

***Examining Shared Endeavors
by Abstracting Video Coding Schemes
With Fidelity to Cases***

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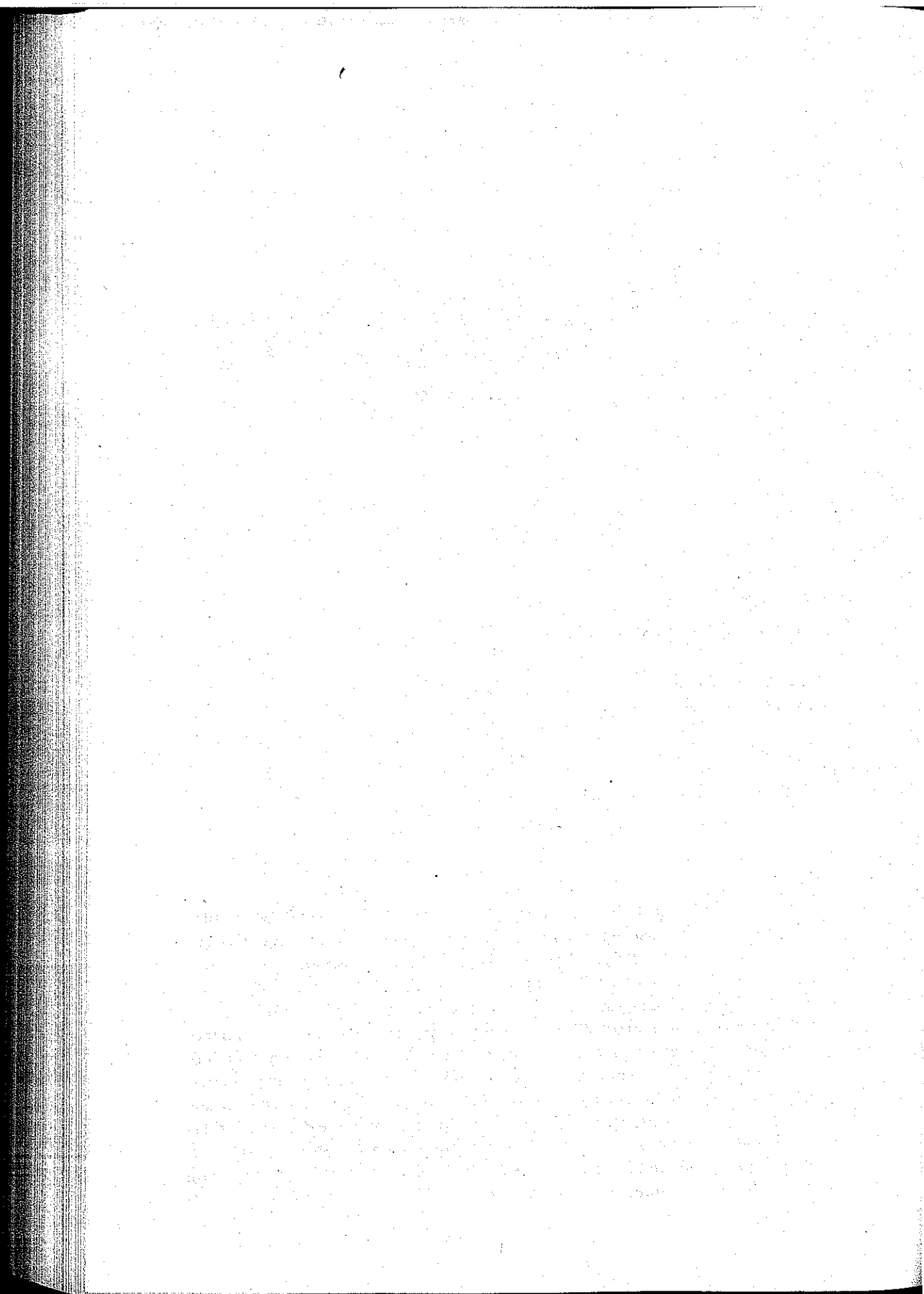
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Sociocultural theories of learning treat social interactions as the crucible in which individuals learn and construct the traditions of their cultural communities (Cole, 1996; Lave & Wenger, 1991; Rogoff, 2003; Vygotsky, 1987). Yet, a challenge for research on learning in social contexts is to develop methods to code between-person engagement *explicitly*. Instead, many studies of social interaction have limited coding to a focus on the isolated behaviors of individuals. For example, studies code the number of questions asked or statements made by an adult, which they relate to separate codes of the number of words spoken or errors made by a child with whom the adult was interacting. The relations among such individual behaviors are examined later statistically or simply speculatively as researchers generate interpretations of the data in their discussion section in an attempt to make sense of isolated 'variables' that have been removed from meaningful interpersonal context (Rogoff & Gauvain, 1986). Such coding that breaks down social interaction into a focus on individuals' acts in isolation from



other individuals' acts does not directly address the dynamic intersubjective aspects of emerging shared meaning and purposes in group interaction. As a consequence, the coding may not actually address a study's social interactional questions.

