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At l, type T *does* involve type T'

are constraints.

Meaning is a matter of constraints. Examples:

The fact that the stump has 100 rings means that the tree that grew from it was 100 years old when cut.

The fact that the bell is ringing means that dinner is ready.

The first example implicitly appeals to constraints about the ways trees grow and what happens when they are cut down. The type of a stump α having 100 rings at a location l involves the type of a tree β[the one from which α resulted] being 100 years old at a location l' [the location, temporally prior to l, at which β was cut].

The second example involves a conventional constraint, the convention being that the bell is rung only when dinner is ready. If a convention is in force in a community - in this case, if people who hear the bell habitually expect and are expected to expect that dinner is ready - it may generate meaning even if not strictly factual. Perhaps, occasionally, winds or playful children make the bell ring.

Situation semantics conceives of language as a complex system of conventional constraints that hold between *types of utterances* and *types of described situations*. The meanings of declarative sentences are most straightforward:

An utterance of a speaker α at a location λ of "I am sitting" *describes* the type of situation in which α sits at λ;

An utterance by α at λ of "He kicked Fred" describes the type of situation in which the male demonstrated by α kicked the person named "Fred" to whom α referred.

Because it avails itself of the rich structure of utterances, situation semantics has many resources for dealing with various forms of context sensitivity. Such phenomena were a main motivation for the theory. But versions of it have been applied to dealing with paradox (Barwise and Etchemendy 1987; see also CONSISTENCY, TRUTH, AND PARADOX), INFORMATION STRUCTURE (Israel and Perry 1990), interrogatives (Ginzburg and Sag 2001), ANAPHORA (Gawron and Peters 1990), and a number of other phenomena. *Situations and Attitudes*, while still a useful guide to the original philosophical and linguistic motivations behind the approach, is no longer a reliable guide to its formal development. Devlin (1991) provides a useful handbook; Barwise (1989) discusses a number of ways of developing the framework.

Situation semantics contrasts in important ways with POSSIBLE WORLDS SEMANTICS. The contrasts with David Lewis–style possible worlds semantics are straightforward: There is only one concrete world in situation semantics; possibility is handled with constraints and unexemplified types of situations rather than alternative concrete worlds and similarity relations among them. Robert Stalnaker–style possible worlds semantics also recognizes only one real concrete world; differences with situation semantics center on different approaches to handling partiality (see Perry 1986).

– John Perry

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SOCIALLY DISTRIBUTED COGNITION

The main storyline of the hominin lineage over the last five million years is the evolution of more and more complex brains. This aspect of our evolved species biology underlies our remarkable capacity to learn and transmit accumulated wisdom to subsequent generations. For most of this time, there was relatively little social differentiation within human groups, such that individuals of the same age/sex category learned and did virtually the same things as their peers. Within the last half-million years, however, our evolved cultural capacity gave rise to larger and more highly differentiated societies, along with a very distinctive communication system, language. The pace of societal differentiation has been accelerating ever since.

Today, the cultural information stored extrasomatically (outside one's own body) in human social systems far exceeds the neurological capacity of any given human. As a result, from an individual's viewpoint, socially distributed cognition puts a premium on knowing how to find out, rather than actually knowing everything oneself. Each of us has only partial knowledge of our cultural heritage and is bound to others in complex webs of reciprocal ignorance and mutual dependence. Indeed, the degree of ignorance and dependence can be startling, as the following apocryphal story illustrates.

Once there was a young man who was visited by his grandparents. Trying to be a good host, the grandson made a pot of coffee and, while his grandmother went to use the bathroom, he asked, "How do you like your coffee, Grandfather?" To which the old man replied, "I don't know, you'll have to ask your Grandmother."

Over the years, the elderly couple had developed such a strong division of labor between them that the grandfather no longer remembered how much sugar and cream he liked in his own coffee. He had "off-loaded" that information to his spouse. The story also highlights the importance of language in such cognitive off-loading. Through language, distributed information can be accessed from others on an ad hoc, need-to-know basis. In this sense, language provides much of the social glue that makes socially distributed cognition (and complex, differentiated societies) possible.

