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LECTURE OBLIGATOIRE N° 5

Context and cognition in models of cognitive growth (G. Butterworth)

Introduction

The study of cognitive development in children has moved through three identifiable phases in the last twenty years. First, there was a shift from a focus on intellectual processes within the individual child, as in the classic research of Piaget, to a concern with social cognition in the 1970s and 1980s very much influenced by the resurgence of interest in Vygotsky. This shift reflects a move away from attempting to explain cognition as a process located solely within the individual, towards an understanding of the interpersonal context of cognitive growth. The shift from 'cold blooded' to 'warm blooded' cognition drew attention to the ways in which thought processes and cognitive growth are socially situated but contextual factors were for the most part seen only as moderators of cognitive growth. Work on cognitive development has recently entered a third phase, in which theorists are beginning to stress an *inextricable* link between contextual constraints and the acquisition of knowledge. Moreover, the physical context is being reunited with the social, within the thought process. The contemporary view tends to be that cognition is typically situated in a social and physical context and is rarely, if ever, decontextualized.

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Language and situated cognition

The recent focus on the basis of cognition…helps explain how language itself is understood through the social context. Margaret Donaldson (1978) published a series of influential studies that purported to show that versions of Piaget's tasks which were socially intelligible to pre-school children revealed a previously unsuspected competence in perspective-taking, conservation and class inclusion. In Donaldson's terms, her situated tasks make 'human sense' because they draw on everyday social experience, with which the child is very familiar. Both Donaldson and more recently Michael Siegal (1991) take the view that much of the pre-school child's difficulty in reasoning arises because the child cannot comprehend the adult's specialized language The argument is quite subtle. It is not just that the child lacks knowledge of language, rather the child's errors arise in an *active* attempt to discover what the adult actually *means* by, the questions being asked.

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As Donaldson (1978, p. 38) puts it:

It may turn out to be a very long journey from the primary understanding of what people mean by the words they speak and by their concomitant acts to the ultimate and separate understanding of what words mean. Perhaps the idea that words mean anything -in isolation- is a highly sophisticated notion, and a Western adult notion at that.

…Just one well-known example will help to make clear the subtle interplay of perception, language and social interaction which is involved.

McGarrigle and Donaldson (1974) reported a beautiful experiment, which has become known as the 'naughty teddy' study, a variant of Piaget's traditional number conservation task. First of all, the child is asked whether two rows of counters arranged in parallel lines contain the same or a different number. The child readily agrees that the number of counters is the same when the length of the rows is identical and each counter is opposite another. Then, under the control of the experimenter, a glove puppet known as 'naughty teddy' rushes in and lengthens one of the rows of counters, just as in the conservation test. The child is then asked whether the longer row contains the same or a different number of counters than the shorter one. Most children between 4 and 6 years now 'conserve', that is, they give the correct answer that the number of counters has not changed, even though they fail to conserve under the standard testing conditions of the conservation task.

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These demonstrations therefore suggest that the child's difficulties with conservation tasks, at least in part, arise in achieving an understanding of what the adult means. The child in discourse with the adult enters into a relationship of unequal power, where the child takes the adult's behaviour in context as a means to understand what is required. As Goodnow and Warton [1992] point out, the particular class of problems often involved in Piagetian tasks are those amenable to criteria of scientific proof, whereas correct answer exists. Different criteria for validation may actually apply to understanding socially relevant events. Typical cognitive developmental testing situations, where experimenters are seeking exact answers, may nevertheless depend on how the child applies judgmental criteria to the social interaction.

These new insights into pre-operational reasoning do not rule out entirely Piaget's theory that development also involves a change in the child's underlying logic. By the age of 8 or 9 years, the answer to conservation questions is obvious to the child who has entered the concrete operational stage. It is still possible for Piagetians to argue that the context sensitivity of reasoning, revealed by these recent studies of the pre-school child, gives way to a more generalized understanding, at least with respect to the classic Piagetian tasks. On the other hand, as Girotto and Light [1992] point out, even adults may perform poorly on tasks of hypothetico-deductive reasoning, when the contents of the premises are remote from everyday experience. A completely deductive system of reasoning, context-free and independent of any particular content, seems never to be fully achieved. What may be being highlighted in the current phrase of cognitive developmental research is the progressive reintroduction of the ecology into Piaget's evolutionary epistemology (Piaget, 1971).

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Defining context

It is surprising how often the definition of 'context' is left implicit in developmental theory... A common sense approach might focus on the physical, social or cultural setting of a particular intellectual task. Beyond such general statements, what is meant by context often remains unanalyzed. It is possible, however, to proceed through a series of definitions from the most general to the more specific, in an attempt to establish what different theorists may hold in common.

