo: *Aabu liu mala* (very much forbidden) (same contour as fa)/ [produces full, correct grammatical form]
11 fa: You all just play lovingly/(.)
12 Don't fight/(.)
13 Don't *fangata'a* (be selfish) (using high rhetoric listing intonation)/(.)
14 Fo: *Fangata'a mala* (same rhythm, intonation as fa)/ [grammatical error as in 8; also fails to use negative]
15 fa: No (.) don't you (singular) *fangata'a/* [ignores grammatical error, instead drawing son's atten tion to lack of negative]
16 Fo: I don't *fangata'a!/*(high pitch, low volume, in adult mode) [correct use of emphatic particle in recognizing father's correction; implies: I'm not mistaken about my meaning]
17 fa: Yes/

(Later in the session:)

18 fa: Another thing, with regard to inside the house/
19 Fo: Inside the house (conversational tone, not imitating father's contour)/
20 fa: Don't you two spoil things in the house/
21 Fo: You two spoil [houses/
22 fa: [Things, leave them alone/
23 Fo: Leave them alone/
24 fa: Yes/
25 Things you two see lying about, put them in order/
26 Fo: You two see_____ spoon/
27 fa: Because they are our (inclusive) things/
28 Don't you two spoil things in the house/
29 Fo: We two don't spoil things we all-/
30 fa: Yes/
31 Fo: Don't you (singular) spoil it either!/
32 fa: Yes/

Reflections on a Model

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It is refreshing to read this set of papers from the Hawaii Research on Thinking Project (HART). The studies reported are imaginative explorations of social-communicative processes involved in education (conceived here in the broad Vygotskian sense of learning-and-development). They contribute to the rapidly growing body of work in the United States that has been probing and elaborating the implications of Vygotsky's construct of the "Zone of Proximal Development" for such social practices as child-rearing and schooling. In the six years since the Rogoff-Wertsch (1984) collection brought early research on this construct to a wide audience, the "ZPD" has gained popularity among educational researchers and practitioners as a conceptual pivot for rethinking instructional processes in school. The HART Project takes its place in this reforming effort. And like others who see an affinity between the ZPD construct and the notion of apprenticeship, HART Projects investigators are also participants in what seems to be a new movement toward reconceptualizing cognitive development as a form of apprenticeship (see Rogoff, 1990).

As someone who is not personally engaged in these efforts, I am not familiar with the many forms research and scholarship on ZPD and apprentice models take. I won't attempt then to compare and contrast the work of the HART Project to other like endeavors, nor will I be able here to give the several articles the attention they deserve. Each has something special to offer and each raises questions for debate - matters of theory, method and interpretation. Readers will discover these. From my

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particular perch and long concern with sociocultural approaches to learning and development, I can best deal with general features of the Project's activities that strike me as especially attractive or worthy of debate.

Attractive features are not hard to find. I am impressed with the social organization of the Project's intellectual work. It is clear on reading these articles that they are more than a collection of individual studies. As I understand it, Project members worked closely together to develop a common research model and to sustain a collective process for enriching and rethinking it. At the same time, the community opened a space in which individuals with very different disciplinary backgrounds and experiences could explore and "test" the model in the particular domains in which they were engaged and in their own fashions. This combination of collaborative and individual activities seems especially suited for research ventures that seek as HART does to move beyond established frameworks. "Moving beyond" is a nebulous enterprise until it becomes transformed into a "moving toward" and this transformation takes lots of different kinds of work, multiple perspectives, specialized skills. It is difficult to bring these elements together around the development of a new conceptual framework and without the hierarchical structure of an academic department or institute. The fact that HART is a community of women researchers (Brandt indicates the community incorporated certain feminist perspectives in its outlook) does not appear incidental.

It is of special interest then to see how commonalities and differences play off each other in this project-with-a-common-model. A teacher of English (Jacobs) analyzes teacher talk about child talk; a university professor (Bayer) models a process she is researching, and others (Watson-Gegeo and Adams) move established lines of research toward the common model. We have a good display of the distinctive contributions made by individuals with differing intellectual histories. We can see how a range of methods, from text interpretation to quantitative coding of videotapes, can be used to investigate processes of common interest. The particular aspects of cognition involved in these studies vary widely as well and they span the age range from toddler to university student. With this diversity in ways of working with an integrative model, we have an unusual opportunity for examining how such a model fares when it is forced to travel across many domains, populations and settings. Do the various studies enrich its content or, as my favorite psychologist Vygotsky warned might happen, does a model or construct "lose content" in direct proportion to the expanse of territory it attempts to cover?