Being able to speak (or read) a language, however, does not necessarily mean we know what we are talking about. As Emile

Durkheim ([1912] 1965, 483) noted almost a century ago, "Which of us knows all the words of the language he speaks and the entire signification of each?" (See also DIVISION OF LINGUISTIC LABOR.) For example, starting from the casual observation that people routinely talk about things they cannot recognize and, conversely, are familiar with things for which they have no names, John B. Gatewood (1983) asked a group of American college students to list all the kinds of trees they could remember. Then, the students were asked to indicate whether they could recognize each of the varieties they had listed. On average, the students thought they could recognize only about 50% of the trees they had recalled. For the other 50%, the student knew *of* the trees but not much else. "Loose talk" of this sort, nonetheless, has an important social function: It is a means for organizing knowledge lying beyond the grasp of an individual. That is, the greater the division of labor in society, the less redundant is the information stored in each individual and, therefore, the greater the importance of language as a means of accessing what other people know.

This general way of thinking about human social organization has a considerable history within anthropology. One of the wellsprings is Durkheim's *The Division of Labor in Society* ([1893] 1964), in which he distinguished between the "collective conscience" and "collective representations." As the division of labor increases, social solidarity derives more and more from the shared collective representations that enable communication among different groups and less and less from a shared sense of morality and motives held in common. Anthony F. C. Wallace (1961) provided an eloquent argument against the notion that shared motives or cognitions are a functional prerequisite for society, concluding that culture rests not on the replication of uniformity but on the organization of diversity. The implication of Wallace's reasoning is that "individuals can produce a sociocultural system that is beyond their own comprehension" (1961, 38). Similarly, John M. Roberts (1964) developed the idea of cultural nonsharing as part of his view of cultures as self-organizing information pools. Since 1980, there has been considerable development, both theoretically and methodologically, with respect to the study of intracultural variation and the socially distributed cognition that such variability entails.

For an anthropologist, intracultural variability presents an interesting epistemological problem. Given the "variable participation of individuals" (Linton 1936) in a culture's "information pool" (Roberts 1964), how can the anthropologist decide if there is a common culture or just individual differences? James Shilts Boster's (1980, 1985) study of Aguaruna manioc identification pioneered a solution to this sort of question. The key to the approach lies in taking seriously the fact that no one knows all of his or her group's culture and that agreement is a matter of degree. By examining the *patterning of agreement* among informants, Boster suggested that one could detect whether individuals' understandings of a particular domain are uniform, variable in the form of expertise gradients, variable by subgroup affiliation, or just randomly idiosyncratic.

A. Kimball Romney, Susan C. Weller, and William H. Batchelder (1986) developed this insight into a cultural consensus theory. Drawing on testing theory in psychology, consensus theory assumes that "the correspondence between the answers of any two informants is a function of the extent to which each is correlated with the truth" (1986, 316). When people know the same cultural truth, they will converge on the same answer. When they do not know, they will guess. Informally, this means that the degree of agreement evidenced in people's responses to a set of question can be compared to the amount of agreement expected just by chance. More technically, if the three assumptions of their formal model are met (there is a common culture, respondents answer independently of one another, and the questions are of equal difficulty), it follows by mathematical necessity that the eigenvalue of the first factor of a minimum residual factor analysis of a chance-corrected, respondent-by-respondent agreement matrix to a battery of questions will be substantially larger than the eigenvalue of the second factor. Conversely, if a particular data set does not have a large ratio between the first and second factors, or if the mean of individuals' first factor loadings is low, then the data do not meet at least one of the three assumptions of the model. In such a case, because the second assumption can be controlled during data collection and the third is robust to violations, the usual reason for nonconsensus is a violation of the common truth assumption. That is, either subcultures exist or the variation is just random.

