Such systems tend to be self-organizing in response to environmental feedback; they can change in nonlinear and dynamic ways and can invent entirely new responses to external forces. These concepts provide a dynamic, change-oriented perspective on organizations. They help to explain how organizations can restructure themselves continually to keep pace with fast-changing environments.

See also: Bureaucracy and Bureaucratization; Bureaucratization and Bureaucracy, History of; Leadership in Organizations, Psychology of; Leadership in Organizations, Sociology of; Organization: Overview; Organizational Climate; Organizational Decision Making; Organizations and the Law; Organizations, Sociology of

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T. G. Cummings

Co-constructivism in Educational Theory and Practice

Ever since Piaget's dynamically Kantian epistemology, it has been widely accepted as a pervasive assumption that learning is a constructive process. In contrast to the epistemological assumption of empiricism that what we know is a direct reflection of ontological reality, learning is considered as an active construction of knowledge. Learners, as they strive to make sense of their world, do not passively receive stimulus information matching independent physical structures, but genuinely interpret their experience by (re)organizing their mental structures in increasingly sophisticated ways, while interacting with the physical and symbolic environment. According to Piaget and most of his successors in cognitive, developmental, and educational psychology, this process of adaptive and viable reality construction is enabled and constrained both by biologically grounded structures (the strength and scope of which, however, are not yet well known) and by the already existing preknowledge (concepts, operative schemas, and structures) of the individual.

Even though the constructivist assumption makes some traditional problems in both psychology and education easier to solve, it also raises some new ones. An important problem is how we can think of achieving intersubjectivity. How can individuals who personally construct their knowledge independently of each other come to the same or similar cognitive structures? How can we *share* a knowledge of our culture if people are conceived of as being solo learners, and socially isolated Robinson Crusoe figures?

One striking answer, which at the same time challenges traditional (Western) epistemological constructivism, stems from symbolic interactionist (Mead 1934) and sociocultural theory (Vygotsky 1962). It claims that learning is fundamentally a *social activity*. Learning and enculturation are not bounded by the individual brain or mind but are intrinsically social endeavors, embedded in a society and reflecting its knowledge, perspectives, and beliefs. People construct their knowledge, not only from direct personal experience, but also from being told by others and by being shaped through social experience and interaction. The basis of personal development and enculturation, thus, is not the socially isolated construction of knowledge, but its co-construction in a social and cultural space. Or, as Bruner puts it: 'Most learning in most settings is a communal activity, a sharing of the culture. It is not just that the child must make his knowledge his own, but that he must make it his own in a community of those who share his sense of belonging to a culture' (Bruner 1986, p. 86). Knowledge, from this perspective, is no longer seen as solely residing in the head of each individual, but as being distributed across individuals whose joint interactions and negotiations determine decisions and the solution of problems.

1. Concept and Process of Co-construction

No precise and widely accepted definition of the concept and process of co-construction can be found in psychological or educational literature. What has been provided is very diverse and depends on the theoretical context in which it is embedded. Differences can be found with regard to at least three aspects:

(a) the social type of discourse eligible to be called co-constructive: mother–child dialog, peer interaction, teacher–student interaction, learning in teams, computer-supported collaborative work;

(b) the psychopedagogical processes involved in productive co-constructive activity: productive dialog such as exploratory talk and collective argumentation, collaborative negotiation after sociocognitive conflict or as a process of reciprocal sense-making, joint construction of a shared understanding, elaboration on mutual knowledge and ideas, giving and receiving help, tutoring and scaffolding;

(c) the expected outcomes of collaboration: taken-as-shared individual vs. socially shared cognitions; convergence and intersubjectivity; academic task fulfillment, student motivation, and conceptual development; effects on skills in listening, discussion, disputation, and argumentation.

Common to most theoretical contexts of co-constructivism is the implication of some kind of collaborative activity and, through joint patterns of awareness, of seeking some sort of convergence, synthesis, intersubjectivity, or shared understanding, with language as the central mediator. Theorists, moreover, largely converge in the adopted methodology of microgenetic analysis that has been used to examine the inherently fragile processes of co-construction.

1.1 (Neo-)Piagetian Perspective

In a (neo-)Piagetian framework, true dialog becomes possible and facilitates the individual cognitive construction of operatory structures when children are able to take other persons' points of view into consideration and when they are able to resolve sociocognitive conflict. Although regarded (by the early Piaget) as a developmental factor, social interaction—specifically, peer interaction—remains more of a catalyst for individual cognitive development. According to studies carried out by coworkers of Piaget (e.g., Doise and Mugny 1984, Perret-Clermont et al. 1991), social factors, such as the need to deal with conflicting perspectives, can have a productive impact on cognitive behavior. For example, in a Piagetian conservation task, pupils more easily progressed to a subsequent level of development after having been confronted by contradictory judgments given by an adult or another child.