Before taking up this question, I would like to comment on the methodological status of the Project model, another attractive feature. From a functional perspective, the HART model appears to be a mediating mechanism between theory and practice. Theories, including sociohistorical and activity theory which seek to understand social practices, do not contain within themselves "prescriptions" for changing these practices. What a theory "means" for practice cannot be read off from texts of the theory. Notions such as "translating theory into practice" or "applying theory to practice" are based on the contrary assumption. They imply, erroneously in my opinion, that grand theoretical propositions can be directly converted into methods for transforming established practices in the contingent here-and-now.

I take the HART model as an effort to put something "in between" an interpretation of theory and an intervention in practice. On the basis of their reading of Vygotskian theory, reframed in an "apprentice metaphor," Project participants singled out a set of social-communicative processes they took to be of singular importance to the development of cognitive skills (the "social transfer of cognition."[1] They systematized these processes and their relationships into a model ("prototype apprenticeship model") which they use in two ways. The model serves as an investigative tool for analyzing "naturally occurring" practices (e.g., parents talking to Kwara'ae children) and inferring (or assessing, Adams) the implications of these practices for cognitive development. The model also serves as a template for reorganizing ongoing practices (e.g., teacher-student patterns of interaction in the classroom) in the direction of producing the desired cognitive outcomes (social transfer). It is a model in the two senses of an analytic-investigative device and as a "desired state of affairs." (In this latter sense, it bears a resemblance to the "formative experiment" developed in the Laboratory of Comparative Human Cognition, (LCHC, 1982; Newman, Griffin, & Cole, 1989). This double function serves what are often the disparate interests of cognitive-educational researchers and educational practitioners. It also serves us, the wider audience, as an example of a level of theorizing that is commonly skipped over in the current ruse to use Vygotsky to improve practice. The model is commendable, too, as a concrete working out of the phases through which the conversion of interpsychological processes to intrapsychological processes is hypothesized to take place. Brandt's paper is a clear exposition, and her diagrammed representation (hard for me to make out at quick glance!) repays study.

Now let me turn to some features of the general Project approach which invite more critical consideration.

In these comments, I adopt the vantage point of Vygotsky's sociohistorical theory and contemporary activity theory. I do this not because I think these theories have the "last word" but because I think they have the first: among all theories of human development, they remain unique in offering foundational constructs for understanding the social origins of mind. HART Project characterizes itself as neo-Vygotskian and I would like to examine this position.

The concept that connects HART to VYGOTSKY is the concept of the "social." A good place to begin then is to ask: what is the "social" in the expression of the "social transfer of cognitive skills" which is how HART refers to its leading question? In the various HART studies its meaning translates into processes that transpire between and among people in a face-to-face context typically organized around a learning task. Although the task itself may be an object of analysis, in most cases, social interactions, and especially verbal communications, are the focal point of interest.

It is instructive to review what HART's account of the "social aspect of learning and development" as incorporated in its apprenticeship model leaves out. For Vygotsky, the social basis of mind involves all levels or organization of human affairs—societal and institutional as well as face-to-face. In a deep sense, it is difficult to understand how negotiation and communication in direct face-to-face contexts take the forms they do without considering larger institutional and societal arrangements—their resources and constraints, the social practices they involve, the motivations which these inspire or extinguish, and the values they express and conceal. (Watson-Gegeo and Levin, this issue, also make this point). The history of individuals participating in face-to-face encounters is interwoven with this larger social order of things. These meanings of "social" involve people, their relationships and their projects on multiple levels of analysis. But as we know, Vygotsky's special genius was in grasping the significance of the social in things as well as people. The world in which we live is humanized, full of material and symbolic objects (signs, knowledge systems) that are culturally constructed, historical in origin and social in content. Since all human actions, including acts of thought, involve the mediation of such objects ("tools and signs") they are, on this score alone, social in essence. This is the case whether acts are initiated by single agents or a collective and whether they are performed individually or with others. (Of course, all activities have unique and individual aspects which develop in dialectical relationship to their social aspects, but we cannot go into this dynamic here). I think of Marx's example of the lighthouse keeper on solitary watch in the beacon tower as the paragon of social labor.

In the context of the larger theory, the construct of Zone of Proximal Development encompasses all these meanings of "social." ZPD can be conceived (see Cole, 1985; Griffin & Cole, 1984) as a space in which social processes and cultural resources of all kinds are involved in the child's construction of her future. It is a general model of human development which incorporates a particular relationship between culture and mind, learning and development. This general model acquires specific content in its deployment to particular developmental questions and to particular activity contexts. Hedegaard (in press) discusses implications of the ZPD as a model for school-based instruction; she emphasizes the significance of motivational as well as cognitive and social aspects of teacher-designed educational activities: "For children entering school, the teacher confronts them with the zone of proximal development through the demands and tasks of school activity in order to guide their development towards the stage of formal learning." School activity is not localized to a classroom but embraces processes on societal and institutional levels as well as those occurring in a particular grade at a particular time.