Cole and Cole (1989) elaborate what they call a 'cultural-context' view of development. They point out that the word comes from the Latin *contexere* meaning 'to weave together', 'to join together' or 'to compose'. The context in their definition is the interconnected whole that gives meaning to the parts. Variations in the cultural context may give different meanings to otherwise identical behaviors, through the historical experience of the different cultural groups. Cole and Cole particularly emphasize the manner in which social contexts are differentially 'scripted' in different societies. That is, cultures transmit, through their language and their material structure, generalized guides to action. These are sometimes known as 'pragmatic action schemes' (Cheng and Holyoak, 1985).

Cole and Cole describe several ways in which the culture influences the child' s development: they suggest that cultures influence development by arranging the *occurrence* of specific contexts. To give their example, the Bushmen of the Kalahari Desert are unlikely to learn about conservation by taking baths or pouring water from one glass to another; nor are the children growing up in Western cities likely to encounter many contexts which will foster skills in tracking animals. The relative *frequency* with which particular contexts are encountered will foster different skills, such as skiing in snowy countries, or making pottery or weaving in simple subsistence societies (Childs and Greenfield, 1980). These relatively culturally specific activities may be associated with other contexts, and with different responsibilities, such as selling products, which will in turn foster further culturally specific types of number skills. Furthermore, as Goodnow and Warton [1992] argue, contexts can coexist in such a way that individuals may participate simultaneously in several culturally constrained modes of knowing. Children may be adept at mathematics in the streets and they may also need to perform at maths in the schools. Not only mathematics but also botany, biology, physics and medicine are practiced in everyday contexts and these forms of traditional knowledge impact on formal methods of tuition (George and Glasgow, 1988). A pluralist perspective on contextual effects enables an understanding of when approximation is a sufficiently accurate method of reasoning, as when cooks solve problems of quantities in baking by using rough approximation, rather than by exact measurement of proportions. The appropriate context may call up the appropriate strategy.

The argument advanced by Cole and Cole is that reasoning typically involves the ability to call up an appropriate scheme, or content-sensitive rule, derived from experience, in regularly occurring settings. These 'pragmatic reasoning schemes' may be abstracted from everyday social experiences in culturally specific contexts. The correspondence between pragmatic action schemas and logical structures is examined by Girotto and Light [1992] for a number of cases. Examples of a correspondence between the logic of implication and commonly occurring types of social interaction pattern are the 'conditional permission schema' (if one wishes to take a particular course of action then one must satisfy a particular precondition) or the' obligation schema' (if a particular condition occurs, a particular action must be taken). What is striking about these examples is that the logical structure actually *exists in a social reality*; it is not a mere abstraction, as in more desiccated tests of reasoning. In fact, a recent twist to this argument is that apparently abstract tasks, such as the Raven's progressive matrices test, or the Wason selection problem, may in fact be the most acculturated in the sense that their performance requires extensive experience within a culture which values this type of intellectual performance.

Hence such tasks differentiate between members of the population and are the least accessible to the majority because they pose their logical problems in a format that is remote from most of everyday life (Richardson, 1991; Johnson- Laird, 1985). The point is that everyday reasoning is generally based on types of culturally specific knowledge, whose representation is evoked by the appropriate context. On this view the context and content of thought are inseparable from the reasoning process.

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Situated cognition

A realistic formulation, then, helps to situate cognition; it gives reasoning an everyday quality because it draws attention to the different ways in which contexts recruit thinking. It does not require a description of reasoning that begins from the strict rules of formal logic; rather thinking begins in the ecological constraints from which physical problems and social encounters are derived. Hatano (1990) has suggested that situated reasoning includes such 'real world' knowledge as 'intuitive physics', 'intuitive psychology', 'intuitive biology' and 'intuitive mathematics'. These domains help us to understand objects in the physical world and to understand why people behave as they do; they provide a means of understanding the natural and social environment and enable basic rules of inference to be applied. Such knowledge arises through informal, everyday experience but it is analogous to the formal, scientific disciplines taught in schools or universities. Everyday knowledge is based on observation and experiment and it has adaptive, heuristic value. The developmental interface between everyday, situated cognition and more formally acquired knowledge within the same domain is seen as a transition from 'novice' to 'expert'. This may involve apprenticeship, verbal instruction, or schooling before fully conceptual knowledge is acquired. Even then transfer between everyday knowledge and formal knowledge may be incomplete because external constraints continue to exercise an influence on cognitive processes. In some domains, such as intuitive psychology or intuitive biology, the distance between the naive and the expert scientist is arguably less than in other domains, such as physics.

Source: Butterworth, G. (1992) 'Context and cognition in models of cognitive growth' in Light, P. and Butterworth, G. (Eds.) *Context and Cognition* (pp.1, 2-7, 10, 13). London: Harvester.