Journal for the Theory of Social Behaviour 21:2
0021-8308 $2.50

Sociogenesis, Coordination and Mutualism

IVAN LEUDAR

COORDINATION AND SOCIOGENESIS

One of the pervasive contemporary problems is to account for the coordination of individuals and social entities. My aim in this paper is to discuss some approaches in psychology which are said partly to explain such coordination.

One approach is the sociogenic theory of thinking. This focuses on relationships between thinking and social interaction and asserts that concepts and intellectual skills are in fact internalized language, discourse or other social structures and processes. The approach explains *individual* cognitive structures in terms of their genesis from the *social* structures. It foregrounds the commonality of cognitive structures of members of a culture and partly accounts for it. In this sense, the approach can be said to *coordinate* social and individual structures. I will refer to this coordination as *diachronic*.

The other approach discussed here addresses a different coordination problem. Some, if not most, human activities are collective in the sense that (a) their component activities are inter-dependent, and (b) these components are behaviours of different agents. One problem for cognitive science models of activity is to give an account of how participants manage to coordinate their individual actions so that they mesh coherently. This is the second aspect of coordination — that of individuals in social events. This will be referred to as *synchronic* coordination.

Thus both the theory of sociogenesis and cognitive science focus on different but clearly complementary aspects of the relationship between the social and the individual processes. I will argue that the sociogenic approach to thinking, at least as put forward originally by Vygotsky, does not pay enough attention to how individuals coordinate in actual joint activities. It could be argued that the

commonality of individuals' cognitive structures, established through sociogenesis, is sufficient to explain their coordination in joint activities. I will argue that this is not the case and that in fact the theory of sociogenesis pre-supposes an account of how individuals with incommensurable cognitive systems coordinate their activities. This is an everyday occurrence and clearly happens in the social events involving adults and children, people from different cultures, people and animals and people and machines.

In this paper I argue that both cognitive science and theories of sociogenesis are based on a sharp individual/environment dualism and that what is required to solve the coordination problem and hence to clarify the issues in sociogenesis of thinking is a *mutualist* approach to interaction which side by side deals with how individuals are constructed in joint social activities and how they coordinate with each other.

SOCIOGENESIS AND INDIVIDUAL/ENVIRONMENT DUALISM

Thinking and discourse are usually studied apart. We have ethnomethodology, pragmatics and linguistics on the one hand, and cognitive science, cognitive psychology, and logic on the other. The *modularity thesis* codifies this division of expertise and asserts that there are natural structural differences between cognition, language and communication, and conceptualizes them in terms of distinct *individual* competences. Chomsky takes the extreme position and argues that in phylogenesis *and* ontogenesis the pragmatic and linguistic competences do not interact, merely providing contexts and contents for each other (Chomsky, 1980). The modularity position is influential, and the separation of cognition and communication has been recently reiterated in, for example, Fodor (1983) and Sperber and Wilson (1986).

The allocation of social discourse and individual thinking into different scientific disciplines discourages the discussion of their relationship and there is no forum to integrate the findings. But of course there is a problem because social action involves both thinking and discourse and so the arguments about their relationship are inevitable. Vygotsky and his followers have focused on their relationship and argue that the child's system of concepts and intellectual skills resonates systems of social interactions — they cannot be accused of Balkanization of the problem. I will summarize some of their position but argue that in general the sociogenic debates confound two problems. The first concerns the relationship between the structures of thought and language, and the second concerns the nature of the distinction between individuals and environments. The first problem is the one usually addressed.

Vygotsky (1986) takes the position that the origins of thinking and speaking in evolution are distinct, and (only) in this respect his view is like the modularity thesis. The crucial difference is that he allows an interplay between thinking

and speaking, in individual ontogenesis (which Chomsky, for example, does not). According to him a child's conceptual system is constructed and restructured in communication; and speech which is initially egocentric is socialized. So Vygotsky's thesis is that cognitive structures are partly social in origin:

> Any function in the child's cultural [or higher mental] development appears twice, or on two planes. First it appears on the *social plane* and then on the *psychological plane*. First it appears between people as an interpsychological category, and then within the child as an intrapsychological category. (Vygotsky, 1981, p. 163, my italics)

This may be taken to imply a close correspondence between structures of cognition and of language and dialogues (cf. Leudar and Browning, 1988). This position has been indeed recently reiterated by the Neo-Vygotskians. According to Lee (1985) a child's consciousness develops in the use of socially available communicative tools in interactions with others. Of course, the relationship between social and psychological structures need not be that of simple correspondence. Bruner (1985) specifically suggests that "given-new" discourse organization (i.e. the distinction between information shared and individually held) becomes in the individual cognition the distinction between known and uncertain. In Vygotsky's account, the speech becomes "predicated" as it is transformed into inner speech: the subjects of sentences in inner speech are not expressed. Inner and external speech share the regulative function but differ in some of their structural aspects. In fact Vygotsky (1978) writes

> The sign acts as an instrument of psychological activity in a manner analogous to the role of a tool in labour. But this analogy, like any other, does not imply the identity of these similar concepts. We should not expect to find *many* similarities with tools in those adaptations we call signs. What's more, in addition to the similar and common feature shared by the two kinds of activity, we see essential differences. (Vygotsky, 1978, p. 53–54)

So Vygotsky argues that the signs which regulate internal activities have social origins and in this his theory is sociogenic. He, however, stresses the *transformation* which tools undergo in the process of internalization into signs. (In this respect Vygotsky sharply differed from contemporary pragmatists (cf. Dewey and Bentley, 1964, p. 340, see below)). As long as the transformation of tools into signs is the same for different individuals, the position provides a basis for the diachronic social coordination — the individuals will come from socialization with the same cognitive structures. It is interesting to notice, however, that Vygotsky actually reinforces the individual/environment dualism by contrasting properties of internal and external activities. This is very clear in the following quote:

Equating psychological and nonpsychological phenomena is possible only if one ignores the essence of each form of activity, as well as the differences between their historical roles and nature. (Vygotsky, 1978, p. 53)

The account thus stresses the difference between individual and social structures. This may of course be factually correct but the sociogenic explanation becomes seriously incomplete. What does determine the manner in which social "communicative tools" are transformed into potential "levels of consciousness"? Cole (1985) rightly points out that the process of transformation of independent features of culture into individual cognitive processes is as yet unspecified (Cole, 1985, p. 147).

One aspect of the social into individual transformation is clear — it occurs in a child's coordinated *joint social activities*. These crucially involve synchronic coordination of a child with other individuals. An account of internalization and sociogenesis thus cannot be given unless we understand how such coordination is achieved.

It seems that Vygotsky was sensitive to the problem. He compares *internal signs* and *social tools* and writes about "attempts to demonstrate the *real psychological link* between the one and the other, or at least to hint at its existence" (Vygotsky, 1978, p. 54). It is not at all clear why such link should be treated as psychological. Vygotsky in fact subsumes social tools and internal signs under a category of *mediated activity* but this is clearly not an adequate or complete account of the link between the social and the individual.

