

Chapter Twelve



Considering the Concept of Planning

Barbara Rogoff, Jacquelyn Baker-Sennett, and
Eugene Matusov

Our goal in this chapter is to discuss planning as process, focusing on the dynamic and evolving nature of planning as it unfolds during activity in individual, social, and historical time frames. Our emphasis on planning as process rather than as the acquisition of stored objects has developed from a sociocultural perspective, which extends the notion of thinking to include mental activities of individuals and groups participating in cultural activities; however, it is consistent with research in other lines of work as well.

The basic shift is from one that assumes that cognition involves operations performed on static concepts and skills (stored in the brain) to one that suspends the use of the metaphor of representations stored in the brain to focus (more parsimoniously, we argue) on the ongoing thinking processes of people involved in actual endeavors. Traditionally, the study of planning has focused on the possession of plans rather than the processes of their development. The development of skill in planning has been regarded as a cumulative acquisition of plans along with an increase

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in planning in advance of action. We argue for the importance of viewing planning as a process of transforming opportunities for anticipated events, with development involving learning to plan opportunistically—planning in advance of action or during action according to the circumstances, flexibly anticipating constraints and opportunities, and adapting to circumstances.

Our contrast between the cranial storage metaphor and the ongoing process approach to planning has grown out of our own efforts to study planning as a sociocultural activity. But we have noted in discussions with many colleagues that the contrast is deep and does not correspond to a split in topic of inquiry; rather it involves contrasting assumptions regarding basic units of analysis. Roughly half the scholars working in areas quite different from our own, such as neurological functioning, perception, animal learning, and cognition (with whom we have interacted in a number of invited addresses, symposia, and classes and in informal discussion) seem to find our perspective an intuitively clear and commonsense approach; the other half have found it to be counter-intuitive and difficult to imagine. At the same time, we have noted that a sizable number of researchers studying social and cultural phenomena argue with us as vehemently as anyone else.

The contrast we focus on in this chapter relates to questions of paradigm or worldview, in the sense that Pepper (1942) and Dewey and Bentley (1949) have described. In considering the implications of a contextualist worldview for understanding cognitive development, Rogoff (1982) contrasted an **interactional** approach—in which elements of human functioning are assumed to have independent standing and the question is how they interact—with a **contextual event** (or **transactional**) approach—in which events are conceived as meaningful and coherent as a unit of analysis. For example, in an interactional approach to the relation of people and context, characteristics of the person and characteristics of the environment are assessed independent of each other and then related; in a contextual event approach, on the other hand, “neither the context nor the person’s activity can ultimately be defined independently, as their meanings derive from their integration in the psychological event. The contextual event approach assumes that events are structured such that no constituent can be adequately specified apart from the specification of the other constituents” (Rogoff, 1982, p. 132).

In this chapter we build our argument on observations and assumptions of a sociocultural approach, since this is the conceptual and empirical domain in which we work, and in this area we argue that reconsidering how planning is conceived is crucial (see Rogoff, 1982, for other psychological approaches consistent with a contextual event approach). Our aim in this chapter is broader, however. We feel that the area of

cognitive development would be well served by examining the cranial storage metaphor rather than treating it as a fact. If it is understood to be a metaphor, scholars can examine whether it advances their understanding in dealing with a particular question or whether it decreases parsimony in trying to understand a particular cognitive phenomenon.

We begin by explicating our contrast between planning as a process of emergence as opposed to planning as selection and application of stored plans. This approach involves an associated conceptualization of change and time. Then we argue for the necessity of this view in a sociocultural approach, in which individual, social, and cultural processes are mutually constituting. The next section describes work from this perspective that points to the importance of flexibility in planning. Finally, we turn to a discussion of how the essential questions for cognitive development are changed by this shift in the assumption system.

PLANNING AS PROCESS

Our view of planning focuses on the processes involved in developing ways of preparing for anticipated events, rather than treating planning as the passive possession of plans as cranially stored objects. Although researchers’ references to processes as objects and to mental functioning as the **operation** of a storage space may serve as a shorthand to communicate about what they are studying, we regard it as a mistake to assume that metaphors for reference to an object of study are necessarily useful ways of conceptualizing what **goes on** when **people plan**. It appears to us that researchers often unknowingly treat the metaphors by which they communicate with each other as facts regarding the phenomena they seek to explain.

Gellatly (1989) expressed a similar concern in pointing out that it is common for cognitive researchers to develop a careful description of reasoning (e.g., children’s understanding of the functioning of a balance beam) in terms of rules and to make the illegitimate jump from using these descriptions to represent what children do to assuming that the rules are possessed by the children and guide their behavior.