In research in this country, ZPD is typically construed more narrowly as referring to a system of interpersonal interactions organized around a particular learning achievement. Sometimes, as in the HART model, the primary focus is on "expert-novice dynamics" (Brandt) in the system and the ZPD construct is assimilated to such others as guided learning, scaffolding and apprenticeship. Research organized around this perspective has its own validity and necessity. I cannot conceive of learning-and-development as occurring without face-to-face interpsychological functioning, and my comments here are not meant in any to diminish its centrality. Besides, we cannot study everything at once; and given the misconceptions of dominant psychological models, it makes sense to put effort into studying neglected questions of how interpersonal systems work. My point is not to supplant this research but to argue that it cannot realize its value if it is not informed by the larger theoretical framework. What transpires between and among people in local contexts cannot carry the entire burden of explanation of learning and development. Studies that disembed the ZPD concept from its theoretical context may misleadingly suggest that they do. And identification of "social origins" with "interpersonal processes" radically reduces the power of the theory and its implications for the reconstruction of edu-

cational and other social practices to enhance human development.

An exclusive preoccupation with contextualized here-and-now interpersonal processes holds another risk: it may trap us again in the dichotomous scheme of "social vs. individual" that Vygotsky's theory transcended. Consider Brandt's concluding question: "Are all higher level cognitive processes and concepts socially based as Vygotsky contends, or are some better acquired by individual, independent efforts?" This question implies an opposition between the social basis of concepts and individual learning efforts. If we understand that the presence of others and interaction among people does not exhaust the social basis of concepts, we might consider "independent efforts" as a component of the "social transfer of cognition" rather than its contradictory. An individual reading a book in the course of a motivated learning activity may participate in a process in which she reconstructs the knowledge and ways of thinking embodied in the text. In a sense, interpsychological functioning occurs between absent author and present reader through the mediation of the text. (Claims of this kind are certainly made these days for computer-based educational activities). The content of the book, its selection by a "more capable other," the organization of a setting that supports reading activities—these are all reflections of socially organized and socially meaningful activities. And they are all entry points for educational interventions. Recognizing that social processes are involved in all phases of learning activities, even those carried out by independent effort, helps us avoid the temptation of dividing up the world into parts that represent socially based learning and parts that represent individual learning. It seems more fruitful to analyze the various forms of the social basis of cognition, and the different ways that interpsychological processes may occur. This approach would move us out to new research and educational questions—specific, concrete queries about how cultural communities this world over organize activity settings for the "social transfer of cognition." In this query, all forms of activity—group, dyadic and individual-would have their place.

Watson-Gegeo and Levin (this issue) raise similar cautions about a reductionist approach that I have raised here. (Watson-Gegeo in fact uses evidence from her studies among the Kwara'ae to make a telling argument against certain activity theory assumptions; see her article this issue). These authors point out that cultures differ in child socialization goals and in theories of how children learn, and that these and other differences affect how interactions and tasks are defined and constructed by participants. Even within one culture, what actually happens in interactions may vary greatly across communities and activities. "We need to be sure," says Watson-Gegeo, not to assume a reductionist view of culture." When we fail to take the larger cultural order of things into account, we may confuse what are (own) culture specific aspects of interactions with socially necessary ones. Several of the studies reported here, for example, incorporate ideas about effective "social transfer" mechanisms—ownership of questions, negotiation of learning agendas- that reflect particular theoretical and ideological predilections. That is fine - educational activities should be organized to support valued objectives - so long as we distinguish between the specific outcomes we have in mind and cognition-in-general. The HART approach aspires to illuminate the social transfer of cognition in a general sense; it focuses on higher thinking skills and how we become "good thinkers." But several studies adopt criteria for good thinking which are quite culture specific—creativity in an individual sense, for example, and skepticism. Research also selects for study what investigators consider are "privileged sites" for learning—certain mother-child interactions, classrooms. Selection of these sites too, involve implicit cultural assumptions about normative practices of child-rearing and education. Recognizing the relativity of the normative, we are more likely to keep in mind the crucial distinction between the normative and the necessary. Earlier, I mentioned the dual functions of HART's contextualized apprentice model. Here it becomes apparent that there is a tension between its function as an analytic device and as a desired state of affairs which merits explicit consideration.