The problem is acutely indicated in the concept of a *zone of proximal development*. Vygotsky defines this as

the difference between a child's actual development as determined by independent problem solving and the higher level of potential development as determined through *problem solving under adult guidance or in collaboration* with more able peers. (Vygotsky, 1978, p. 86, my italics)

It is Vygotsky's hallmark to question the developmental distinction between thinking and speaking; in the concept of zone of proximal development he also seems to relax the synchronic individual/environment dualism — the thinking of adults and children mesh together —

For each subject of instruction, there is a period when its influence is most fruitful because the child is most receptive to it. (Vygotsky, 1986, p. 189)
we offer leading questions or show how a problem is to be solved and the child then solves it, or if the teacher initiates the solution and the child completes it or solves it in collaboration with other children. (Vygotsky, 1978, p. 85)

The concept of zone of proximal development is important because it introduces the possibility that psychological activities are collaborative. A

child's thinking can be, at least partly, organized by the environment. It is rather unfortunate that Vygotsky did not focus his concept of the zone of proximal development on how a child's (or in fact any individual's) thinking may be partly completed only in the activities and thoughts of individuals with whom she is involved in joint activities, in other words on synchronic coordination. Instead, Vygotsky defines the zone of proximal development from the point of view of a child's individual skills:

> The zone of proximal development defines those functions that have not yet matured but are in the process of maturation, that will mature tomorrow but are currently in an embryonic state. (Vygotsky, 1978, p. 86)

For Vygotsky, the zone of proximal developmental development "permits us to delineate the child's immediate future" and "what is a zone of proximal development today will be the actual developmental level tomorrow." So he focuses on what a child will be able to do *by herself* in the immediate future rather than on how she manages the problems collaboratively with others.

The point is not so much *that* "children are capable of doing so much more in collective activity or under guidance of adults"; the focus should be on *how* individuals coordinate in joint activities so that they can [usually] achieve more than they could individually. Should one conceive of development solely in terms of increasing *individual skills* but also, or maybe rather, in terms of increasing *coordinations* with others?

It is instructive to compare Vygotsky's work with that of his contemporary, G. H. Mead. Like Vygotsky, Mead is concerned with resolving the strict individual/environment dualism. He writes that

> Activities are social in that the acts begun within the organism require their completion in the action of others. (Mead, 1934/1972, p. 446)

and thus he seems to transcend individualism in his theory of social action — he positions social acts as basic units of existence. He, however, continues thus:

> In the human organism the pattern of the whole *social act* is in some sense initiated *in the individual* as the pattern of his act. The mechanism of this is the effect, which the gesture of the organism has upon itself that is analogous to the effect which it has upon the other. (Mead, 1934/1972, p. 446, my italics);

and

> When this gesture, as is the case in the vocal gesture, tends to arise *in the individual* who makes it the response or responses which it calls out in the other or others, there may appear in his organism the initiatory stages of the act of the other or others. (Mead, 1934/1972, p. 447)

So Mead relaxed the incommensurability and mutual inertness of structures of thinking and social action and Vygotsky did so also in a different way. Neither of them however questioned the individual/environment distinction itself. We have seen that Vygotsky argues that internal and environmental processes are related to each other in microgenesis but are essentially different; Mead argues that they are essentially alike. In both cases they remain *internal* and *environmental* respectively, and uncoordinated. What is missing is an account of their *contiguity*. This is characteristic even of some recent work; Valsiner and van der Veer for example comment that

> *inner* consciousness is socially organized by the importation of social organization of the *outer* world. (Valsiner and van der Veer, 1988, my italics)

Of course, the approaches which acknowledge the inner/outer distinction need not hold that the "internal space" pre-dates sociogenesis, and that, for example, the inner/outer dualism is biologically given. They can hold that the distinction between the "inner" and "outer" is socially constituted and develops in social activities. If we accept this, we immediately face two problems: (a) when does the split occur and how does the internal develop in social activities; and (b) accepting that the "inner" and the "outer" become differentiated, how are they coordinated, as they must be?

How do sociogenic approaches propose to establish synchronic coordination of the inner and outer structures, and of individual participants in joint social activities? Mead defines a dynamic "I/me" system.

> I talk to myself and I remember what I said and perhaps the emotional context that went with it. The 'I' of this moment is 'Me' of the next moment. (Mead, 1962, p. 174)

Valsiner and van der Veer (1988) assert that

> the 'I'-'me' relationships as the mechanism by which the person relates to the society. (Valsiner and van der Veer, 1988)

The dynamic I/me system is of course interesting, especially if the relationship between the 'I' and the 'me' is interpreted dialogically, but it will not do as an account of inter-individual coordination. The I/me dynamic is internal to individuals and thus it has to be externalized and brought to bear on others and their I/me systems. Like any other internal mental phenomenon it can only do so in joint social activities, such as discourse, and this presupposes coordination. Voloshinov (1987) writes "'I' can realize itself verbally only on the basis of 'we'" but this we '*we*' is not reducible to an aspect of self, otherwise the problem of coordination is only put back and will re-emerge.

In fact, some workers in the area do pay attention to the coordination problem. Lotman (1976), in a semiotic framework, addresses the problem of

such coordination in an analysis of acts of translation between adult texts (languages with large vocabularies) and child texts (languages with small vocabularies). The point is that an adequate translation between such systems is not possible. Children faced with "adult texts" do not necessarily respond by expanding their own systems of meanings, but both reduce adult texts to fit to their own meanings and referents, and include the features of adult texts, extra-systemic from their view-point, as "textual inclusions with unclear semantics" (Lotman, 1976). Lotman argues that such "inserts" perform the role of unique "spores" — folded programs; and it is precisely thanks to them that the accelerated development that characterizes the psychology of childhood occurs (Lotman, 1976). For example, in listening to the story of Little Red Riding Hood a child does not introduce additional personages (e.g. a wolf) into his world but instead identifies them with the existing ones (with her father) and includes the sign "wolf" as extra-systemic. Parents, and therapists, do not necessarily interpret these reductions as being such, but in other terms (as an example of hostility to father). Thus there is a *sort of* coordination. The coordination problem is surely pervasive; in cognitive science it is put as the problem of "semantic coordination" of individuals in (social) interaction (Clark and Carlson, 1982 — see below).

Valsiner (1989) develops the concept of "zone of proximal development" in his analysis of the function that environmental constraint structures play in cognitive development. According to him, adults structure children's environments through constraints which determine what is possible to do in different situations:

> The constraint structures empower the developing organism towards a transformation into a future state. Children's development is socially guided through constraints structures that empower children to explore novel ways of acting and thinking. [Children] integrate sets of constraints into a working model of acting in the given setting. (Valsiner, 1989, p. 9)

Children co-construct the constraint structures — accept them or attempt to modify them. The mechanism Valsiner describes must take place in dialogues and so involves the participants' coordination. Surprisingly, however, Valsiner does not ask how this coordination is achieved; rather, he focuses on how multiple care givers coordinate their "constraint structures". This is interesting and important, but the environment is analyzed separately from a child's relationships to it and so, again, the problem of how the child and adults achieve coordination in actual joint activities, in which the constraint structures are emergent is side-stepped. We can say that a child adjusts its behaviour to the constraint structures of a situation and that she is empowered by them, but these structures do not exist just as the child's cognitions, they are also in her environment, distributed in discourse with care givers and they partly define her as an individual.