Roediger (1980; see also Hoffman, Cochran, & Nead, 1990) provided an extensive analysis of spatial storage and search metaphors for memory (ranging from Plato’s aviary to Atkinson and Shiffrin’s stores to Broadbent’s library) and expressed the concern that “the theoretical controversy has been about what type of search process occurs, not whether or not the phenomena are best explained by the search metaphor in the first place” (p. 238). Although Roediger noted that several scholars have questioned the spatial storage and search assumptions (and Bartlett provided an early alternative to them), he warned that the assumptions are

so ingrained in our language that the enterprise of examining alternative theories may be difficult. But he called for an examination of the assumptions, because "they add nothing new to the observations under study and simply involve circular reasoning. For example, if an experimental manipulation increases recall over some other set of conditions, why say that the manipulation encouraged better storage or search for the stimuli?" (p. 243).

In an incisive chapter, Kvale (1977, p. 177) went beyond questioning the cranial storage metaphor in traditional research on remembering and outlined an alternative:

In a dialectical conception of remembering as a relationship there are no **memory traces**, no things or copies stored in an inner hank. Rather, a person's behavioral repertoire and possibilities have been altered by his past experiences. This involves, of course, physiological changes in the organism, but these need not be in the form of a library or picture album the remembering person is inspecting. The person has been changed through his experience so that he may re-produce, re-construct, re-cognize more or less vivid and accurate earlier experiences and also communicate them to others. By systematic investigations of **remembering** as a subject's interaction with the world, applying phenomenological descriptions and experimental studies, the recourse to an inner bureaucracy as explanation of observable remembering activity may become superfluous.

We want to draw attention to the use of the cranial storage metaphor for characterizing mental functioning in order to allow critical examination of its utility. We argue that what goes on when people plan can be studied directly as an inherently developmental **process** of planning, without resorting to intermediary constructs involving the possession or acquisition of plans. In our view, the intermediary constructs often obscure the examination of planning and other processes that can be studied through close analysis of ongoing processes when an event or activity is employed as the unit of analysis. In our experience, a more satisfying account is given when a colleague describes how people went about planning something to accomplish this or that than when the direct description of what occurred is translated into an account based on acquisition, storage, and retrieval of plans in the brain.

This does not mean the cranial storage metaphor is never useful; some researchers may find it very revealing. Rather, our argument is against the practice of treating it as a premise not to be questioned. And we note that when we remove it from accounts of planning and remembering, the resulting explanation seems to us to be just as complete and more parsimonious. Sometimes colleagues who rely on the cranial storage metaphor ask us for evidence that it is unnecessary;

rather, we propose that researchers examine it and consider when it is necessary or useful.

Processes of Ongoing Activity versus Black Boxes with Homunculi

Models of planning that attribute explanatory strength to assumptions of cranial storage of mental representations seem to us to promote static views of cognitive processes presumed to be collected inside individuals' heads. This statement may seem puzzling since many lines of research refer to the study of **process**. We argue that approaches that seek basic elements (such as cranially stored objects) and view process as the change of state of these elements make processes themselves difficult to specify (instead, mechanisms of change in state are sought). In contrast, approaches that truly study process focus on the ongoing events as they change and do not seek static elements on which to rest analysis.

The traditional view portrays planning as the shuffling of cranially stored mental representations (Fabricius, 1988; Klahr & Robinson, 1981), with most attention devoted to characterizing potential mental representations and little devoted to how the shuffling occurs. The use of latencies in reaction time studies to infer planning processes seems to be the way the traditional approach examines the shuffling of the stored representations. Such an approach treats planning as a black box, with inputs and outputs specified and observed and internal working assumed to involve objects labeled with the terms researchers use to classify and discuss the tasks given to the subjects ("memory," "perception," etc.). The research focuses on identifying the locations and relations between these assumed mental objects; their actual use is not observed and usually requires the assumption of a homunculus or an executive process to make decisions regarding how to use the cranially stored representations. Since the cranial storage metaphor makes it difficult to observe the processes as they occur, researchers in this tradition seem to be satisfied with treating reaction time as an indicator of how long the mysterious processes take to change from state 1 to state 2. At least for some research endeavors, the application of this metaphor leads to a less parsimonious approach than does studying planning activities directly.

Guba and Lincoln (1982, p. 251) have similarly argued that the black box approach is unable to deal with process considerations, whereas other research perspectives focus directly on the processes involved in events:

In the early decades of this century, for example, physicists were obsessed with modeling the atom, and a variety of models were proposed. But all of these models proved unsatisfactory. Moreover, means were not (nor

are) available to “see” inside the atom in any event. Atoms came to be regarded as “black boxes” which could be manipulated from the outside and which would produce reactions, but the process by which the stimuli were reacted to (inside the black box) remained a mystery. The inability of physicists to deal with process and the invention of the “black box” idea came to be viewed, in an interesting reversal, as the proper way to do research—stimulate, wait for reaction, observe reactions, and never mind how stimulus came to be translated into reaction. But what physicist would forego looking inside the atom if able to do so? And if, in other areas, process can be examined, why persist in the use of a model that ignores that possibility?