1.2 (Neo-)Vygotskyan context

In Vygotsky's cultural-historical view of development as a process of meaningful appropriation of culture, the interactive foundation of the cognitive is at the core of the developmental process. In contrast to Piaget's view, however, 'the constructivist principle of the higher mental functions lies outside the individual—in psychological tools (such as 'language') and interpersonal relations' (Kozulin 1998, p. 15). According to Vygotsky's claim that interpersonal interactions on a social plane serve as prototypes for intrapersonal processes, i.e., for functions to be internalized, co-construction can be seen as (asymmetrical) adult–child interaction, or interaction between a child and a more capable peer, in the 'zone of proximal development.' 'What a child can do today in cooperation, tomorrow he will be able to do on his own' (Vygotsky 1962, p. 87). The quality and development of higher order thinking is prepared by the co-constructive patterns and distinctive properties of social interaction. Meaningful new learning emerges by embedding mental functions (like logical argumentation, proof, reflection, or problem solving) into specific forms of goal-directed interaction and dialog, where more knowledgeable individuals tailor a task in such a way that a child can successfully coperform it. The acquisition of a new concept or mental function becomes progressively more skillful as the child learns to respond in gradually more sophisticated and personally more meaningful ways to the co-constructive, sense-mediating context of adult regulations, and eventually takes over responsibility for his or her own learning.

1.3 Perspective of Situated and Socially Shared Cognition

Situated learning theory views human cognition as being embedded in and inseparable from specific sociocultural contexts. The goal of learning is to enter a community of practice and its culture, i.e., to learn, like an apprentice, to use tools as practitioners use them (Brown 1989). As a process, learning takes place through the interaction and transaction between people and their environments. Co-construction, from a situated cognition perspective, can be seen as having two or more individuals collaboratively construct a shared understanding, or a solution to a problem, which neither partner entirely and necessarily possesses beforehand (Chi 1996). In a widely quoted definition proposed by Roschelle and Teasley (1995): 'Collaboration is a coordinated, synchronous activity that is the result of a continued attempt to construct and maintain a shared conception of a problem' (p. 70).

At the heart of this concept of co-construction are two coexisting activities: collaboratively solving the problem, and constructing and maintaining a *joint problem space*. Both activities require constant negotiations and recreations of meaning, i.e., trying to find out what can reasonably be said about the task in hand, and occur in structured forms of conversation and discourse utilizing language and physical actions as their most important mediators and resources. With the use of symbolic tools, it becomes possible for the conversants to express and objectify meanings, to

compare and change them deliberately, to exchange and renegotiate them with others, and to reflect on the organization of judgments and arguments (see van Oers 1996). However, as observational studies show, co-constructive learning is hardly a homogeneous but an inherently fragile process in the service of convergence and mutual intelligibility. The achievement of a shared conceptual structure cannot be reliably predicted, nor does the iterative construction of a joint problem space through cycles of displaying, confirming and repairing occur by simply putting two students together. As Roschelle and Teasley (1995, p. 94) remark:

> Students' engagement with the activity sometimes diverged and later converged. Shared understanding was sometimes unproblematic and but oftentimes troublesome. The introduction of successful ideas was sometimes asymmetric, although it succeeded only through coordinated action. These results point to the conclusion that collaboration does not just happen because individuals are co-present: individuals must make a conscious, continued effort to coordinate their language and activity with respect to shared knowledge.

1.4 *Context of Discourse Linguistics*: *Grounding*

From the perspective of communication or conversation analysis, co-constructive or collaborative learning requires individuals to establish, maintain, and update some degree of mutual understanding. The basic process by which this is accomplished between individuals is called *grounding* (Clark and Brennan 1991). Grounding as a basic form of collaboration means the moment-by-moment coordination and synchronization of the content-specific as well as the procedural aspects and steps of co-constructive activity. There is no need, however, to fully ground every aspect of an utterance. Clark and Brennan (1991, p. 148) frame a pragmatic criterion for grounding: The conversants 'mutually believe that they have understood what [they] meant well enough for current purposes.' Thus, the techniques that are used for grounding are shaped by the goal and the medium of communication. That is, the criterion of grounding and the techniques exploited for its maintenance dramatically change according to the purpose of communication (e.g., planning a party, swapping gossip, or gaining deep understanding) and the constraints of its medium (copresence and visibility in face-to-face communication; sequentiality and reviewability in letter communication, e-mail, or computer-supported collaborative work).