We can also understand how a child may be helped to act in a relatively sophisticated manner by supportive adults. It is however quite unclear how the help and the sophisticated behaviour result in the subsequent increase in the individual cognitive competence. In other words, an account of internalization is missing in these accounts, which treats environmental structures as independent of the child.

Thus in summary, sociogenic approaches to development (cf. Hickman, 1987; Wertsch, 1985) focus on social explanations of individuality and cognition. They recognize the inter-dependence of individual consciousness with its social context but mainly diachronically. This does not solve the problem of such dependence at any point in time. It appears to me that, ironically, this is why the approach has problems in providing a clear account of internalization, a process that is so crucial to it. I will argue that the process will remain mysterious unless one re-thinks the individual/context dichotomy.

In the next two sections I discuss some aspects of joint social actions and some attempts in cognitive science to account for their coordination.

COORDINATION IN JOINT ACTIONS

Manufacturing cars, playing chess, preparing a meal with a partner or just talking with somebody are some examples of *joint social activities*. One of their essential features is that the behaviours of one participant determine whether another one can engage in an action and its outcome. On the production line a particular operation is only possible if another has taken place; the effect of adding a spice to a dish will depend on what one's partner has put in already.

Some joint actions are essentially *collective* — they necessarily involve multiple individuals. For example, elections presume political parties, candidates, people who nominate them for an office, electors and election officers. Actions of all of these participants are inter-dependent and are finely coordinated. Appointing somebody to a post is also a collective action. One cannot do it unilaterally — one can offer the post to a candidate and she may or may not accept (cf. Hancher, 1979). We shall see below that arguments have been made that in fact all communicative actions are collective. We should not have to argue this, but there is a "problem" with our language: it usually represents joint social activities from the viewpoint of some participants. For instance, the Prime Minister is said to appoint the Chancellor of Exchequer; sexual activities are represented from the male stand-point (Cameron, 1985).

Some joint actions could in principle be individual but they can also be conducted cooperatively by several agents — they become *distributed actions*. An action can be analysed into a set of components functionally related to each other. These component activities can be conducted all by one agent or they can

be distributed over several agents. Riding a bicycle involves pedalling, steering, staying balanced etc. All of these can be done by a single rider, but on a tandem one person steers, both pedal and both need to stay balanced. Von Neumann and Morgenstern (1944) pointed out that the individual components of joint actions are logically inter-dependent and must be temporally coordinated. Individual contributions to distributed actions are coordinated in pursuit of aims which could be achieved by a single agent with difficulty or not at all. Distributing activities over multiple agents enables human enterprises to increase in complexity. A simple two engine airplane can be flown by one pilot; airliners need several individuals operating them in coordination. "The human species maintains itself through coordinated activities of its members" (Habermas, 1984, p. 337). The distribution of a joint activity over cooperating participants is not simply dictated by the logic of the activity. It is also dictated by factors such as power, control and physical means of coordination available (cf. Doray, 1988).

Some coordinations are a matter of etiquette, politeness and social norms. Two pupils simply working side by side may hold each other responsible for how their behaviours change their shared environment. Families may develop tacit rules to regulate the use of common resources. We are obliged to help, without being asked, individuals with handicap to achieve their goals. So even when we act seemingly as individuals we do not act in isolation from others, but typically we orientate ourselves towards other individuals (cf. Weber, 1968) and consider the social effects of our behaviour, as Goffman pointed out some time ago. Departures from such social orientation are given labels ranging from "selfishness" to "psychopathy" and "madness".

Coordination is thus ubiquitous and is characteristic of a wide variety of activities, communicative *and* instrumental. It is essential to any multi-agent activity which involves a division of labour, of responsibility for component activities and the distribution of participants' control over each other's actions. Coordination can be a voluntary and spontaneous process but it can also be enforced through hierarchical "plans" enscribed in the work-environment (Ehn, 1988; Doray, 1988 Bannon and Bodker, 1989). How is coordination explained in cognitive science?

THE COORDINATION PROBLEM IN COGNITIVE SCIENCE

Cognitive science studies knowledge representation and its approach is characterized by methodological solipsism and functionalism. *Methodological solipsism* stipulates that "no psychological state, properly so called, pre-supposes the existence of any individual other than the subject to whom that state is ascribed." (Putnam, 1975, p. 220). *Functionalism* asserts that cognitions are properly defined in terms of their causal properties and their (functional)

relationships to other cognitions. These cognitions are thus defined in terms of their relationships to other cognitions *in the individual.* The agents in cognitive science are self-enclosed modules, isolated and strictly autonomous from the environments in which they exist. Methodological solipsism denies that individual cognitions should be contextually differentiated and thus it asserts radical individualism (for a defence of methodological solipsism see Fodor, 1987, ch. 2; Burge, 1986). Putnam (1975) rejects methodological solipsism and argues that

> The features that are generally thought to be present in connection with a general name — necessary and sufficient conditions for membership in the extension, ways of recognizing if something is in the extension ('criteria'), etc. — are all present in the linguistic community *considered as a collective body*, but that collective body divides the 'labour' of knowing these various parts of the 'meaning'. (Putnam, 1975, p. 228)

> Whenever a term is subject to the division of linguistic labour, the 'average' speaker who acquires it does not acquire anything that fixes its extension. In particular, his individual psychological state *certainly* does not fix its extension; it is only the sociolinguistic state of the collective linguistic body to which the speaker belongs that fixes the extension. (Putnam, 1975, p. 229.

Putnam's view is not as radical as it may seem. In the two above texts he argues for *socially distributed meanings* but not for *distributed cognitions* nor for socially constituted *agency.* He thus introduces a distinction between social meanings and individual cognitions, but he does not provide an account of their coordination. (The problem resembles one that Mead created by distinguishing between individual and collective actions.) More importantly, Putnam's philosophical argument for socially distributed meanings ends as a mere *prologomenon* to a detailed empirical study and the analysis of "collective linguistic bodies", the ways 'average' speakers can "belong" to them, and to the analysis of coordination in linguistic practices. A body of relevant empirical research is available in sociolinguistics, pragmatics and feminist accounts of language, but it does not interface with Putnam's philosophical analysis.