In the black box approach, processes are often attributed to an “executive” function that coordinates the other parts (memories, percepts, motives, and so on), but the functioning of the executive (a homunculus) must also be explained. The problem can be illustrated with an anecdote about an absentminded Russian professor of mathematics. To keep his promises to other people he used a traditional Russian memory strategy—tying knots in his pocket handkerchief. This usually worked well for the professor. But once he missed an appointment with his student despite making a knot. As his excuse, he told the student, “There are three problems that everyone experiences with this technique of making knots. First, it is necessary **to remember when** it is appropriate to think of the handkerchief. Second, it is necessary **to remember where** one put the handkerchief. Third, it is necessary **to remember what** one meant when making the knot.” From the perspective of the cranial storage metaphor, explanation is in terms of the encoding and retrieval of the representation of the mental note (remembering what), and where it is stored (remembering where). The homunculus itself, which performs these activities and determines when the information is needed (implementing the plan to remember what and where, and remembering when to), eludes explanation. A sociocultural approach calls for focus directly on the person (not black boxes within the person) remembering, planning, perceiving, and thinking. In our view, focusing on the activity itself is a more direct and parsimonious way to go about understanding planning than having to explain both the boxes and the homunculus. After all, the efforts of people can be observed.

We are not arguing against mental representation *as an activity*. In fact, planning is a process that often involves representing one situation in terms of another, with or without material support. The acts of re-presenting ideas at another time and of transforming ideas to other forms are essential to human thinking. The use of material representations such as maps or schedules is a central feature of human cultural activity, and shuffling papers in metal file cabinets can usefully be seen

as working with material mental representations. An imagined map, like a physical map, becomes a tool in the actual process of planning; the imagined map does not exist outside the planning process (C. von Hofsten, personal communication, 1993).

The point of our argument is to question the assumption that planning is an operation carried out on mental representations **stored** in the brain. The questions of how people represent and transform ideas, imagine, think, solve problems, remember, plan, and so on, remain **very** much a focus of interest in our approach. We argue for studying what people actually **do** to re-present ideas, imagine, plan, remember, and so on.

Consistent with our stress on planning as an active process is an integration of cognitive processes that in other views have often been separated. We aim to understand how people manage their endeavors; it is not our aim to separate planning from remembering, feeling, thinking, wanting, creating. Indeed, we do not regard these as separate processes (Rogoff, 1982, 1990). Their treatment as separate processes derives from the view that thinking consists of activating stored cranial objects such as plans, concepts, thoughts, emotions, and motivations, **with** a need to separately define each of these assumed elements.

If we view thinking as the inherently integrated and dynamic transformations in people’s management of their endeavors, we must recognize that our concept of change and time is also different from the conception involved in the activation of mental objects.

Conceptions of Time and Change

We consider events and activities to be inherently dynamic rather than consisting of static conditions with time added to them as a separate element. Change and development, rather than static characteristics or elements, are basic (Kvale, 1977; Michaels & Carello, 1981; Pepper, 1942; Rogoff, 1982). Time is an inherent aspect of events and is not divided into separate units of past, present, and future. Any event in the present extends previous events and is directed toward goals that have not yet been accomplished. As such, the present contains past and future and cannot be separated from them.

When people act in the present based on their previous involvements, their past is present. The past is not merely a cranially stored memory called up in the present; it contributes to the event at hand by having prepared it. The present event is different than it would have been had previous events not occurred, but this fact does not require a storage model of past events.

Rogoff (in press a) provided a physical example: “The size, shape, and strength of a child’s leg at age 6 are a function of growth and use that have occurred previously; the child’s leg has **changed** over develop-

ment—it is not a summation of stored units of growth or of exercise. The past is not *stored* in the leg; the leg has developed, changed, to be as it is currently. There is no need to separate past and present or future or to conceive of the development in terms of the acquisition of stored units. Development is clearly a process spanning time, dynamic, with change throughout rather than accumulation of new items” (p. 37 of manuscript). Similar examples could be drawn from social processes of change—for example, the development of a company is conceived of as change, not as an accumulation of stored units of some sort.

Not only is the past present, but the future is **also** present in **each** moment. Children’s physical growth, and human activity in general, moves in particular directions (which are usually not explicit or precise). Little doubt exists when a child is 6 about what shape and utility his or her legs (a better example might be the child’s gonads) will have 20 years in the future. Likewise, human planning, communication, work, and play all are directed within the present toward some general directions or purposes of the participants. For example, in planning dialogue for a play, children work with the general theme **and** aims of the performance as they manage specific wording decisions of the moment (Baker-Sennett, Matusov, & Rogoff, 1992). Ochs (1994) argued that in creating narratives, people move their lives forward in time by mentally and verbally stretching their past life events into the future. Goals or purposes need not be tightly formulated (and certainly need not be subject to reflection) to guide present action.