Our research team¹ has been developing coding schemes that focus directly on shared engagement among people, examining both the emerging group processes and the contributions of individuals to them. We describe a method of creating coding schemes to examine multiple cases with sufficient precision that different observers can use the schemes with agreement. Our team's method combines the strengths of qualitative and quantitative analyses by abstracting ethnographic accounts of a few cases to examine patterns numerically across cases in a way that maintains fidelity to meanings of individual cases. This approach has yielded several ways of explicitly examining individuals' contributions to shared endeavors as well as the overall form of group engagement.

Moving beyond the limitations of coding isolated behaviors of individuals as if they were independent of each other has been difficult in part because the field has tended to pit qualitative analyses of 'meaningful' social events against quantitative analyses of 'objective' individual behaviors. This unnecessary dichotomy has made it difficult to address the *sharedness* of people's contributions in shared endeavors.

From the sociocultural perspective from which our research team works, the aim is to investigate people's *mutually constituting* contributions to social events as they build on their own and each other's prior contributions. We argue that coding schemes should focus directly on the interactive processes about which researchers want to learn if video studies examine questions of social engagement, intersubjectivity, or mutuality. Coding schemes can directly examine the interrelated processes of group engagements (such as how several people collaborate) or contributions of individuals to emergent social events (such as how one person manages another's attention to an object during a lesson).

This often means that coding schemes require interpretation on the part of coders. However, these interpretations can be cross checked through use of precise definitions and through examination of intercoder reliability. This seems like a more responsible and replicable way of examining social interaction patterns, via explicit checking of the views of several observers, than to leave the interpretation of the relation among coded separate individual behaviors to discussion sections, where authors' interpretations cannot be explicitly checked.

This chapter describes a process for combining the strengths of qualitative and quantitative analyses to examine patterns of shared engagement across cases. We describe our research team's approach to examining mutually constituted social interactions by demonstrating how we develop coding schemes through recursively cycling through various phases of abstraction:

- developing and honing research questions based on the initial focus of the research,
- abstracting ethnographic descriptions of participants' engagements in the activities seen in single cases, and

¹The research team extends beyond the three authors of this chapter to include several 'generations' of graduate students and postdoctoral fellows working with Barbara Rogoff.

- creating and fine tuning coding schemes to apply across multiple cases by abstracting coding categories that retain meanings fitting individual cases.

Using the emerging coding categories on multiple cases then permits graphical and quantitative comparisons across cases, helping researchers to discern differences and similarities in interactive processes across cases and cultural communities (or other comparative questions) in ways that maintain fidelity to the meanings of individual cases.

Unlike individualist approaches, our approach to development of coding schemes addresses both the contributions of individuals to shared endeavors as well as the overall form of shared endeavors themselves. A focus on shared or group processes does not preclude attention to individual contributions—indeed, attending to individual contributions is necessary for the examination of shared or group processes. In this approach, individuals' contributions are viewed as they relate to the contributions of other people, not analyzed as if each individual were acting in isolation.

Using this approach to coding, our research team has investigated similarities and differences across cultural communities in how children's learning is organized. For example, the research team has examined the organization of mothers' and toddlers' interactions as they explored novel objects in four cultural communities (Rogoff, Mistry, Göncü, & Mosier, 1993), patterns of working together among children from U.S. schools that differed in collaborative practices (Matusov, Bell, & Rogoff, 2002), parent volunteers' engagement with children in science activities in a cooperative U.S. school (Matusov & Rogoff, 2002), and group coordination among Guatemalan Mayan mothers varying in schooling experience as they constructed a puzzle with related children (Chavajay & Rogoff, 2002).

In what follows, we describe the process of creating coding schemes to examine mutually constituting social interactions, by abstracting coding categories that permit comparative, numerical analysis across multiple cases from ethnographic descriptions of cases considered one at a time. We begin our description by first emphasizing the importance of focusing and shaping the research question.

WHAT IS THE RESEARCH QUESTION? FOCUSING THE RESEARCH QUESTION AND CODING SCHEME

Key to the process of developing a coding scheme is using the study's working question to guide decisions about what categories should be coded, and how. Without continual reference to and honing of the central research questions, coding schemes run into a number of dangers—especially the risk of trying to capture everything that happens (rather than to focus) and the risk of examining arbitrary variables that do not address the purpose of the research.

A study's research questions may at the outset be rather general, sketching a domain of inquiry that is vague but still useful to guide decisions regarding the coding scheme. For example, Rogoff et al. (1993) began a study in four cultural communities with the broad research question "What cultural variations and similarities occur in the ways that mothers aid toddlers in problem solving?" Such a broad question provides researchers a general focus with latitude that helps them keep an open mind to relevant (and sometimes unexpected) aspects that may appear in their observations of the video data.

In writing and discussing ethnographic accounts of interactions in specific cases, more focused empirical questions may be crafted that address the broader research question, and these more focused empirical questions may serve as drafts for deriving coding categories. For example, one question that Rogoff et al. (1993) derived from the process of analyzing the video cases ethnographically was "How do mothers motivate toddlers' involvement in the activities?" when they noticed that the mothers varied in use of mock excitement or praise with their toddlers. This distinction eventually became a coding category with a precise definition for the final coding scheme.