Because of the solipsist conception of agency, the coordination problem is stated in cognitive science in individualistic terms. The problem is to account for the fact that given *individual* agents cooperate to coordinate their actions in *joint* activities. Much of the work on coordination in communication in fact stems from the attempts to extend the work on *individual* action (Fikes and Nilsson, 1971; Sarcedotti, 1977; Wilensky, 1983) to *multi-agent* activities. Individual actions are intentional: *goal-directed* and *planned*; they are represented by sequences of *operators*; an operator has a *body* and *conditions of applicability* which determine whether or not it is applicable in a model of an environment. Operators can be applied to models of environment and they transform it from one state to another. The study of action in cognitive science is really a study of

problem solving — the problem being to construct a sequence of operators which would produce effectively the desired transformation of representations. Cognitive science usually ignores the bodies of operators and studies actions in impoverished virtual environments. There is little interest in concrete activities taking place in actual complex environments and just for this reason this model of coordinated action is incomplete. The problem is that in ignoring the bodies of actions, cognitive science also ignores unintended but systematic concrete consequences of activities, which may add up to coordinated social patterns (cf. Giddens, 1989). The planning agent *assumes* that an operator transforms a model of the environment in the same way that its concrete realization would transform the environment represented by the model. In practice, the planner would have to monitor continuously that the operators were correctly realized, that the models of environment remained correct and environments changed as planned; all this despite the changes introduced into the environment by the agent's own and other agents' actions. Wilensky (1983) suggests that plans are continually revised in response to detected "flaws and changes in the environment". In our terms, one problem for cognitive models of action is to ensure continuous coordination of operators and environment-models with their referents and the contexts of application. The coordination problem comes in with a vengeance once we admit individuals usually have multiple goals (cf. Appelt, 1985; Willensky 1983). The individual's *choice* of actions to fulfil a goal will depend on her other goals and plans. This requires, amongst other things, that she "recognizes" her own goals when they become relevant and that she coordinates plans of various actions as well as the actions themselves. In other words, the individual agent with multiple goals has to coordinate *with herself*. Such coordination involves the same set of problems which arise in coordinating multi-agent activities. In these also one agent has to take into the account other agents' goals, plans and actions. The resources available for the intra- and inter-agent coordinations may of course differ.

How is the necessary intra-individual coordination achieved in planning systems? Usually, planned actions are simulated internally by agents. In such simulations the model of an environment is transformed from a current state to what it would become if the action has taken place. The result is a model of a possible world; such models are said to be indexed to an individual's standing goals. This allows the planner to determine which of its actions might achieve other desired goals or avoid undesired outcomes. The planners are designed to choose those operators which achieve the goal in focus and also achieve (or avoid "achieving") some other goals. A planner with multiple goals can be seen as a coordinated multi-agent system. So even individual planning becomes a "cooperative" multi-agent process. In fact, cognitive science and artificial intelligence increasingly acknowledge that individuals are best seen as multi-agent systems (e.g. Nilsson, 1981; Agha, 1986; Harmon, 1987). The individual, however, has to cooperate not only with herself but also with others. How is this

coordination accounted for in cognitive science? The model of communication current in cognitive science is based on the model of instrumental action just outlined. Cohen and Perrault (1979), Allen and Perrault, 1980; Littman and Allen (1987) specifically formulated *a plan based theory of speech acts*. Its crucial assumption is that utterances are planned actions; but now the goals are to change other agents' beliefs and intentions, rather than physical worlds. (This approach thus does not distinguish between 'consent oriented' and 'success oriented' discourse as, Habermas (1984) does.)

Since the cognitions which cause and explain actions are attributed to individuals, to extend the model to social activities, cognitive scientists typically argue that co-acting agents form *mutual* knowledge, beliefs and intentions (see Smith, 1984). What are these? To have, for example, *mutual beliefs*, participants must share a belief and also believe, assume or know that this is so and so on recursively *ad infinitum*. Cognitive science postulates cognitive coordination to explain social activities. This is the solution to the coordination problem also proposed by Tuomela (1984, 1985). Tuomela argues that intentional social actions presuppose that participating agents from *we-intentions*. By this he means that jointly acting agents intentionally produce *contributions* to joint activities, they believe that others will produce theirs, and this is mutually known by the participants.

So mutual cognitions crucial for coordination in social actions are defined in terms of inter-locked individual cognitions of participants. Mutual cognitions are the background against which participants interpret each others' behaviours.

The first problem is whether they still remain individual cognitions or whether they are better conceptualized as distributed over collectives of agents. Tuomela (1985) does not discuss the second possibility and some researchers in AI specifically reject it. Perrault and Cohen (1981), for example, argue that mutual knowledge can only be defined from the perspective of each participating agent considered separately. However, this relocates the problem of coordination rather than solves it. The perspective-specific mutual cognitions are still *individual* cognitions, which must be — in turn — coordinated in interaction. Miller (1985) pointed this out discussing Tuomela' (1985) *we-intentions*. Power (1984) avoided the regression problem and defined mutual beliefs and intentions in terms of cognitive states of multiple cooperating agents, that is as distributed, trans-subjective cognitions. This in turn runs into the danger of neglecting individual perspectives on joint actions, which according to Lotman (1988) are unavoidable because of the complexity of semiotic systems and necessary for a collective's involvement in complex activities. Lotman argues that the "individual aspect of a linguistic message meets precisely the social needs of the collective as a whole, for only the individual aspect is able to supply the collective with "stereoscopic" information that

enables it to orient itself in a complexly organized reality far better than with texts having a fixed commonplace viewpoint."

There is obviously a dilemma. The individuation of language is necessary for complex social activities but the individual perspectives and interpretations must be coordinated if the activities are to be coherent. Lotman (1988) suggests that individualization of language "calls to life "speech about speech", purposeful efforts at increasing synonymity through the use of some semiotic system. This is clearly not the whole story, because as Garrod and Anderson (1987) have shown, and contrary to Habermas (1984), people do not typically resort to meta-discourse to establish semantic coordination.

Another point is that even though individual actions may belong to individuals, any participant can interpret them *as contributions*, only relative to the joint activity. In other words, individual activities only achieve their appropriate significance as parts of coherent social activities (or transactions, using mutualist terminology). They are thus not individual in any radical sense but rather pre-suppose the existence of over-arching intentional social activities. So the focused individual and trans-subjective cognitions are not exclusive but rather complementary representations of the intentionality in joint activities.

The second problem concerns the agency of mutual cognitions. We have already seen that it is best to view individual planners as coordinated collectives of agents. So are we to postulate a supra-individual for a mutual cognitive state? Certainly not literally in the sense of a collective agent, who would have a global, unfocused perspective on the joint activities. Conception of agency involves a unique perspectives on events: unique aims, needs. It is possible to talk about "collective agents" (of common beliefs or joint activities), but we do so either from a view-point external to the collective, or relative to other groups of agents. If however, we allow that mutual cognitions are *agentless*, should we then refer to them as cognitions at all (cf. Margolis, 1987)?