Thus, we emphasize that planning occurs in the service of endeavors involving prior events and anticipated events and cannot be severed from goals to be accomplished or from the history of the activity. People’s history and goals are inherently involved in a unit of analysis focusing on events or, in the term used by sociocultural theorists, an activity, discussed in the next section.

A UNIT OF ANALYSIS FOCUSING ON PROCESS: SOCIOCULTURAL ACTIVITY

Sociocultural theorists employ the *activity* as the unit of analysis, studying a unit that consists of the ongoing processes of interest without dissecting them (Laboratory of Comparative Human Cognition, 1983; Leont’ev, 1981; Vygotsky, 1987; Wertsch, 1985). The activity **involves** active and dynamic contributions from individuals, their social partners, and historical traditions and materials and their transformations, in mutually defining relations. This differs from the common approach of viewing social and cultural processes as separate factors or influences that affect basic individual factors or characteristics. If individual, social, and

cultural processes are treated as inseparable **and** mutually constituting, it is inappropriate to try to locate them in the individual.¹

Activity theory posits that in addition to developmental transitions occurring across an individual’s life (ontogenetic development), transformations in thinking occur with successive engagements in an activity, even in time spans of minutes (microgenetic development; see Siegler & Crowley, 1991; Wertsch, 1979). These are embedded in and at the same time constitute the developmental processes involved in societal and phylogenetic change. Development within lives proceeds along with cultural and species development occurring over historical time (Scribner, 1985). Even solitary planning operates in social, cultural, and historical institutions.

Developmental processes in **each** of these time frames can be viewed as involving observation of the whole coherent process in different planes of analysis (Rogoff, in press a). If we regard personal, interpersonal, and community/institutional processes as mutually constituting, it is at times convenient to focus attention on one or another plane of analysis, keeping in mind that each one cannot be separated from the others, since each is defined in terms of the others. In other words, one plane of analysis may be foregrounded for close examination, but the others remain active even while they are not the focus of attention (just as the negative space in a painting is essential to understanding the focal images that constitute the positive space). This notion contrasts with the idea that any one of these planes is prior to the others or can be defined separately to determine the **influence** of one upon another.

In contrast to interactional views that separate the individual and the environment (to examine planning either without regard to or owing to the effects of the environment), individuals and the environment are seen as inseparable—processes cannot **be** independently attributed to one or the other (Dewey & Bentley, 1949; Gibson, 1982; Leont’ev, 1981; Rogoff, 1982). The **focus** is on the transformations involved in an unfolding event or activity in which people participate.

Thus, along with the contributions to planning made by people’s efforts, analysis of a planning activity includes investigating the social order

1. Compatible units of analysis also seem to be employed by some researchers studying events in the brain (such as the functioning of neurons or the development of brain matter) and perception-and-action (such as coordination of limbs in the context of action in real circumstances). For example, see Pribram’s (1990) discussion of the hologram metaphor, which he attributes to the parallel distributed processing approach: “Each part of the hologram is representative of the whole. The whole becomes enfolded in each portion of the hologram since each portion ‘contains’ the spread of information **OVER** the entire image. The properties of holograms are expressed by the principle that ‘the whole is contained (or enfolded in its parts),’ and the very notion of ‘parts’ is altered, because parts of a hologram do not have what we think of as boundaries” (pp. 92–93).

of planning with others (e.g., in school or work or family activities) and cultural tools such as maps, pencils, and linguistic and mathematical systems as well as cultural values and situational constraints and resources involved in the means that are valued for solving problems (e.g., planning during action or planning all moves in advance of action). This perspective can be applied to all planning activities—including those occurring in classrooms, backyards, or laboratories, which all constitute sociocultural events. However, few investigations of cognitive development have focused on the sociocultural conditions in which children create and pursue goals, or on how the activities of individuals themselves constitute and transform historical, cultural, and economic institutions and practices.

Because most research on planning occurs in situations that are devised by the researchers themselves, the sociocultural context of the planning is seldom noticed, since it is embedded within research and educational institutions that surround the investigators. Systems one is completely immersed in are difficult even to detect. Such systems are automatic at the cultural level, much as well-practiced moves are automatic for individuals, and this leads us to overlook their existence, to the point that we fall into the assumption that in laboratories (or in tests) we are able to observe “pure” cognition or individuals’ true competence independent of situational “confounds.” Analysis of the sociocultural context of social and individual activity is difficult for researchers embedded in educational situations or research traditions that are often seen as the way things must be rather than just one way that things happen to be.