In the same spirit, it seems important to examine whether interpersonal processes fulfill similar or different functions in particular learning activities. Are we concerned with infants or toddlers who are just beginning to acquire language and verbal concepts, and whose control over mediating devices is minimal? Or are we considering a particular educational enterprise involving university students who we assume already have a repertoire of learning strategies and mediational means at their command? In the former case, interpersonal processes may be constructing a zone for the formation of *new* intellectual functions—inner speech, verbally mediated reasoning and the like. In the latter, interpersonal processes may function to construct possibilities for learners to invoke already developed intellectual functions. I am uncomfortable, for example, at the implication that the same apprentice model applies to university students as "apprentice thinkers" (Bayer's paper) that applies to toddlers as "apprentice classifiers" (Adams' paper). Bayer's design

of education as a collaborative activity is beautifully conceived and well analyzed; and it appears effective as well. But we cannot assume that the processes she describes are formative to cognitive processes among her university students in the same sense as parent talk (see Watson-Gegeo) may be to three-year-olds. Aren't her students learning a scheme for an effective classroom activity? In what way does their appropriation of the formats the teacher initially organizes turn them from novice to expert *thinkers*? Are we to assume that they would remain "apprentice thinkers" without this experience? For that matter, it is not obvious to me that the conception of a transition from inter- to intra- personal cognition requires (or in everyday life most frequently takes) the classical expert-novice form. Among youth and adults a process in which novices with differing partial expertises share knowledge and engage in co-action may be as effective a model of "social transfer" as an expert-novice model, or a better one. Collaborative work arrangements, for example, often embody reciprocal teaching-learning processes and it would be fascinating to analyze how these support internalization. Interestingly, Bayer's demonstration classroom program deftly invokes cooperative processes through "sharing memories" and group discussions but these processes are not explicitly accounted for in the proferred expert-novice model.

HART has made a fine beginning. As Brandt concludes, the Project is now ready to tackle new questions. I have argued that in this upcoming phase it might be helpful for the Project to "peg up" to the larger theory so that it situates its apprentice model in relation to other endeavors examining the myriad ways in which sociocultural processes affect learning and development. Paradoxically, pegging up to grand theory carries with it new possibilities for infusing a general model with specific content illuminating learning and development in particular activity settings in particular cultures. We look forward to new work from Hawaii.

Note

[1]I am retaining the HART Project terminology in these comments thought I have questions about some of it—viz., the notion of "transfer" as referencing the process of transformation of the interpsychological into the intrapsychological

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Introduction *CONTINUED FROM PAGE 55*

special importance for the culturally heterogeneous population of the United States.

As management of the *Newsletter* passes on to a new editorial team, it is perhaps the appropriate time to reiterate a point that we first made in an editorial note to Contributors, Readers, Journal Editors and Faculty Evaluation Committees in October, 1981 because it seems as relevant today as it was almost a decade ago:

> A few times during the last year the position of the *LCHC Newsletter* with respect to its status as a publication has been brought to our attention. In one case, a colleague reports that the unpolished nature of an article was raised in a faculty review of the work. In another case, the fact that some data and ideas were tried out in a *Newsletter* article was held against a junior researcher who incorporated that material into a more thorough article submitted for publication to a refereed journal.
>
> Such cases fundamentally misinterpret the purpose of this *Newsletter*. To begin with, we do not have a carefully neutral and anonymous review process; we never intended one, for it would defeat the purposes of this publication. We are a newsletter, not an official archival journal. We are a forum for trying out ideas that fall between the accepted rules of a good deal of academic discourse on matters of

human cognitive processes. This forum is mediated by our Laboratory, and thus reflects, naturally enough, the kinds of issues that we view as relevant to the field. It is also intended to be an *open* forum where multiple points of view can contest informally, rapidly, and in a collegial manner. It is the production of interesting possibilities, the awakening to new ways of thinking, that we see as our major goal.

If authors choose to include articles in their academic files, we feel they should certainly feel free to do so. In many cases, we would be proud to have written materials that our colleagues have submitted. But we do not edit for standard canons of research and we do not view ourselves as appropriate gatekeepers of academic quality. In like manner, we do not view articles that appear here as "last words," but rather as "first thoughts" that the writer wants to get some feedback on and which we judge to be of interest to the community defined by the thematic interests of the *Newsletter*. May all join in making the enterprise useful, not straitjacketing.

In recent months a similar set of concerns has arisen in another medium of interaction about issues of culture and human nature, XLCHC, the electronic mail discussions that LCHC has helped to organize. Some contributors to that discussion worry either that their ideas are too "half baked" to be worthwhile communicating about, or that if they do communicate, someone will steal their ideas. Our inclination there, as here, is to welcome the opportunity to assist people in baking up their ideas into food that can help to sustain humane social science research and if it should turn out that someone else is able to "bake up" our half baked ideas, so much the better. (For those who have not done so, we invite participation in XLCHC which can be accomplished by the simple expedient of writing to xlchc@ucsd.edu or xlchc@ucsd.bitnet.

Judging from recent contributions to the *Newsletter*, including those in the present issue, it seems that we are perhaps experiencing the emergence of a new scientific paradigm which will provide a theoretically inclusive, empirically grounded, and practically useful, theory of the role of culture in constituting human nature. As always we welcome readers' contributions to that enterprise.

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