The third problem concerns how the state of cognitive mutuality can be achieved. We have seen that any mutual cognition has infinitely many components. As a result it cannot be established in a piecemeal fashion. The common position is that mutual cognitions are inferred on the basis of mutual background conventions and heuristics. Schelling (1963) and Lewis (1969) argued that coordination is achieved through participants acknowledging global *conventions* and assuming other participants' (instrumental) rationality. The position is also clear in Grice's (1975) account of implicature; he proposes that maxims of conversation ensure that communicative intentions of speakers and their interpretations by the hearers are coordinated. The limits of the account are by now clear. In psychology, Clark and Marshall (1981) argued that individuals infer *mutual knowledge* inductively, using *co-presence heuristics* (cf. Perner and Garnham, in press). On this approach, mutual cognitions are grounded in social, situational and linguistics co-presence of participants.

Unfortunately, the work in sociolinguistics and pragmatics indicates that linguistic co-presence, for example, is a matter of, for example, complex coordination, power and user variation, and so it cannot be treated as an unanalysed primitive, and we can safely assume that neither can the other *co-presences*.

One source of cognitive mutuality is obvious: mutual beliefs are established in communication. Power (1984) has begun to investigate the process for "agreement games" and suggested that mutual intentional states which are necessary for coordination are formed as their result. A similar position is taken by Habermas who argues that "coordination has to be established through communication — and in certain central spheres through communication aimed at reaching agreement" (Habermas, 1984, p. 397). The establishment and exploitation of mutual cognition requires a detailed empirical analysis of talk in activities, as we shall see below.

So cognitive science does address the synchronic coordination problem explicitly but the above collage of problems makes it clear that it has not been particularly successful in solving it. The analysis suggests that there are two reasons for this. The first is the sharp *individual/environment* dualism. The second reason is the attempts to explain social coordination exclusively in terms of individual agents' cognitions, ignoring the bodies of actions and their social consequences. We have seen that the cognitive coordination of radically individualized agents is insufficient to account for their coordination in social activities. Some of individuality must be constituted and maintained in joint practices and cognitions must be situated.

I hope to have also shown in the first section that, perhaps more surprisingly, individual/environment dualism is also characteristic of the sociogenic perspective. Both approaches treat it as obvious and unproblematic. This stance blocks the solution of the coordination problem, or one could say that it in fact creates it.

What is the relationship of the coordination studied in cognitive science to that postulated in the sociogenic approaches? We have seen above that sociogenic approaches aim to give an account of *structural* cognitive coordination of individuals in a common (cognitive) culture. Using cognitive science terms, we might say it proposes to account for the origins of "cognitive architecture" in social activities. In cognitive science, on the other hand, we deal with semantic coordination, which concerns particular beliefs, intentions and attitudes. We are concerned with coordination, which is specific to particular activities and thus must be cancellable and yet it should leave traces in the individuals. In a sense, we are talking about local *sociogenesis*. The problem of how much developmental coordination is necessary for such "situated sociogenesis" cannot be dealt with here, but it is clear that the developmental accounts of socialization presuppose on-going local sociogenesis.

COORDINATION AND MUTUALISM

The final approach to coordination which I will consider in this paper is *mutualism*. This has been developed with interruptions during the past ninety years in areas ranging from pragmatic philosophy (Dewey and Bentley, 1964; Mead, 1934/1972) to psychology of vision (Gibson, 1986; Good and Still, 1988; Costall and Still, 1989).

Mutualism effectively originates in the work of the turn of the century pragmatists. Dewey (1958, 1975) and Dewey and Bentley (1949) explicitly reject the individual/environment *dualism* and argue that "individuals" and "environments" are produced in *transactions*. The two are aspects of transactions. Dewey thus considers it misguided to talk about *interactions* between individuals and environments. He writes

> Like "stimulus-response," the words "organism" and "environment" have to have a functional interpretation within events which are integral. I tried to guard against misrepresentation of "interaction" stating that "interaction of organism and environment" express a condition of partial disintegration of a prior integral event, rather than something primary. (Dewey, 1942, in Dewey and Bentley, 1964, p. 115)

Dewey and Bentley felt it necessary to be able to refer clearly to the "unity of life process" and attempted to construct a *transactionalist* terminology, that would be relational and would reinterpret and substitute for English, which according to them dualizes and reifies individuals and environments. Their attempt was unsuccessful and it seems to me that it was to some extent misguided. Did Dewey and Bentley expect that the community would adopt the transactionalist terminology? Or was it to be just terminology for them as researchers? In everyday English, transactions are usually referred to and represented from the point of view of a particular participant who serves a specific role in it. Sometimes this obviously misrepresents activities and masks their transactional, social nature. When I say "Watson and Crick discovered the double helix", their part in the activity stands for the whole of it and this masks the contributions of other scientists to the discovery and its social and technological context. Referring to a transaction from a particular view-point has, however, interesting consequences, relevant to understanding the coordination problem. If I refer to a transaction from a particular view-point (e.g. I say "I want to buy that hat"), I thereby position myself in that joint activity (i.e. in the exchange of goods) as a participant, in a particular function (i.e. the buyer) and I position the other participant in the complementary "role". This would not be so if I referred to the activity as a transaction from "outside" ("I want to participate in an exchange of goods involving that hat"!). The consequence of using a transactionalist term would be to *distance* the speaker from partaking *in* the activity. The result of using *perspective specific* language (or

as Dewey and Bentley would say *centered terms*), is to situate participants in joint activities. In fact, in English many activities can be referred to both as *transactions* and from their participants' perspectives. We talk about "exchange of goods" but also about "selling" and "buying". Buying and selling, however, cannot be perceived as individual acts defined just in terms of mental states of their agents. They are *relational* terms. The language of individual *contributions* to activities serves to situate individuals in transactions and this is clearly relevant to the previous analysis of dilemma of individually and generally defined mutual cognitions.

Dewey's mutualism was significantly developed in the work of J. J. Gibson and particularly in his concept of *affordance*; Heft (1989) comments that affordances are properties of environments, but functionally defined relative to organisms which make use of them as resources. The relationship between an environment and the organism is characterized by mutuality, compatibility, and fittedness. The aspect of Gibson's work particularly relevant for analysis of coordinations is where he argues that we "perceive affordances". This has an interesting consequence for the analysis of the constitution of individuals and environments in activities. Since affordances "point to characteristics of the organisms" and portray objects for them, perceiving an affordance provides coordinated information about both the individual and her environment. This seems to be essential to mutualism. In this sense, neither the cognitive science not Tuomela's (1984, 1985) accounts of coordination in joint activities are mutualist, because in them actions do not position individuals as participants.