In contrived planning research, researchers may fail to notice that they themselves and the other participants are constrained in the problem definition, the appropriate means of solution, and the material supports and constraints provided by the researcher as an agent of academia. The participants cannot redefine the problem or its appropriate solution without going out of the bounds of the social contract between “subject” and “experimenter.” Planning in laboratory studies, as much as in other settings, is a sociocultural process. However, the sociocultural aspects of planning may be easier for us to observe in situations that are not of our own making.

To study the sociocultural context of children’s planning, Rogoff, La-casa, Baker-Sennett, and Goldsmith (1994) observed planning processes of individuals, groups, and communities or institutions as Girl Scouts participated in cookie sales. That the arrangement of the planning tasks in this activity was not designed by the researchers made it easy to see how the planning tasks were constituted by individuals, groups, and the communities involved.

Individual scouts in the annual fund-raising cookie sales carried a great deal of responsibility for planning routes, keeping track of sales, cookies, and money, and managing their time, in collaboration with other scouts, siblings, parents, customers, and adult troop leaders. The collective experience of planning cookie sales occurred in the cultural context of institutional supports and constraints provided by traditions and practices of the Girl Scouts organization, which provides training to troop leaders and many organizational tools that the girls used and adapted. For example, the cookie order form requires customers as they order to calculate the amount due at the time of **delivery**. In this context customers often provided a talk-aloud plan for multiplying the number of units (at \$2.50 each) as fourths of **\$10** rather than by multiplying each column in turn. The girls were thus often given a strategy for handling the money through their customers’ own out-loud calculations, sparked by the organization of the institutional tool, the order form.

The tools that people use in planning, and the involvements with other people and cultural institutions, are clearly inseparable from the ways of planning people engage in. However, they have often been overlooked as an aspect of the planning process, when planning is defined narrowly as a process occurring within an individual’s head. We regard them as inherent to rather than external to planning processes. “Even when planning occurs out of the context of action, it often relies upon simulations of aspects of the activity, with maps, lists, or simulations of sequences of events using written, spoken, or drawn symbols as in blueprints, thumbnail sketches, or battle plans. And in planning during action, a planner uses the resources and constraints of the environment in the process of generating and carrying out the plan, again using external aids such as lists, reminders, and the assistance of others” (Rogoff, Gauvain, & Gardner, 1987, pp. 306-307). Material and social aspects of planning are not just accidentally available; they are organized in social institutions and practices having to do with economic, academic, political, and other systems and their associated tools and systems of values regarding what is to be done and how it is best achieved. Spoken, written, and signed language, calendars, maps, and many other cultural artifacts inherited from others and further developed by each generation are central to planning by human individuals and groups. They provide affordances for new goals and opportunities for indirect exploration of planning approaches through simulation of various sorts and are themselves developed through people’s adaptations.

With activity as the unit of analysis in a sociocultural approach, planning is inherently developmental; it is a process of transformation of possibilities. The metaphor of planning as the acquisition and accumulation of plans stored in the head gets in the way of an approach that

focuses directly on the processes of transformation inherent to planning. We consider planning to be a process of flexibly and deliberately devising means to accomplish interpersonal and practical endeavors. The term "deliberate" was chosen to rule out accidental and automatic action and to allow discussion of planning that gives evidence of orientation toward a goal with flexible means to achieve it (without having to be concerned with hoary issues of consciousness or awareness; see Baker-Sennett, Maturov, & Rogoff, 1993). To plan is to develop an approach to an anticipated event; planning requires flexibility of thinking in order to define both the goals and the means in ways that optimize the inherently changing nature of events. Although these ideas are found in other sources as well, we argue that taking a sociocultural approach makes them central.

With any process, the nature of the phenomenon changes as the process develops. The focus of planning itself develops, with some processes becoming nested in others, thereby addressing the classic issue of automatization: any activity can require deliberateness or can be carried out more or less automatically, depending on how it fits with the goal, how complicated the circumstances are, and how facile the planner is. Automatization is a developmental process that allows people to chunk aspects of the activity as they gain facility, and to turn attention to fitting the chunks together (Bjorklund & Jacobs, 1985; Stenberg, 1985). Throughout microgenesis and ontogenesis, the focus of attention and planning moves to the aspects of the process to which the individual needs to devote attention in order to proceed.