1.5 *Pedagogical Context of Tutoring*

Another aspect of concern for the social nature of learning—and for a crucial way in which it is supported by culture—is instructional dialog or conversation. This term refers to a discursive activity in classrooms that permits the co-construction of meaning between teachers and students, tutors and tutees, the more and the less experienced. Consistent with Vygotsky's theory of the constructive role played by adults in children's acquisition of knowledge, the teacher's goal of assistance can be seen as trying to get the students to share his or her understanding and knowledge. However, because of the asymmetrical distribution of knowledge between teachers and students, understanding might be expected to be less jointly constructed in instructional conversation than it is observed to be in peer-cooperative dialog. Actions that tutors or teachers can take in order to elicit responses, including some co-constructive behavior from a tutee, are, for example, described in literature on reciprocal teaching and on cognitive apprenticeship (Collins et al. 1989). They can be subsumed under two broad categories: (a) modeling, scaffolding, and fading as content-specific ways of providing hints, strategies, and situational forms of coaching and guidance that are tailored to the needs of individual students; and (b) prompting as a more content-neutral invitation by the tutor to elicit elaborations, reflections, and self-explanations from students (Chi 1996).

2. *Pedagogical Facilitation of Co-construction*

The question of how best to support co-constructive learning is concerned with the design of effective collaborative learning environments. Much empirical work has addressed the conditions under which productive collaborative interaction is most likely to occur, and a whole range of possible ways to enhance its quality has been provided. Among the input characteristics that exert a complex influence upon the quality of interaction are: the preparation of the students for collaborative learning (including training for cooperation and discourse prior to the collaborative learning event), the establishment of a culture of dialog and of problem-based learning, group characteristics (composition, size, ability and sex), the goal and incentive structure of the task, and the structuring of group interaction (see, for a review, Webb and Palincsar 1996).

2.1 *Importance of Dialog*

Probably the most important single feature of a culture of collaborative learning is dialog as opposed to, e.g., solo learning and teacher monologs. Emphasis on joint learning and instructional conversation among peers, and between teachers and students, is associated with the internal mediating processes that are essential for an understanding of how co-construction through discourse operates and influences outcomes. The pedagogical cultivation of processes such as negotiation of meaning, reciprocal sense-making, revising one's cognitions in situations of sociocognitive conflict, precise verbalization of reasoning and knowl-

edge, listening to others' lines of argumentation, tuning one's own information to that of a partner, giving and receiving help, or modeling cognitive and metacognitive activities to be internalized by the participating individuals should, thus, be placed at the core of instructional design.

2.2 Support Structures for Collaborative Thinking and Problem Solving

A means of improving the quality of collaborative thinking is explicit process-related and task-related support structures in the learning environment (Pauli and Reusser 2000). *Process-related support structures* refer to the structuring of the interaction through the implementation of scripts for collaboration, such as 'reciprocal teaching', 'scripted cooperation', or 'prompting' for questions and elaborations. These techniques have in common the fact that a set of cognitive and metacognitive strategies which have to be used in a prescribed way is provided. A complementary way of supporting collaborative learning is to provide students with *task-specific support structures* and help. The main goal of task-related assistance, including more or less explicit instructions, domain-specific formats of task representation, and the modeling of strategies, is to scaffold students' domain knowledge construction, understanding, and skill acquisition. What is not yet clear, however, is how much structuring of the interaction is actually beneficial. Ideally, the quality and quantity of guidance and help has to be adjusted to the learners' subjective needs. As Cohen (1994) has pointed out, overstructuring interaction may be counterproductive and have detrimental effects, if it 'prevent[s] students from thinking for themselves and thus gaining the benefits of the interaction' (p. 22).

One promising possibility for making environments more supportive for collaborative learning is to enrich learning situations with technology. Well-designed *computer-based cognitive tools* provide users with both process-related and task-related instruments of thought and communication. As mediational resources and cognitive tools for the representation, negotiation, and modeling of concepts and activities, educational software has the potential—by making conceptual structures and processes visible, accessible, and manipulable on a computer screen—to facilitate processes of sharing understanding and of achieving convergence and intersubjectivity (Reusser 1993).