The question is whether Gibson's mutualism can be transposed from visual perception to social discourse. There are two crucial problems. First, the discourse affordances would have to coordinate not just an individual and the environment, but instead the author of a message, the recepient(s) and their environment. The second problem is whether we can find such affordances in discourse(s). Heft (1989) attempts to extend the concept of affordance to socio-cultural domain. According to him, individuals acquire "repertoires of intentional acts, each act being *situated with respect to a particular set of environmental features*, the functional significance of which are socially conveyed" (Heft, 1989, my italics). How does this analysis of intentional action apply to communication and discourse? We have to decide what the counter-parts of physical "objects invested with a functional meaning" are in discourse. Take the following mundane situation:

1. Alex sees John drifting towards him down the corridor.
2. Alex turns to John, slows down, smiles and says "hello".

3a. John averts his gaze, keeps a serious face, speeds up and sails past John.

3b. John orients his head and body at John, slows down, smiles and says "hello".

The *situation* described in 1 could be said to afford to John the action of greeting Alex. The situation 1 and 2 taken together could be said to afford to John, amongst other things, rejecting the greeting (3a) or reciprocating it (3b).

Perceiving and acting on affordances is also supposed to situate participants as individuals. We can indeed say that 1, 2, 3a and 3b situate participants as a person-who-can-greet-another, person-who-greets-another and who-is-subject-of-greeting, person-who-rejects-another and who-is-a-subject-of-rejection, and person-who-reciprocates-greeting, respectively.

So it is possible to talk about the discourse events in mutualist terms and it does not seem to be too controversial, but is this enough? The problem is clearly that it is not enough to say that the situations 1 and 2 afford discourse activities. Why do they afford them for those particular participants? What Gibson and Gibsonians of course reject is the idea that the participants need to *mentally represent* meanings of each others' acts in order to know what they afford, to decide in their heads on appropriate reaction, to plan how to carry out the reactions and to execute them.

The treatment of individuality in mutualism can be seen to be similar to the conception of *subject* in post-structuralism, and as for example in Foucault (1980). Situated actions of others towards an individual, provide affordances, the perception of which situate the individual as a subject. The account is also very similar to Harre's (1990) analysis of the relationship between language structure and individuality. As these accounts do, mutualism runs into a danger of neglecting the *agency* of participants in joint activities (cf. Giddens, 1989). An individual participating in joint activities is not just a subject, but also an agent, who affirms or resists subjectivization, and in acting towards others, constitute them into subjects. This means that Gibson's concept of affordance needs to be re-formulated to take into the account agency of the participants in joint activities and its inter-play with subject positioning. We could say that in discourse, an author of a message produces it as an agent, and her action positions recipient(s) as subjects. In other words, transaction components position participants as agents and subjects with respect to each other (cf. Giddens, 1989, pp. 83–92). It is of course the case that when an author of a message acts as an agent, she orients at the other participants, possibly with respect to how she has been positioned by them as a subject. Affordances of joint activities must thus point not just between the individual and her environment, but coordinate the participants as (possibly collective) agents and subjects.

Recent developments in conversation analysis (CA) may be relevant to the problem of affordances in social activities (e.g. Atkinson and Heritage, 1987, Goodwin, 1981; Levinson, 1988; Sacks *et al.*, 1974, Schegloff *et al.*, 1977). In CA framework exchanges, like transactions, are collective behaviours in that meaning of contributions is relational. Individuals' utterances (or turns) achieve their significance partly because of their individual properties, but more importantly as moves in exchanges. This aspect of CA is clearly consistent

with the mutualist treatment of meaning, including Mead's definition of social acts (although this is unacknowledged in CA).

According to CA conversation structure is the resource, which can be exploited by participants to ensure an appropriate interpretation of their utterances and resulting in local and on-going coordination. The problem is that the focus on conversation structure excludes other features of environment, in which conversations and other joint activities are situated. Doray (1988), for example, shows how Taylorist and Fordist physical environments and architecture, constrain workers and coordinate the work process. Indeed, some applications of CA to the study and design of modern IT systems pay attention to coordination through the design of physical environment and work tools (e.g. Suchman, 1987).

The crucial problem with CA for mutualists is, however, that, with some exceptions, (Sacks, 1972 a,b) CA does not pay sufficient attention to how exchanges and turns constitute the participants into agents and subjects or to the inter-play between the two (cf. Bakhtin, 1984; Benjamin, 1983; Foucault, 1980; Leudar, 1988; Voloshinov, 1987). Goffman has focused on impression management in discourse (e.g. Goffman, 1963) but this is usually frowned on in CA (cf. Schegloff, 1988). In fact, in a sense the analysis of agency and subjectivity in CA is surprisingly rudimentary, and hinders its application in the analysis of collective actions. Some preliminary work suggests that the role of speaker must de-composed using finer categories (e.g. *animator, author and principal* — Goffman, 1981; or *speaker, composer, motivator, source* — Levinson, 1988) and these can be occupied collectively by several participants — the author can now be a collective agent. The *hearer* role can be similarly transformed and this again allows for a structured collective audience, the members of which stand in specific relationships to each other and to the (possibly collective) author of a message. The distinction between the producer (the author?) and the recipient (the consumer?) remains firmly in place (cf. Levinson, 1988; Leudar and Antaki, 1988). The turns are attributed to "speakers". This may agree with common sense but the problem is that the distinction implies that the participants in conversation, whose turn "it is not" (who do not own the turn?) do not contribute to its construction. In fact, detailed studies of conversation reveal that even the turns are co-constructed — during one person's turn her audience partakes in the construction of the turn through posture, eye-contact, gestures, "ehms" etc. (cf. Goodwin, 1981) and the joint significance of the turn depends on these signals. Thus even turns are *joint* actions, even though the contributions of participants are unequal and disparate.

In summary, it is clear that in describing conversation structure, conversation analysts usually do not describe affordances. Mutualist treatment would require that exchanges in conversation are treated as transactions and that the coordinated discourse-participant roles are afforded by the turns and

exchanges. The detailed analysis of participant roles in discourse, together with an account of how they are actually established and maintained may lead the CA account towards mutualism. But of course, the account of agency and subjectivity is not exhausted by accounting for discourse participant roles.

One further process seems to operate in the joint activities. It is their individuation. Leudar and Antaki (1988) analyzed co-authored utterances, which are coherent sentences which are, however, produced not by one, but by two or more participants to discourse. In some joint instrumental activities regulated through language, the participants do not seem to even notice that an utterance has been co-authored, and it remains collective. In other varieties of discourse it seems important who first enunciated a proposition even though it is subsequently mutually accepted. Then the co-authoring is usually noticed and the co-authored utterance repeated or rephrased by one participant, who thereby appropriates it. One could say that collectively constructed messages are *privatized*. Establishing the "ownership" of joint utterances and mutual cognitions is one process of individuation of collective achievements in discourse. It does not seem to be enough in discourse that mutual cognitions are established; they are usually indexed with respect to which participant warrants them. Voloshinov comments as follows:

> nothing verbal in human behaviour (inner and outward speech equally) can under any circumstances be reckoned to the account of the individual subject in isolation; the verbal is not his property but the property of his social group (his social milieu). (Voloshinov, 1987, p. 86)