Leont'ev (1981) explicated three interrelated levels in the analysis of activity, which we find useful in considering planning as a phenomenon in which actions are nested within goal-oriented activity, which in turn serves other goals. Leont'ev's global level of analysis is the unit of the *activity*. Activity inherently involves motive, or driving force, which is socioculturally structured (e.g., play, schooling, and work activities). Leont'ev's second level of analysis is the unit of *goal-directed action*. Activity and goal-directed action are different levels of analysis because involvement in a particular activity can be independent of specific actions. The same action can serve very different activities, and different actions can serve the same activity. Leont'ev's third level of analysis is the unit of *operations*. Operations are the means by which actions are carried out—specifically how the action is done, which is defined by the circumstances in which the goal is approached. Actions are concerned with goals, and operations are concerned with conditions. Different operations can be substituted to achieve the same goal-directed action, and the same operations can serve different goal-directed actions. Thus the levels of activity, while nested in each other, are not operational definitions of planning. The levels are not hierarchical in a fixed sense, but

rather allow for the likelihood that what serves as an activity in one analysis may function as an action in another (e.g., educational play in a classroom), and what is an operation in one situation is an action in another (e.g., shifting gears in driving may be an action while one is learning to drive or an operation to serve the action of driving to work in unproblematic situations for an experienced driver).

A sociocultural approach to planning involves considering the integration of processes occurring at personal, interpersonal, and community planes of analysis that have frequently been seen as working separately. Leont'ev argued that "*systematic* analysis of human activity . . . allows us to overcome the opposition of social, psychological, and physiological phenomena, and the reduction of one to another" (1981, p. 69).

An analysis of mutually constituting developmental processes across personal, interpersonal, and community planes of observation has yielded insights regarding the development of planning that have been underemphasized, we think, in work on planning that employs the metaphor of cranially stored objects. Specifically, such an analysis of processes and a view involving integrated planes of analysis calls attention to the importance of flexibility in planning.

FLEXIBILITY IN DEVELOPMENT OF GOALS AND MEANS DURING PLANNING

We focus here on the importance of flexibility in planning to provide an example of how a focus on planning as process advances our understanding of planning through empirical observations and conceptual perspectives addressing the transformations inherent in planning.

Researchers have generally characterized more mature planning as involving planning in advance of action (Brown & DeLoache, 1978; Forbes & Greenberg, 1982; Klahr, 1978; Magkaev, 1977). However, the importance of development of flexible planning—involving both advance planning and improvisation fitted to the circumstances—has been emphasized by Dewey (1916), Miller, Galanter, and Pribram (1960), Rogoff, Gauvain, and Gardner (1987), and Hayes-Roth and Hayes-Roth (1979). These authors have noted that the search for problem solutions often proceeds by generating best guesses rather than searching systematically and exhaustively for the final solution in advance of acting.

Leont'ev (1981) extended the importance of flexibility to include the development of goals. Planning is not only a process of reaching goals through planful sequences of actions but also a process of forming the goals themselves. Goals need not be preset but may emerge or be modified in the course of an activity. Opportunistic planning involves a flexible

combination of advance planning and improvisation, developing skeleton plans to be elaborated to various degrees during action.

There are some advantages to planning in advance of action (Rogoff, Gauvain, & Gardner, 1987)—placing one's emphasis on advance planning may simplify tasks by limiting and organizing options and promoting systematic consideration of the relative advantages of the options—but advance planning is often unnecessary, inefficient, or impossible (Goodnow, 1987; Rosaldo, 1989). Improvisation allows a planner to take advantage of changeable circumstances and to avoid the mental effort and delays required to formulate an advance plan outside of action (Gardner & Rogoff, 1990). Improvisation also has the virtue of emphasizing preparing to be flexible and to take advantage of events that are as yet unknown in developing both means and goals. It involves a flexible attitude involving decision making in action, which takes advantage of as yet undetermined opportunities for creative handling of problems; it does not simply defer decision making in case things go wrong.

The importance of flexibility of planning is especially notable when planning is viewed as a sociocultural activity occurring with other people in particular events that involve cultural organization and the use of cultural tools."

The study of how Girl Scouts planned routes for selling and delivering cookies reveals the necessity of flexibility (Rogoff, Baker-Sennett, Lacasa, & Goldsmith, 1994). Had the girls limited themselves to planning the whole route in advance, their effectiveness in selling and delivering cookies would have suffered. For example, one girl began her delivery by separating out each customer's order and marking it with a Post-It note showing address and amount due, then lining up all the customers' orders according to their addresses, creating an efficient route around her neighborhood. She lined up dozens of groups of orders on the sidewalk in front of her house, asked her mother which addresses would be closest to which others, then stacked the linear array *in reverse order* in a wagon (to have the beginning of the route on top).

This approach looked sophisticated by criteria that focus on advance planning. But when the scout began delivery she soon found the need to change the fixed order because some customers were not home, her companions lost interest, and so on. In subsequent deliveries, this scout (like many others) used a more flexible strategy, choosing a small number of orders to deliver in a small area and adjusting delivery according to what occurred in the process. This plan meant anticipating some

backtracking of routes; however, if such flexibility had not been planned, backtracking still would have been necessary because of the impossibility of anticipating all aspects of the delivery.