2.3 Structuring the Role of Teachers

The role of teachers in the co-constructive activities of learners can be described within the didactic framework of 'cognitive apprenticeship' (Collins et al. 1989). According to the ethnographic model in which practices and principles of traditional craftsmanship are applied to cognitive learning activities, teachers, experts, or more capable peers provide guidance and support to learners as they participate as apprentices in authentic and task-related, structured social interactions. As opposed to a transmissionist view of instruction, teachers should provide aid in the intellectual development of students in ways that leave room for negotiation and joint expansion of meaning: (a) as scaffolds and role models for the behavior that students are expected to engage in; (bi) as active participants in learning groups aiming at shaping the group's dialog; (c) as monitors of co-constructive norms in social interactions in which negotiation of taken-as-shared meaning is essential (Webb and Palincsar 1996); (d) as advocates of content-specific standards and of the achievement of convergence and intersubjectivity in understanding and problem solving.

Associated with this shift in the pedagogical orientation of teachers is a shift in the role of learners and the organization of classrooms. In the wake of a view that sees learning essentially as sociocultural interaction, classrooms should develop from aggregations of solo learners to communities engaged in co-constructive learning. That is, individuals should become acculturated members of a culture and community through collaboration and negotiation. Or, as Bruner (1986, p. 123) has put it: culture as 'a *forum* for negotiating and renegotiating meaning and for explicating action ... is constantly in process of being recreated as it is interpreted and renegotiated by its members.'

See also: Cooperative Learning in Schools; Piaget, Jean (1896–1980); Piaget's Theory of Human Development and Education; Situated Cognition: Contemporary Developments; Situated Cognition: Origins; Vygotskij, Lev Semenovic (1896–1934); Vygotskij's Theory of Human Development and New Approaches to Education

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K. Reusser

Code switching: Linguistic

Code-switching (CS) refers to the mixing, by bilinguals (or multilinguals), of two or more languages in discourse, often with no change of interlocutor or topic. Such mixing may take place at any level of linguistic structure, but its occurrence within the confines of a single sentence, constituent, or even word, has attracted most linguistic attention. This article surveys the linguistic treatment of such *intrasentential* switching.

In combining languages intrasententially, various problems of incompatibility may arise. The most obvious derive from word order differences: under what conditions, if any, can the boundary between constituents ordered differently in two languages host a switch? Other potential combinatorial difficulties involve mismatches in grammatical categories, subcategorization patterns, morphology, and idiomatic expressions. Systematic examination of the spontaneous speech of bilinguals resident in a wide range of communities suggests, however, that speakers generally manage to circumvent these difficulties. CS tends not to produce utterances that contain monolingually ungrammatical sentence fragments. Discovery of the mechanisms enabling such 'grammatical' CS is the major goal of current research. Central questions include locating permissible switch sites and ascertaining the nature (hierarchical or linear, variable or categorical) of the constraints on switching.

1. Background

Though CS is apparently a hallmark of bilingual communities world-wide, it has only begun to attract serious scholarly attention in the last few decades. Researchers first dismissed intrasentential code-switching as random and deviant (e.g., Weinreich 1953/1968) but are now unanimous in the conviction that it is grammatically constrained. The basis for this conviction is the empirical observation that bilinguals tend to switch intrasententially at certain (morpho) syntactic boundaries and not at others. Early efforts to explain these preferences proceeded by proscribing certain switch sites, for example, between pronominal subjects and verbs or between conjunctions and their conjuncts. However, these particular sites were soon reported to figure among the regular CS patterns of some bilingual communities.

The first more general account of the distribution of CS stemmed from the observation that CS is favored at the kinds of syntactic boundaries which occur in both languages. The *equivalence constraint* (Poplack 1980) states that switched sentences are made up of concatenated fragments of alternating languages, each of which is grammatical in the language of its provenance (see also Muysken 2000). The boundary between adjacent fragments occurs between two constituents that are ordered in the same way in both languages, ensuring the linear coherence of sentence structure without omitting or duplicating lexical content.

That general principles, rather than atomistic constraints, govern CS is now widely accepted, though there is little consensus as to what they are or how they should be represented. Much current research assumes unquestioningly that the mechanisms for language switching follow directly from general principles of (monolingual) grammar. Theories based on this assumption tend to appeal to such abstract grammatical properties as inter-constituent relationships (e.g., government, case assignment) and/or language-specific features of lexical categories (i.e., subcatgorization of grammatical arguments, inherent morphological features).

Since Klavans's (1985) proposal that CS was constrained by structural relations, the formal linguistic theories successively in vogue have each been extended to encompass the data of CS. Di Sciullo et al. (1986), for example, identified the relevant relations as C-

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