In several research projects, we have used a "focusing exercise" to bring to the foreground the specific questions that are of most immediate relevance to the broader research question and to articulate the corresponding video evidence that would be required to address them. We show a draft of a research team's engagement in a focusing activity for a study that examined how learning/teaching processes occurred among European American middle-class adult-child dyads varying in experience with computer games (Angelillo, Rogoff, & Tudge, 1997). The focusing exercise in Table 12.1 built on earlier coding schemes developed by Matusov, Bell, and Rogoff (2002) and Matusov and Rogoff (2002).

TABLE 12.1
Focusing Exercise

<i>Main Motivating Research Question</i>	<i>Specific Empirical Questions</i>	<i>Operationalized Categories</i>
How does the teaching process differ with child versus adult "experts"?	Intersubjectivity (extent of shared thinking)	Collaborative (building on each other's ideas) Division of labor (turn taking; separation of roles) Little to no contact of ideas
	Leadership roles	Mutual (community of learners) Didactic (expert run) Laissez-faire (novice run)
	How does the novice contribute?	Obeys expert Ignores expert Explores on own Draws out expert Reminds expert of need for novice to learn
	Is there guidance from the expert?	Explanation out of context Conversation while collaborating Test questions
	What could learner have learned from guidance?	Goals of game Broad strategies (with purpose beyond immediate decision) Local strategies Just local moves
	How well do they play?	Superficial understanding throughout Some progress Great progress

The process of creating this table helped the research team to cull some aspects of the dyads' interactions that would not address empirical questions related to the main motivating research question (although they might be of interest for some other questions). The process of proposing preliminary definitions for the operationalized categories helped the team focus on the specific aspects of the data to be investigated and to cull categories that overlapped or appeared uninteresting once they were closely examined. This table shows a stage in which the categories that the research team considered were sorted into six empirical questions—which was still overly ambitious for a single study.

In engaging in the recursive cyclical process of honing the research questions and the coding scheme in various studies, our research team has found it useful to ask ourselves periodically whether the draft coding scheme allows us to make conclusions regarding the question under study. We try to think ahead to potential statements summarizing the findings of the study, and without precluding the specifics of the findings, we ask ourselves whether the aspects of the activity that our coding examines will allow us to speak to the topic about which we want to learn enough to make conclusions. In addition to continually checking that the coding categories address the overarching research question, it is also essential to use the coding categories derived from the video data to hone the question itself.

One way to check the appropriateness and clarity of the correspondence between the research questions and coding categories is to pay attention to the confusions of coders-in-training and to anticipate concerns of reviewers. The new perspective offered by coders who are unaware of hypotheses of the study helps not only to articulate the definitions of coding categories but also clarifies the overall coding scheme. The coders' confusions and questions highlight areas of vagueness, overlap, and lack of clarity of purpose in the definitions. Attending closely to these 'glitches' provides crucial information that may help to simplify and focus the study when, for example, it becomes clear that two categories are difficult to distinguish and may need to be combined or new categories need to be added to better capture aspects of interactive processes that are the focus of the study. It is helpful to think of the coders as stand-ins for eventual readers, to whom our coding categories will also need to make sense.

In the next section, we illustrate this approach to analyzing video data by presenting how Rogoff et al. (1993) studied mothers' and children's contributions to shared problem solving in four cultural communities.

CYCLING BETWEEN ETHNOGRAPHIC ANALYSIS OF CASES AND NUMERICAL ANALYSES ACROSS CASES: AN ILLUSTRATION

We illustrate the process of integrating ethnographic analyses of single cases with quantitative analyses of multiple cases with a study that focused on cultural variation in mothers' and toddlers' contributions to distinct forms of guided participation. The study began with extensive ethnographic descriptions of interactions during visits to 14 families in each of four communities (Rogoff et al., 1993). The study eventually utilized dozens of precise coding categories to examine patterns

across cases and across communities using case-based graphs and statistical analyses. These quantitative analyses built on in-depth descriptive accounts (averaging about 30 pages each) of the emerging events that occurred across the 1½ hour home visits for each of these 64 cases. The analysis focused especially on how the mothers helped the children figure out how to operate novel objects as well as how to handle problems with some familiar objects (such as getting arms through sleeves and opening a cellophane cookie package).

In beginning to address their loose-starting question, "What cultural variations and similarities occur in the ways that mothers aid toddlers in problem solving?" the researchers (Rogoff et al., 1993) had some idea of what to look for based on the literature and on prior familiarity with the four communities. For example, they planned from the outset to examine the extent of use of words versus nonverbal forms of communication. However, the most interesting features of social interaction that they ended up coding and publishing were ones that came to their notice through writing and discussing their ethnographic descriptions of the videotaped interactions of each family visit.

Abstracting Descriptive Accounts From Raw Video Data

In the descriptive accounts of each case, Rogoff et al. (1993) sought to capture the communicative purposes and functions of the mothers' and toddlers' actions in relation to each other over the course of their interactions. These descriptions were not merely transcriptions of participants' words or accounts of their behavioral moves (although these were included as relevant). Instead, the descriptions reported what the participants said and did to portray how participants coordinated with each other in accomplishing what they did. Here is a sample fragment of the descriptive account from the visit to a 21-month-old middle-class European American child and his family. As they examined a difficult-to-open jar with a peewee doll inside,

Sandy's mother held the jar up and chirped excitedly, "What is it? What's inside?" and then pointed to the peewee doll inside, "Is that a little person?" When Sandy pulled down on the jar, she suggested, "Can you take the lid off?"