Another study underlining the importance of flexibility in planning involved the creation of a classroom play (Baker-Sennett, Matusov, & Rogoff, 1992). A group of six second- and third-grade girls spent ten 20- to 30-minute sessions planning and preparing to perform a play based on *Snow White* as a class assignment. Their planning was analyzed at five levels ranging from advance metaplanning in deciding how to plan the planning process and establish decision-making rules to local planning and improvisation of more concrete decisions about specific words and actions. The girls in the early sessions considered many issues that formed the metaplanning and interpersonal foundation for their later concrete planning decisions. They considered alternatives for deciding how to go about planning the play, discussed how to develop strategies and procedures for handling disputes during the planning process, and worked on the main theme and events of the play and how to divide and distribute roles.

The interpersonal process was the same as the creative planning of the play itself, for in the effort to resolve disputes, some of the most creative planning of the play occurred. For example, a major advance in planning the play occurred when the girls, with the help of their teacher, resolved their differences in recall of the "true" story line of *Snow White* by deciding to create a twisted version of the tale. From then on the girls coordinated more easily in their planning as they transformed the story line to their own plan.

Both the interpersonal process and the play-planning process required flexibility in order to coordinate efforts. Some of this flexibility was needed to cope with plans' being derailed by absences of group members, with later lack of agreement or of understanding by those who had been absent, and with running out of time at the end of a session before a process came to conclusion. Although these "inconveniences" are carefully controlled in most laboratory planning sessions, during everyday endeavors they are the occurrences that make the creative planning process a challenge and provide opportunities for breaking to new patterns. In most of life, it is impossible to anticipate all the obstacles and opportunities that will arise during the course of events.

Most of the flexible planning the girls engaged in was not in response to intruding events but was instead the means by which they managed the complexities of creating a play and coordinating their often discrepant ideas. Often the girls elaborated on an idea mentioned by another person, with the collaborative product more than the sum of the individual contributions. Ideas changed over the course of resolution of conflict

2. It is interesting that the compatible view of planning provided by Hayes-Roth and Hayes-Roth (1979) involves a metaphor of coordination of a social group-specialists who suggest decisions when promising opportunities arise.

and germs of ideas appeared, submerged, and resurfaced transformed as the girls worked out the scenes of the play. An example involves use of a fortuitous circumstance in planning a scene:

During the first session, the girls considered how they could have a talking mirror, and a number of possibilities were discussed. One of which was to have a hole in a mirror with an actor speaking in the hole. All six girls participated in this discussion, which ended without resolution as one girl brought them back to the need to focus on main events. Nothing more was done with the mirror issue until the ninth session, when [during rehearsal] the evil queen went to look in a pretend mirror but was inconvenienced by the student teacher who was right where she wanted the mirror to be. She told him to move. But his being there seemed to have prompted the idea of having a person play the mirror. and she asked a classmate to come over to be the mirror and told her the mirror's line. This feature was replayed in the tenth session, and appeared in the final performance as well. In this example, the creative planning built on an intrusion to develop a creative germ that had been mentioned long before. (p. 104).

The collaborative process necessitated explicit planning and flexibility in order to allow cooperation among group members and to take advantage of creative opportunities offered by the group process. The process was filled with interruptions and topic changes that nevertheless were managed by the group in working together by sharing attention, communicating about ideas, and adjusting individual ideas to facilitate the group process and progress on playcrafting.

Underlying these analyses of planning is the shift in perspective regarding planning as process rather than the acquisition or accumulation of cranially stored objects, with sociocultural activity rather than individual characteristics as the unit of analysis and with analysis of the transformations inherent to the activities rather than a search for mechanisms of acquisition or accumulation of plans conceived as objects. Such an analysis has drawn our attention to the centrality of flexibility as a feature of planning, a feature whose necessity is less noticeable in analyses that focus on planning as the acquisition of cranially stored objects and with the individual as the basic unit of analysis. In the final section of this chapter, we briefly note several changes in the questions to be addressed, given a shift to a focus on planning as process.

CHANGES IN THE QUESTIONS TO BE ADDRESSED

Our suggestion that planning (remembering, feeling, etc.) can be studied and referred to in the active form (as "verbs") rather than in static forms (the possession of plans, memories, affects, etc.-"nouns") that require the postulation of some other entity to make them active (the homuncu-

lus or executive) may appear at first to be a semantic distinction between talking in verbs versus in nouns. Indeed, this is how it began for us, upon reading the suggestions of Leont'ev (1981), Gibson (1979), and Pepper (1942) to this effect.