CONCLUSION

I have tried to analyze and integrate some of the treatments of "coordination problem" in developmental psychology, cognitive science, ecological psychology and sociology. Vygotsky's sociogenic approach to development attempts to account for the common cognitive structures of members of a society, but cannot really explain the process of "internalization" because it neglects the synchronic coordination of adults and children in on-going joint activities. Such activities involve situated coordination of individuals with unique perspectives and possibly incommensurable "cognitive" systems. I outlined and analyzed some solutions to this synchronic coordination problem in cognitive science. The conclusion was that these are deeply inadequate in that they focus too much on intentional aspects of coordination and neglect its concrete aspects; they neglect the origins and the maintenance of cognitions mutual cognitions in transactions; and finally because the analysis of agency does not allow for constitutive effects of social environments, it neglects subjectivity. I outlined a mutualist treatment of coordination, based on Dewey's concept of transaction and Gibson's concept of affordance and its

perception. I think it is clear that a simple notion of affordance (which indexes organisms and environments) will not do. I concluded that affordances in situated discourse activities would have to coordinate the subject positioning of participants with their (socially oriented) agency. The mutualist treatment of coordination in joint activities has clear theoretical features, some of which are also characteristic of conversational analysis and post-structuralism. These should be born in mind in the analysis of discourse and other social practices.

Acknowledgements This paper is based on papers presented to the 1st Conference on Mutualism, Durham, September, 1988 and to 2nd International Congress for Research on Activity Theory, Lahti, Finland, May 1990. I am also grateful to the following colleagues for their comments on earlier versions of the paper: Paul Arnold, John Bowers, Alan Costall, Peter Lloyd, Tony Manstead and Arthur Still.

Ivan Leudar
Department of Psychology
University of Manchester
Manchester M13 9PL
U.K.

REFERENCES

AGHA, G. A. (1986). Actors: A model of concurrent computation in distributed systems. Cambridge, Mass.: MIT Press.

ALLEN, J. F. and PERRAULT, C. R. (1980). Analyzing intention in utterances. *Artificial Intelligence*, **15**, 143–178.

APPELT, D. E. (1985). *Planning English Sentences*. Cambridge: Cambridge University Press.

ATKINSON, J. M. and HERITAGE, J. (1987). *Structure of Social Action. Studies in Conversation Analysis*. Cambridge: Cambridge University Press.

BAKHTIN, M. (1984). *Problems of Dostoevsky's Poetics*. Manchester: Manchester University Press.

BANNON, L. J. and BODKER, S. (1989). *Beyond the interface: Encountering Artifacts in Use*. DAIMI PB-288, Computer Science Department, Arhus University.

BENJAMIN, J. (1983). Master and Slave: The fantasy of Erotic Domination. In A. Suitow, C. Stansell, and S. Thompson (eds.), *Desire. The politics of Sexuality*. London: Virago Press.

BRUNER, J. S. (1985). Vygotsky: a historical and conceptual perspective. In Wertsch, J. V. (ed.) (1985). *Culture, Communication and Cognition: Vygotskian Perspective.* Cambridge: Cambridge University Press (pp. 21–34).

BURGE, T. (1986). Individualism and Psychology. *The Philosophical Review*, **XCV**, No. 1, 3–45.

CAMERON, D. (1985). *Feminism and Linguistic Theory.*: London: Macmillan Press.

CHOMSKY, N. (1980). *Rules and Representations.* Oxford: Basil Blackwell.

CLARK, H. H. and CARLSON, T. B. (1982). Speech Acts and Hearers' Beliefs. In Smith, N. E. (ed.), *Mutual Knowledge.* Cambridge: Cambridge University Press (pp. 1–37).

CLARK, H. H. and MARSHALL, C. R. (1981). Definite reference and mutual knowledge. In Joshi, A. K. , Sag, I. and Webber, B. L. (eds.), *Elements of Discourse Understanding.* Cambridge: Cambridge University Press.

COHEN, P. R. and PERRAULT, C. R. (1979). Elements of a Plan Based Theory of Speech Acts. *Cognitive Science*, **3**, 177–212.

COLE, M. (1985). The zone of proximal development: where culture and cognition create each other. In Wertsch, J. V. (ed.) (1985). *Culture, Communication and Cognition: Vygotskian Perspective.* Cambridge: Cambridge University Press (pp. 146–161).

COSTALL, A. and STILL, A. (1989). Gibson's Theory of Direct Perception and the Problem of Cultural Relativism. *Journal for the Theory of Social Behaviour*, **19**, 433–441.

DEWEY, J. (1975/1898). *Lectures on psychological and political ethics — 1898.* New York: Hafner Press.

DEWEY, J. (1958). *Experience and Nature.* New York: Dower Publications.

DEWEY, J. and BENTLEY, A. F. (1964). *A Philosophical Correspondence, 1932–1951.* Ratner, S. and Altman, J. (eds.). New Brunswick, N. J. : Rutgers University Press.

DORAY, B. (1988). *From Taylorism to Fordiam. A Rational Madness.* London: Free Association Books.

EHN, P. (1988). *Work-Oriented Design of Computer Artifacts.* Stockholm: Arbetlivscentrum.

FIKES, R. E. and NILSSON, N. J. (1971). STRIPS: A new approach to the application of theorem proving to problem solving. *Artificial Intelligence*, **2**, 189–208.

FODOR, J. (1983). *Modularity of Mind.* Cambridge, Mass. : MIT Press.

FODOR, J. (1987). *Psychosemantics.* Cambridge, Mass. : MIT Press.

FOUCAULT, M. (1980). *Power/Knowledge.* Falmer, Sussex: Harvester Press.

GARROD, S. and ANDERSON, A. (1987). Saying what you mean in Dialogue. *Cognition*, **27**, 181–218.

GIBSON, J. J. (1986). *The Ecological Approach to Visual Perception.* Hillsdale, N. J. : Lawrence Erlbaum.

GIDDENS, A. (1989). *The Constitution of Society.* Cambridge: Polity Press.

GOODWIN, C. (1981). *Conversational Organization. Interaction between Speakers and Hearers*. New York: Academic Press.

GOFFMAN, E. (1963). *Stigma. Notes on the management of spoiled identity*. Pelican.

GOFFMAN, E. (1981). *Forms of Talk*. Oxford: Blackwell.

GOOD, J. and STILL, A. (1988). *Some themes in the development of Mutualist tradition*. A paper presented to the Conference on Mutualism, Durham, September, 1988.

GRICE, P. (1975). Logic and Conversation. In Cole, P. and Morgan, J. L. (eds.), *Syntax and Semantics, Vol 3*, New York: Academic Press.

HABERMAS, J. (1984). *The theory of Communicative Action. Vol. 1: Reason and rationalisation of society*. Boston: Beacon Press.

HANCHER, M. (1979). The classification of cooperative illocutionary acts. *Language in Society*, **8**, 1–14.

HARMON, S. Y. (1987). Practical implementation of autonomous systems: Problems and solutions. In Hertzberger, L. O. *et al.* (eds.) *Intelligent Autonomous Systems*. Amsterdam: North Holland.