Sandy inspected the round knob on top and said "Da ball."

"Da ball, yeah." his mother confirmed. "Pull the lid," she encouraged, and demonstrated pulling on the knob, "Can you pull?" Sandy put his hand on hers and they pulled the lid off together triumphantly. "What's inside?" asked his mother, and took the peewee out, "Who is that?"

Although the researchers began the process of describing the events with a format that used one column for the mothers' moves and a second column for the child's moves, they found that the meaning of the events was usually better captured by not trying to isolate one partner's moves from the other in such an extreme way. Rather, the participants' moves could be described with respect to others' contributions in a more integrated fashion. The researchers tried to write the descriptions in ways that someone not present could visualize the events that transpired, or even re-enact them (see Rogoff et al., 1993).

Abstracting Coding Categories From the Descriptive Accounts

During the ethnographic analysis, Rogoff et al. (1993) became aware of similarities and differences across all four communities in efforts to bridge between the toddlers' and mothers' understandings of the situation and to structure the toddlers' involvement. For example, they noted striking variations in:

- How mothers and toddlers used language (to give vocabulary lessons or to communicate needed information for shared endeavors);
- How mothers and toddlers attended to ongoing events (simultaneously, in alternation, or even apparently unaware);
- How mothers maintained readiness to assist toddlers;
- How toddlers engaged as members of the group rather than only dyadically or solo;
- How mothers handled toddlers' insistence or refusal to follow the mother's suggestions (by mothers insisting on their own agenda or by allowing the event to follow the toddler's agenda).

Through the abstracted ethnographic analyses and associated discussion of what the researchers discerned in their descriptive accounts of the video cases, Rogoff et al. (1993) began to establish a rough draft of their coding scheme, and then elaborated precise definitions that could be applied across cases and communities. Without the ethnographic analyses, they would have focused only on the categories with which they had begun the study. (The researchers also analyzed and reported those categories, yielding some interesting information, which was not as productive as the categories that emerged from the ethnographic analysis.)

The research team's discussion of the patterns that seemed to emerge from the descriptions was an essential part of the process (along with exploration of the patterns in a preliminary chapter focusing on the ethnographic data: Rogoff, Mosier, Mistry, & Göncü, 1989). The words that the researchers used with each other to try to describe the patterns yielded preliminary ways of describing the coding categories to use to check their impressions systematically across cases and across the four communities. For most of their impressions of the patterns, the preliminary versions of the coding categories required honing to capture the precise meaning so that several of the researchers could look at the same stretch of tape and agree on whether or not they saw the phenomenon in question.

The researchers continually checked their developing coding categories against specific cases, to see whether the categories were capturing what they wanted to address and to make sure they were not introducing misleading contrasts at the same time. They sought categories that would seem "fair" in describing each case, and not impose a meaning on other cases that twisted what was going on.

Employing Graphical and Other Quantitative Comparisons Across Multiple Cases

Quantification of the video data through use of a precise coding scheme permitted the use of graphical as well as descriptive and inferential statistical analyses that re-

vealed striking distinctions in cultural patterns of engagements across the communities. Graphs that maintained information about individual cases were important tools in the comparative, numerical analyses. Utilizing graphs that portray medians, ranges, and middle, upper, and lower quartiles, as well as confidence intervals for comparisons (such as box-and-whisker plots) allowed for examination of the trends across individual cases.

In addition to using box-and-whisker plots to stay close to case-based information, in a number of studies we have developed graphs that display the data for each case in a concise way that encourages examination of patterns across cases. For example, the Rogoff et al. (1993) study presented the case graph shown in Figure 12.1 of 14 individual cases from each of two communities to examine patterns of attentional management during mothers' and toddlers' problem solving. Each bar shows the extent of use of simultaneous and alternating attention, and appearing unaware of events of interest for each case—with the mothers in the bottom two graphs and each toddler displayed directly above their mother.