[The Gibsonian approach] suggests that cognitive processes be cast in active form (e.g., remembering, thinking, perceiving) rather than as objects possessed by a thinker (e.g., memories, cognitions, perceptions) (Bransford et al., 1977; Gibson, 1979; Johnston & Turvey, 1980; Pick, 1979a). As Michaels and Carello (1981) put it, "Ecological psychologists prefer to talk about knowing as something that the organism does rather than knowledge as something the organism has [p. 62]." The thinking person is active in participating in an event, exploring a situation, directing attention, attempting solutions. The person is not merely the receptacle for interacting mental entities that are responsible for selecting information, adding interpretations, and embellishing stimuli in ways consistent with the biases of memory. The *person*, rather than elements contained in the person, is active (Michaels & Carello, 1981; Shoter, 1978). (Rogoff, 1982, p. 136)

If **such** a shift is made, however, it soon becomes apparent that the consequences are much deeper. They extend to transformations in what questions seem important (or even sensible to address). The most obvious changes in questions include the following:

- A focus on how people re-present prior activities and anticipate events to themselves and each other rather than investigating *where mental representations are* stored in the brain and how they connect.
- A focus on how children's participation in cognitive activities transforms with their continued involvement rather than on *when children first possess* particular cranially stored concepts and skills (the onset question; see Rogoff, in press b).
- A focus on the nature of people's actual involvement in ongoing events, substituting an interest in understanding what children *do* do and think for questions of what children *can* do and think (seeking *competence* assumes an underlying stable "ability" that can in some ideal world be separated from the context to be assessed in "pure" form; see Rogoff, in press a,b; Rogoff, Radziszewska, & Masiello, in press).
- A focus on how individuals and communities construe activities to relate to each other rather than assuming that what is observed on one occasion is *general* (broadly or within domains) or that *transfer* from one situation to another occurs through mechanical similarity of the situation or automatic processes of the brain (see Rogoff et al., in press).
- *A focus on how people together transform their responsibility in participation in sociocultural activities rather than on how external mental knowledge and skill is *internalized* or how the social world *influences* the individual (see Rogoff, in press a).

Researchers who use the cranial storage metaphor to organize their way of thinking about psychological processes are often concerned that the alternative eschews the scientific aim of reaching generalities about human functioning. But this is not the case. Instead of looking for generalities by **trying** to locate psychological processes in the form of knowledge and skills stored in the brains of **individuals**,³ the approach we are suggesting attempts to build generalities in terms of patterns of convergence of processes observed across varying activities. The resulting generalities have to do with processes of people engaged in sociocultural activities, not with processes independent of sociocultural activities. For example, in both the Girl Scout cookie study and the playcrafting study, we noted the importance of a flexible approach to planning in circumstances where the contributions of other people and uncontrolled events cannot be foreseen, or in which it is more trouble or less **satisfying** to attempt to foresee them than to improvise during the process. This generalization emerges from the convergence of patterns of findings in the two studies.

We suggest that the metaphor of brain storage has been reified and has become applied as an axiomatic assumption. Our aim is to draw attention to the metaphor so that researchers can consider whether or when it serves a useful function. We argue that in a sociocultural perspective, treating the metaphor as an assumption is not parsimonious and gets in the way of studying cognitive and sociocultural processes. However, there may be other approaches for which the metaphor is useful; we suggest its utility may be evaluated for such endeavors if it is used in a more self-aware fashion.

SUMMARY

In this chapter our aim was to describe how planning can be studied as an inherent part of human activity rather than as the acquisition and storage of isolated elements in the brain. When activity is the unit of analysis, a conceptual shift in the way we think about such issues as the nature of time, change, and purpose occurs in both theory and methodology. This approach moves us away from traditional developmental perspectives that examine age-based comparisons of individuals and cognitive perspectives that rest with relabeling planning processes in terms of static objects.

3. We are not arguing against the importance of **brains**; we see our approach as having parallels in the study of brain activity (rather than brain localization). We are intrigued by recent developments suggesting that it is fruitful to examine brain functioning in terms of the activity of communities of neurons. It is interesting to us that the **brain** researchers with whom we have discussed our ideas are divided into those who find them **counter-intuitive** and those who find them common sense, as with researchers of other topics.

Rather, a sociocultural approach allows us to examine the roles and responsibilities that people take in activities and to see how their participation evolves over time. People take advantage of new aspects of developing events and adjust to unforeseen circumstances to plan in the context of activities occurring in actual material circumstances, with other people, engaged in activities based on and contributing to sociocultural practices, communities, and institutions with associated values and tools relevant to planning. As they participate, they change. Viewing planning as a sociocultural process has led us to question the assumption that planning involves possession of cranially stored objects and to investigate (in a manner we regard as more **straightforward** and parsimonious for our purposes) how planning involves people's changing their involvement in sociocultural activities in anticipation of future aspects of their endeavors.

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