In short, consensus analysis provides an inductive, data-reduction technique whereby one can determine the degree of cultural consensus (or nonconsensus) among individuals for given sets of questions. Furthermore, each respondent's first factor loading ("cultural competence," in consensus parlance) is a composite measure of how well that individual represents the entire sample's answers. Whether this computed group-representiveness variable is associated with other characteristics of individuals, such as age, sex, education, kin group, and so on, can be checked using standard statistical tests. Suppose, for example, there is overall cultural consensus with respect to people's judgments concerning which liquors can be plausibly combined with a variety of mixer beverages, such as tonic, orange juice, vermouth, and so on. One could then investigate the extent to which individuals' cultural competence is correlated with their sex, age, or experience as a consumer of mixed drinks (Gatewood 1996).

In addition to off-loading knowledge for storage in other people, extrasomatic information can also be stored in artifacts and our built environments. The key idea here is that although cognition is usually regarded as pertaining to individuals as such, *cognitive systems* may well extend beyond the boundaries of individual organisms, the full extent being determined by closure of cybernetic loops of information flow. Gregory Bateson was one of the early proponents of this broader, more inclusive, and highly contextualized view of cognition. For instance, "we may say that the 'mind' is immanent in those circuits of the brain which are complete within the brain. Or that mind is immanent in circuits which are complete within the system, brain *plus* body. Or, finally, that mind is immanent in the larger system – man *plus* environment" (1972, 317). Bateson's thinking along these lines traces back to his first book, *Naven* (1936), but *Mind and Nature: A Necessary Unity* (1979) provides his most complete articulation.

More recently, Edwin Hutchins's *Cognition in the Wild* (1995) provides a compelling demonstration of this cognitive systems view of distributed cognition, including not only the

abstract argument for a more contexualized and distributed view of cognition but also an extended ethnographic example. As Hutchins explains, navigating a large ship can be viewed as a computational problem, but one that involves teams of individuals doing calculations using numerous inanimate instruments and components of the ship's hardware. By tracing the flow of information required to solve navigational problems, one comes to see that the cognitive system encompasses numerous individuals interacting among themselves, the ship's hardware, and changing environmental circumstances. The computational system includes all of these parts, human and nonhuman. In a similar vein, Charles M. Keller and Janet Dixon Keller (1996) detail the ways in which information required for blacksmithing is distributed among the blacksmith, his tools, the layout of his shop, and the physical changes in the iron being worked.

In summary, socially distributed cognition is an old and familiar notion within the social sciences, though generally known by other names - division of labor in society, social organization of knowledge, or intracultural variation. Only in the wake of the cognitive revolution, and particularly since Bateson's (1979) and Hutchins's (1995) books, has the expression *socially distributed cognition* come into vogue. This entry has sketched some of the concept's antecedents, noted its key features along with some of the different kinds of anthropological research based on them, and indicated the challenge posed by the concept for the more familiar, individual-in-isolation view of cognition. Clearly, the idea of distributed cognition is not confined to anthropology. For example, Minsky (1986), Suchman (1987), Dillenbourg and Self (1992), Norman (1993), Rogers and Ellis (1994), and Hollan, Hutchins, and Kirsh (2000) discuss the concept from the perspectives of psychology and computer science.

– John B. Gatewood

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SOCIOLINGUISTICS

Sociolinguistics is an interdisciplinary research area concerned with covariance between language and social factors. Since its beginnings, it has sought to explain how variably speakers use language and what the patterns of the variation are. It is characterized both by the diversity of its subject matters and by the heterogeneity of its approaches to them.

Despite their diversity, the different brands of sociolinguistics subscribe to the position that a language is inherently variable, and they reject the assumption that a grammatical system applies uniformly to all speakers and all settings. The social factors usually invoked to account for the variation include gender (see GENDER AND LANGUAGE), age (see AGE GROUPS), level of formal education, and profession. The settings are distinguished into categories, such as family gathering, in which vernacular (i.e., colloquial) speech is the norm; medical appointments, at which speakers do not hold the same status and do not speak exactly the same variety; and university lectures, at which the control of the floor is not equally distributed between instructor and students, and the language is typically not vernacular. Much of this boils down to a common distinction between formal and informal settings, correlated roughly with the opposition standard versus colloquial, casual, and nonstandard speech, among a host of other distinctions. Another common characteristic of all the different brands of sociolinguistics is their emphasis on empirical observation, rather than on elicitation; research