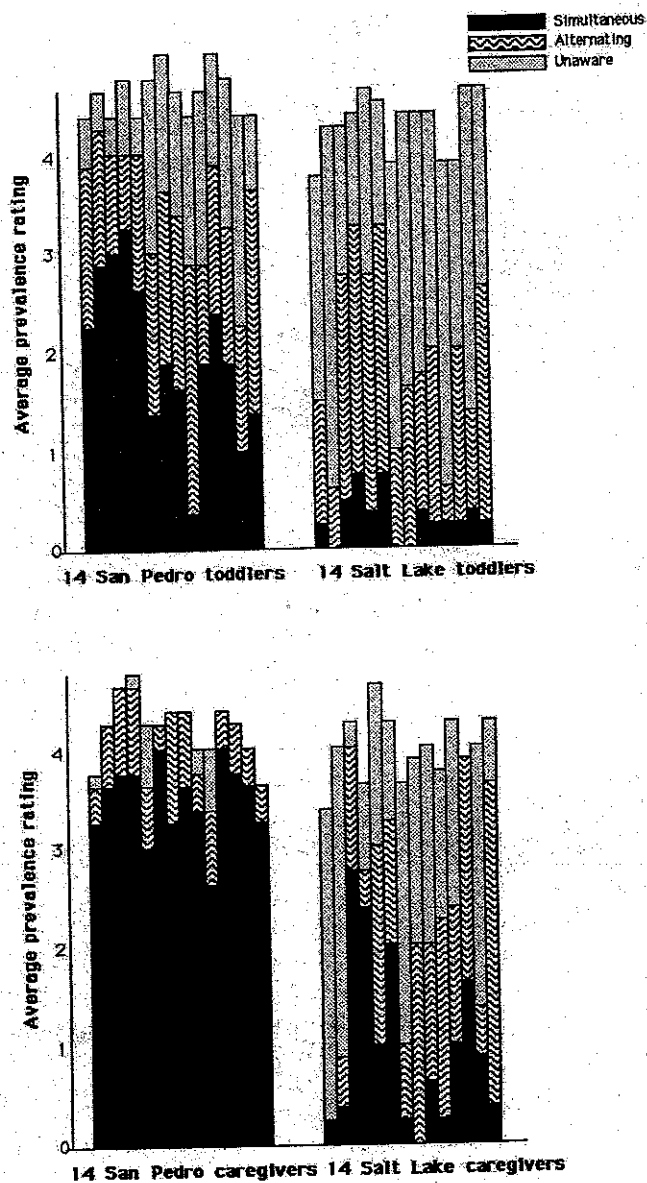


Figure 12.1. Case graph of patterns of attention. From "Guided participation in cultural activity by toddlers and caregivers." *Monographs of the Society for Research in Child Development*, 58, Serial No. 236. Reprinted with permission from the Society for Research in Child Development.

These graphs make clear that although there is variability within each community, the ranges barely overlap—for example, the San Pedro mother who used the least simultaneous attention was at the same level as the Salt Lake mother who used the most simultaneous attention.

Rogoff et al. (1993) employed statistical comparisons primarily to check the strength of the patterns discovered in the graphical analyses. The statistics provided confirming support for the strongest patterns in the graphs and provided a cut-off for eliminating discussion of marginal patterns. They were also useful for communicating the extent of the patterns to the readers of the resulting monograph.

USING DIAGRAMS TO CODE SOCIAL ORGANIZATION OF GROUP PROBLEM SOLVING

Building on the Rogoff et al. (1993) study, our research team sought ways of examining the extent to which people solving a problem together actually think together. The coding categories of Rogoff et al. (1993) focused on the contributions of individuals to shared endeavors, but we wanted also to examine the group process itself, as people engage in shared problem solving. We drew on literature that provided some guidance for explicitly examining intersubjective engagement among participants (such as Bos, 1937; Gauvain & Rogoff, 1989; Glachan & Light, 1982) as well as ideas from the focusing exercise (described earlier) and coding schemes regarding consensus and collaboration versus unilateral processes of problem solving, developed by Matusov, Bell, and Rogoff (2002) and Matusov and Rogoff (2002).

In the process of designing a study that we never carried out, a very useful discussion took place among Eugene Matusov, Chikako Toma, and the three of us as we contrasted coding approaches used in several of our team's previous studies. At some point, we began sketching little diagrams to illustrate the overall form of engagement of a group—how the group coordinated problem solving. These diagrams indicated the roles of each participant vis-à-vis the group's activity, not separately. At the time, the sketches were just for the sake of communication among ourselves, but a couple of years later, they turned into a reorganization of how we code the mutually constituting contributions of participants in a shared activity.

The first full-blown use of diagrammatic coding was in Chavajay and Rogoff's (2002) study examining the social organization of problem solving among Guatemalan Mayan mothers and children. Mothers varying in extent of schooling and three related school-age children were video recorded as they constructed a three-dimensional totem pole jigsaw puzzle. To depict their most prevalent form of coordination during each one-minute coding interval, Chavajay and Rogoff (2002) used "bird's eye view" diagrams that portrayed the extent and type of mutual engage-

ment in problem solving. Their system of diagramming—that served as an ethnographic shorthand—included a number of conventions for visually conveying who was involved with whom and how they were involved, such as acting together, observing, directing others, and playing a supportive role. We summarize the simplified diagrams that were the center of the published findings. [A=mother; 1=oldest child; 2=middle child; 3=youngest child]

In *shared multiparty engagement*, all participants worked together in a coordinated and fluid way, mutually engaged in the same aspect of construction (e.g., same row of the puzzle). Some group members may have been in supporting or observing roles, but all four needed to be involved in the same cohesive focus.

For example, the family group in Figure 12.2 is working together in “shared multiparty engagement.” The mother is placing a piece of the puzzle on the totem pole while her three sons are poised ready to help place the next pieces with her. One of the sons helps hold the totem pole together in the process. This segment of shared multiparty engagement would be diagrammed as shown in Figure 12.3.