HEFT, H. (1989). Affordances and the Body. *Journal for the Theory of Social Behaviour*, **19**, 1–30.

HERITAGE, J. (1988). In C. Antaki (ed.), *Analyzing Everyday Explanations: a Casebook of Methods*. London: Sage.

HICKMAN, M. (ed.) (1987). *Social and Functional Approaches to Language and Thought*. London: Academic Press.

LEE, B. (1985). Intellectual origins of Vygotsky's semiotic analysis. In Wertsch, J. V. (ed.) (1985). *Culture, Communication and Cognition: Vygotskian Perspective*. Cambridge: Cambridge University Press (pp. 66–93).

LEUDAR, I. (1988). Communicative environments for people with mental handicap. In M. Beveridge, G. Conti-Ramsden and I. Leudar (eds.), *Language and communication in people with mental handicap*. London: Chapman Hall.

LEUDAR, I. and BROWNING P. K. (1988). Meaning, Maxims of Communication and Language Games. *Language and Communication*, **8**, 1–16.

LEUDAR, I. and ANTAKI, C. (1988). Completion and Dynamics in Explanatory Conversations. In C. Antaki (ed.), *Analyzing Everyday Explanations: a Casebook of Methods*. London: Sage.

LEVINSON, S. (1983). *Pragmatics*, Cambridge: Cambridge University Press.

LEVINSON, S. (1988). Putting Linguistics on a Proper Footing. Explorations in Goffman's Concepts of Participation. In Drew, P. and Wotton, A. (eds.) *Goffman. Exploring the interaction order*. Oxford: Polity Press.

LEWIS D. (1969). *Convention*. Cambridge, Mass.: Harvard University Press.

LITTMAN, D. J. and ALLEN, J. F. (1987). A Plan Recognition Model for Subdialogues in Conversations. *Cognitive Science*, **11**, 163–200.

LOTTMAN, I. M. (1976). On the Reduction and Unfolding of Sign Systems (The Problem of "Freudianism and Semiotic Culturology"). In H. Baran (ed.),

Semiotics and Structuralism. Readings from the Soviet Union. International Arts and Sciences Press Inc.

LOTTMAN, I. M. (1988). Primary and Secondary Communication Modelling Systems. In D. P. Lucid (ed.) *Soviet Semiotics.* Baltimore: The John Hopkins University Press (pp. 95–101).

MARGOLIS, J. (1987). *Science without Unity.* Oxford: Basil Blackwell.

MEAD, G. H. (1962). *Mind, Self and Society.* Chicago: Chicago University Press: Chicago.

MEAD, G. H. (1934/1972). *Philosophy of The Act.* Chicago: Chicago University Press.

MILLER, M. (1985). We-Intentions and Process-Oriented Problems of Social Action. In G. Seebas and R. Tuomela (eds.), *Social Action.* Dordrecht: D. Reidel (pp. 139–148

NILSSON, N. J. (1981). *Distributed Artificial Intelligence.* Report, SRI International.

PERNER, J. and GARNHAM, A. Conditions for mutuality. *Journal of Semantics*, in press.

PERRAULT, C. R. and COHEN, P. R. (1981). It's for your own good: a note on inaccurate reference. In Joshi, A. K., Sag, I. and Webber, B. L. (eds.) *Elements of Discourse Understanding.* Cambridge: Cambridge University Press (pp. 217–230).

POWER, R. (1984). Mutual Intention. *Journal for the Theory of Social Behaviour*, **4**, 85–102.

PUTNAM, H. (1975). Meaning of Meaning. In *Mind, Language and Reality.* Cambridge: Cambridge University Press.

SACKS, H. (1972a). An initial investigation of the usability of conversational data for doing sociology. In D. Sudnow (ed.) *Studies in social interaction.* New York: Free Press (pp. 31–74).

SACKS, H. (1972b). On the analyzability of stories by children. In J. J. Gumperz and D. Hymes (eds.), *Directions in Sociolinguistics*: New York: Holt, Rinehart and Winston (pp. 325–345).

SACKS, H., SCHEGLOFF, E. and JEFFERSON, G. (1974). A simplest systematics for the organization of turn-taking in conversation. *Language*, **50**, 4, 696–735.

SARCEDOTTI, E. D. (1977). *A structure for plans and behaviour.* Amsterdam: Elsevier North-Holland.

SCHEGLOFF, E. A. (1988). Goffman and the analysis of conversation. In Drew, P. and Wootton, A. (eds.), *Erving Goffman. Exploring the Interaction Order.* Oxford: Polity Press.

SCHEGLOFF, E. A., JEFFERSON, G. and SACKS, H. (1977). The preference for self-correction in the organization of repair in conversation. *Language*, **3**, 4, 361–382.

SCHELLING, T. (1963). *The Strategy of Conflict.* Cambridge, Mass.: Harvard University Press.

SPERBER, D. and WILSON, D. (1986). *Relevance.* Oxford: Basil Blackwell.

SUCHMAN, L. A. (1987). *Plans and Situated Actions.* Cambridge: Cambridge University Press.

TUOMELA, R. (1984). *A Theory of Social Action.* Dordrecht: D. Reidel.

TUOMELA, R. (1985). Social Action. in G. Seebas and R. Tuomela (eds.) *Social Action.* Dordrecht: D. Reidel (pp. 103–128).

VALSINER, J. (1989). Collective Coordination of Progressive Empowerment. In L. T. Winegar (ed.), *Social Interaction and the Development of Children's Understanding.* Norwood, N.J.: Ablex (pp. 7–20).

VALSINER, J. and VAN DER VEER, R. (1988). On the Nature of Human Cognition: An Analysis of the shared intellectual roots of George Herbert Mead and Lev Vygotsky. *Journal for the Theory of Social Behaviour*, **18**, 117–136.

VOLOSHINOV, V. N. (1987). *Freudianism. A critical Sketch.* Bloomington: Indiana University Press.

VON NEUMANN and MORGENSTERN (1944). *Theory of Games and Economic Behaviour.* New York: J. Wiley.

VYGOTSKY, L. S. (1978). *Mind in Society: The Development of Higher Psychological Processes.* M. Cole *et al.* (eds.). Cambridge, Mass: Harvard University Press.

VYGOTSKY, L. S. (1981). The genesis of higher mental functions. In J. V. Wertsch (Ed.), *The concept of activity in Soviet Psychology.* Armonk, NY.: Sharpe (pp. 144–188).

VYGOTSKY, L. S. (1986). *Thought and Language.* Cambridge, Mass.: MIT Press.

WEBER, M. (1968). *Economy and Society.* New York: Bedminster Press.

WERTSCH, J. V. (ed.) (1985). *Culture, Communication and Cognition: Vygotskian Perspective.* Cambridge: Cambridge University Press.

WILENSKY, R. (1983). *Planning and Understanding.* Reading, Mass.: Addison-Wesley Publishing Company.