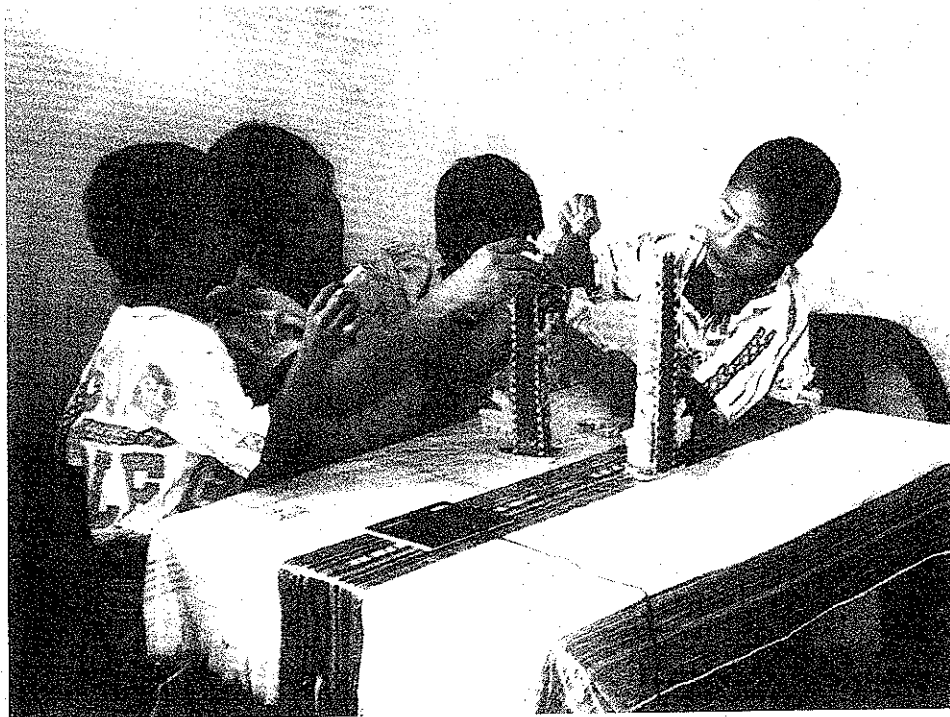


Figure 12.2. Example of shared multiparty engagement. (Photograph copyright 1997 by Pablo Chavajay.)

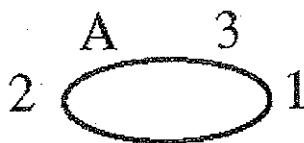


Figure 12.3. Diagram of shared multiparty engagement show in Figure 12.2.

In *division of labor*, participants worked on different aspects of the puzzle, occasionally checking in with each other. A few of them may have worked together.

For example, the family group in Figure 12.4 is using "division of labor." Mother and niece are constructing the front side of the puzzle together, while the son is constructing the puzzle from the ground up by himself, searching for his next piece on the table. Adjacent to the son, the daughter is constructing the back side of the puzzle on her own. This segment of division of labor would be diagrammed as shown in Figure 12.5.



Figure 12.4. Example of division of labor. (Photograph copyright 1997 by Pablo Chavajay.)

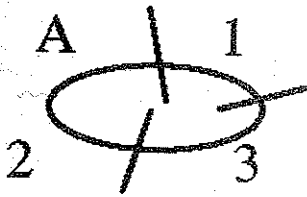


Figure 12.5. Diagram of division of labor shown in Figure 12.4.

In *mother directs the children*, the mother unilaterally and explicitly directed the children, as a unit (like a teacher directing a class), to carry out specific aspects of puzzle construction, without conferring with them.

For example, a mother describes the structure of the totem pole puzzle to the children and tells them what pieces to find (see Fig. 12.6).

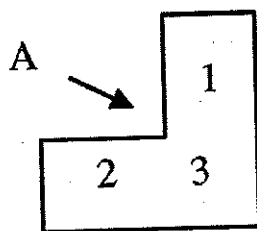


Figure 12.6. Diagram of mother directing children.

In *noncoordinated engagement*, not all four group members were jointly coordinated with each other, although all members were engaged in puzzle construction. Some individuals or dyads worked without checking in with the others.

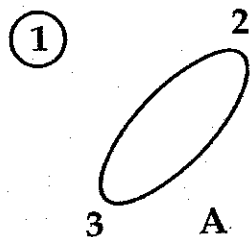


Figure 12.7. Diagram of noncoordinated engagement.

For example, 1 constructs the second wing of the totem pole by himself, while 3, 2, and A construct the fifth row of the totem pole; neither subgroup connects about their agenda.²

By abstracting diagrams from the video data depicting the predominant form of engagement within each one-minute segment, Chavajay and Rogoff (2002) ended up with a couple of pages of small detailed diagrams for each family's group session of approximately 25 minutes. They laid these pages out on a long counter to conduct a visual analysis of the frequency and patterns of diagrams. The clarity of the diagrams allowed them to discern complex patterns in the data in a matter of only a few hours of examination of the data sheets.

In this "eyeball analysis," Chavajay and Rogoff (2002) first examined the diagrams to detect distinctions that could be dropped on the basis of occurring very rarely or could be combined due to being similar conceptually and showing the same patterns across all three levels of maternal schooling (0–2 grades, 6–9 grades, or 12+ grades). (This process yielded the four simplified categories diagrammed earlier.) For example, through visual analysis, Chavajay and Rogoff could see that the division of labor category did not need to maintain the subcategories distinguishing different sizes of work teams, because the subcategories did not show marked differences in pattern and they conceptually made sense to combine into the overarching category of division of labor. (Reliability calculations also helped us determine that some distinctions were too difficult to make, indicating that a distinction should be removed.)

²From "Schooling and Traditional Collaborative Social Organization of Problem Solving by Mayan Mothers and Children," by P. Chavajay and B. Rogoff, 2002, *Developmental Psychology*, 38, 55–66. Copyright © by the American Psychological Association. Reprinted and adapted with permission of the authors.

Once the categories were simplified into the four mutually exclusive diagrammatic categories described earlier, Chavajay and Rogoff (2002) then visually examined whether any distinct patterns were evident related to mothers' schooling experience. They then tallied the occurrence of each of the diagrammed types of engagement for family groups varying in maternal schooling and constructed graphs of the tallies, taking into account the varying lengths of time each family group took to complete the puzzle. Chavajay and Rogoff (2002) used these graphs to examine the predominant patterns of engagement across the schooling backgrounds and then conducted statistical trend analyses on the data.

The analysis revealed that in Mayan family groups with a mother who had extensive experience in Western schooling (at least 12 grades), group members were more likely to divide the task up among themselves, with the mother at times directing the children, compared with Mayan family groups with a mother who had little experience in Western schooling (0 to 2 grades). These latter groups more often worked collaboratively, with members sharing focus on the same aspects of puzzle construction, in a way that resembles speculations about traditional indigenous ways of organizing community involvement.³

As the Chavajay and Rogoff (2002) study illustrates, such diagrams provide a visual format for abstracting the approaches to problem solving used by participants in each family's case, and facilitate distinguishing patterns of engagement. The diagrams are thus a form of ethnographic shorthand, making it possible to visually (and later, statistically) examine participants' coordination of problem solving. Abstracting the cases in this shorthand helps to simplify variations in the diagrams to a few central forms of organization, yielding coding distinctions based on key contrasts among the cases.

Our research team has found this diagrammatic method of coding social organization of participation to be very useful in subsequent studies, to analyze the predominant ways that participants organize their interactions. One study found that during an adult demonstration, triads of Mexican-heritage children whose mothers had little experience in Western schooling (averaging 7 grades) more often worked as a coordinated team in folding Origami figures, whereas Mexican- and European-heritage triads of children whose mothers had extensive schooling more often worked in dyads or solo (Mejía Arauz, Rogoff, Dexter, & Najafi, in press). In another study, the diagrams revealed that triads of European American middle-class siblings more often used turn taking to manage their collaboration in exploring a science exhibit, compared with triads of Mexican-descent siblings who more often collaborated without using turn taking (Angelillo, Rogoff, & Chavajay, 2006).

We have found that diagrammatic coding categories provide a valuable summary view of differences in social organization across cases, while maintaining fidelity to individual cases by representing them directly. Coding of the social organization as a whole may also be accompanied by coding of individuals' contributions to the emerging shared endeavor (such as those employed by Rogoff et al., 1993). Studying both group social organization and individuals' contributions can thus be done in a way that does not simply code individual behaviors as if they occur in isolation.

³The patterns of social organization among groups involving mothers with 6 to 9 years of schooling fell between those of the groups involving mothers with 0–2 years and 12+ years of schooling.

FINAL REFLECTIONS ON ENGAGING IN RECURSIVE CYCLICAL ANALYSIS OF VIDEO DATA

We have argued for the value of creating coding schemes that address interpersonal processes directly, and described a recursive process cycling between ethnographic analysis of individual cases and abstracted coding schemes capable of portraying patterns across cases while retaining fidelity to the level of meaning of individual cases (see also Rogoff & Gauvain, 1986). By referring to the process as recursive, we emphasize that ethnographic analyses of video data are not simply preliminary. They are also important for elaborating the coding scheme (e.g., providing key examples to explicate categories) and often for disambiguating uncertainties in graphical or statistical patterns found using the coding scheme. The process is a recursive cycling between close-in analysis of a few cases and abstracted analysis and comparisons of numerical patterns across cases. To conclude our chapter, we discuss the importance of larger scale ethnographic understanding and the building of methods across a line of research.

Larger Scale Ethnographic Understanding

Far from trying to be "blind" to phenomena, researchers can use their understanding of how participants' cultural histories shape and are shaped by what they and the researchers do as well as how the participants are used to doing and making sense of related activities. Researchers' and coders' cultural expertise regarding participants' ordinary activities facilitates skilled "reading" of participants' actions, gestures, pauses, posture, and words. In addition, extensive piloting of procedures in researcher-structured situations and decisions involved in making naturalistic observations are essential to informing researchers of the meaning that participants make of the activities under study.

Thus, we argue for the importance of ethnographic study not just in the sense of focusing on individual videotaped cases, but also in the sense of understanding the broader organization and meaning of community events. For example, the development of the questions and coding schemes of several of our studies built on available ethnographic knowledge of the distinct cultural ways that people may use nonverbal and verbal means of communication to manage one another's attention and to coordinate efforts. Some of our research group members had observed everyday activities among Guatemalan Mayan families that tend to rely on subtle and skillful use of nonverbal communication (e.g., gaze, slight changes in posture, touching to call attention) to accomplish everyday tasks such as conveying a message or coordinating a religious ceremony. These observations coupled with other ethnographic studies suggesting extensive use of nonverbal communication among North and MesoAmerican indigenous groups seemed to contrast with observations of more exclusive reliance on verbal communication among some European American groups (e.g., Hall, 1959; Pelletier, 1970; Philips, 1983). This broader ethnographic understanding informed our research on such topics as how mothers and toddlers manage their attention and how groups coordinate their contributions to shared endeavors, in a Guatemalan Mayan and a

European American middle-class community (Chavajay & Rogoff, 1999, 2002; Rogoff et al., 1993).

Ethnographic analysis of video data relies on a deep understanding of the everyday lives of the research participants involved in the study to be able to interpret the video records. For example, in Rogoff et al.'s (1993) study, the development of the research question and the associated coding categories involved the researchers bringing to the discussion their knowledge of local meanings of particular ways of acting. An example of this is the researchers' development of a way to code whether, in the face of toddlers' insistence or refusal to follow the mother's suggestions, the mothers insisted on their own agenda or followed the toddler's agenda. This topic arose in viewing videotapes of the middle-class Turkish community, with which one of the researchers (Göncü) was very familiar, but the other three researchers were not. The researchers all agreed that there was something important distinguishing the communities in this regard, but the idea was vague and initial suggestions for how to code it were off base. Göncü was so familiar with mothers insisting on their own agenda that he did not have words for it, but the other three researchers' initial attempts to suggest a way to code this did not fit with the local meaning. Extensive discussion was required to find a way of describing the phenomenon that got beyond initial suggestions like "intrusiveness," which did not fit the meaning system in the middle-class Turkish community. Knowledge of local meanings in open-minded discussion with colleagues lacking this knowledge was very productive for coming up with a coding category that captured the phenomenon of interest in a way that "fairly" represented its local meaning. (See Rogoff et al., 1993, and Rogoff, Topping, Baker-Sennett, & Lacasa, 2002, for further discussion of this process.)

Building Methods Across a Line of Research

In a program of research, early studies examining a new question are likely to require more cycling between creating ethnographic descriptions, abstracting coding categories from them, and using ethnographic analyses to clarify numerical information. In new lines of investigation, an extensive ethnographic analysis of video data may be necessary to elaborate the study's question and coding scheme in ways that capture the phenomenon, especially if new communities or new aspects of interactive processes are under study. Subsequent related studies can jump into the later phases of this work, tailoring the question and coding scheme to the particular study with savings based on prior studies.

With growing understanding of a phenomenon as well as findings of related prior studies to inform the development of later research questions and coding schemes, a more focused ethnographic analysis may be sufficient. Some of our later studies that have started with a more refined research question have employed limited ethnographic descriptions using a random or targeted sample of cases as a tool for adapting a coding scheme, without the need to create extensive descriptions of all cases. Often the selection of cases has aimed to contrast key aspects of the data (for example, focusing on creating descriptions of three cases from each of the study's conditions or comparison groups). The ethnographic descriptions may also focus on creating summary

descriptions or brief notes on specific aspects of social interaction (e.g., how turn taking occurs). Even if less extensive ethnographic analysis is needed in the adaptation of the coding scheme, ethnographic analysis is needed to help interpret the findings.

It is important to note that each new study in a line of research requires some adaptation of the coding scheme built on prior work. Our research team has never found that we can just apply a coding scheme unmodified from one study to the next, because we learn a great deal from each study and need to tailor coding schemes to take into account the next study's specific question and the differing participants, cultural communities, and activities of each study.

A feature of coding that requires rethinking for each study is how the data will be segmented. Some of our team's studies have segmented video data by events, when the flow of an activity provides naturally occurring events. For example, Mejía Arauz, Rogoff, and Paradise (2005) divided the video data into 16 segments according to the 16 folds required to make the Origami figures during an adult's demonstration of Origami paper folding.

For activities that do not involve easily designated segments or when we want to use smaller units, our research team has employed time segments of varying sizes. To determine the length of segments for a particular study, we consider the pace of the activities, the nature of the coding categories, and the "mental load" of the coders. A stretch of a video segment should not be so long that it contains too many of the target events or creates a burden for remembering the details necessary for coding; it should not be so short that it is difficult to achieve an understanding of the meaning of participants' actions.⁴ Segmentation of coding for a study needs to be adjusted to the particular activities of the research participants so that the events of interest are caught, without too many of them happening within a particular interval nor too much effort spent in catching them. This requires familiarity with the data (as can be achieved in ethnographic analyses) to design a coding scheme that fits with the specifics of a particular study.

In conclusion, the process of recursive cycling to create ethnographic descriptions and to abstract coding categories of relevance to a research question is a fruitful way to compare interactional patterns across cases for their similarities and differences, while maintaining fidelity to the meaning of events within cases. Checking categories against cases and cases against categories provides a means of making sure that inferences are well founded across cases and well grounded within cases. The result is an approach to analysis that makes the most of both qualitative and quantitative methods to examine the ways that people coordinate their shared endeavors.

These methods can aid in focusing on emerging intersubjective processes that are central to learning through participation in sociocultural activities. We offer these reflections in the hope that they encourage the development of coding schemes that directly address the ways that social groups organize their interactions as well as different ways that individuals contribute to such social processes.

⁴In any case, coders consider the whole activity in interpreting an aspect of it. They use surrounding intervals to inform their coding decisions within an interval, so that their coding of an interval takes into account the meaning available in the prior and subsequent moment.

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