COMMENTARY
CONTINGENCY IN TUTORING AND LEARNING

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Introduction

Elbers, in this Special Issue, outlines research undertaken in the 1970s and 1980s which stimulated a new wave of interest in the analysis of adult–child interaction. Although he traces the theoretical roots of the paradigm that emerged to Vygotsky, research during this period pursued several aims and led to different empirical analyses. The early investigations by Wood, Bruner and colleagues, for example, were concerned with the impact of tutoring on “local” learning in procedural tasks, whereas Sigel’s work on “distancing” represents an attempt to relate parental teaching styles to general aspects of cognitive development and educability in children. Earlier, inspired by Bernstein’s sociolinguistic theory, Hess and Shipman (Hess & Shipman, 1965) had explored relations between variations in parental socio-economic status, maternal instructional styles and children’s general problem solving abilities.

Contributions to this issue demonstrate that each of these research objectives is still a focus of theoretical concern and empirical enquiry. However, as exemplified in several papers, we are now seeing serious attempts to contrast and relate hitherto distinct approaches. Since several authors refer their research findings to research on contingency, we begin by exploring some of the issues raised in relation to our more recent work on this concept.

Contingent Support for Learning

Our initial goal in analysing tutorial contingency was to explain why some children taught by their mothers learned how to perform a (for them) complex task whilst other children learned little or nothing. We found that it was possible to predict how much children learned by calculating the relative frequency with which mothers followed two “rules”: if the child succeeds, offer less help; if s/he gets into trouble, offer more help (Wood & Middleton, 1975). Subsequently, other investigators went on to show that
analyses of contingent instruction predicted learning outcomes in other domains with children of various ages. We have also argued that similar principles apply to teaching adults how to perform procedural tasks (see Wood & Wood, 1996 for an overview).

Leseman and Sijsling suggest that contingency analysis ignores the fact that children may entertain a conceptualisation of the task which differs from that of the adult tutor. Thus viewed, contingency promotes the idea that the tutor enforces their definition of the task on the learner and leads to a "transmission" view of learning. We, however, would classify as non-contingent any instruction that fails to refer to a child's selected task activity.

In addition to instructional contingency which we outlined in terms of the two rules stated above, effective instruction also involves domain contingency. By this we mean that effective tutoring should provide help in relation to the (inferred) learning goals of the tutee. We have observed in several studies that children as young as three sometimes invent means for solving problems which have not been taught or modelled (e.g., Murphy & Wood, 1981). Even on tasks that we have designed ourselves, we have sometimes been surprised by children who invent solutions that we had not envisaged. Such surprises are, of course, symptomatic of the fact that tutors may themselves learn new ways of conceptualising a task from their tutee. Where this happens, contingent instruction dictates that any help given relates to the attempted solution of the child, not to any pre-determined plan of the tutor.

A third aspect is temporal contingency. Briefly, this refers to the need to time any instructions to fit the flow of a learner's activity. We were not conscious of this aspect of tutoring in our early work, perhaps because adults and children are usually competent at meeting such demands. However, in analyses of tutoring and communication between adults and deaf children, we have found that the timing of instruction can create problems in the maintenance of mutual understanding (Wood, Wood, Griffiths, Howarth, & Howarth, 1986).

The notion of contingent instruction is easy to describe but difficult to practise. Leseman and Sijsling report that about 20% of maternal acts and utterances in their study could be interpreted as "jeopardising" communication. We suggest that this finding illustrates the difficulty of achieving contingent tutoring in "real time" on tasks that the learner finds difficult. The cognitive demands on the tutor in such circumstances are considerable.

Leseman and Sijsling observe that their findings are in agreement with a basic idea of a contingency approach, namely the importance of adapting instruction to the child, but that they "differ from Wood et al. in placing greater stress... on the importance of following the child and refraining from lower-level instruction." They also suggest that contingent instruction has apparently no built-in mechanism of withdrawing instruction. But it does: that is what the rule "if the child succeeds, offer less help" entails. For example, when, after a general prompt (such as "Carry on") a learner proceeds successfully with the task, the contingent response is to leave them to it. The tutor might offer the odd word of praise or encouragement, but any task-related suggestion or action on their part would be non-contingent.
Active Tutor, Passive Learner?

Although contingency turns the analytical spotlight onto the adult, it does not follow that the child's role in the interaction is ignored. Investigations of computer-based tutoring may serve to illustrate this point.

In one study (Wood, Shadbolt, Reichgelt, Wood, & Paskiewicz, 1992) we developed a computer-based system to teach 3- to 7-year-olds how to assemble our construction task. Although the same rules governed the system's responses to all children, the average 7-year-old "drove" it to generate very different sequences of instruction than the average 3-year-old. Further, when younger children displayed a marked aptitude for learning the task, in that they required less frequent and less specific help than most of their same-aged peers, their ability to construct the task alone after instruction was similar to that of older children, i.e. measures of the ability to learn from instruction were better predictors of subsequent performance than age alone.

In another study we found that children who were able to learn with least help from the computer tutor also proved most effective in teaching the task to a peer after instruction (Wood, Wood, Ainsworth, & O'Malley, 1995). Similarly, a contingent tutoring system designed to teach the quadratic function to 14-year-olds was driven to give less frequent and less specific instructions to children with higher maths test scores (Wood & Wood, forthcoming). Thus, the instructional profiles generated by children reflect individual differences in ease of task mastery. To the extent that the learner accepts and works on the task, we can always predict what a contingent tutor should do (including offering no instruction) in response to their efforts. However, we cannot predict what the learner will do in response to the tutor. In this sense, the behaviour of a contingent tutor is a reflection of the performance of the learner.

The analysis of tutorial contingency is primarily concerned with assessing the impact of social interaction on task learning. As both Hoogsteder et al. and Nilholm and Säljö argue, other developmental sequelae may arise out of different forms of adult–child interaction. Thus, Hoogsteder and colleagues suggest that what they term "didactic" interactions between adults and children involve episodes in which the adult does not respond to the child's apparent mistakes but leaves them to grapple with solutions for themselves. "A child's persistence in following his or her own way is not necessarily unconstructive . . . even if they are clearly wrong or in disagreement with the adult's suggestion". However, we would still wish to ask if and how a child's persistence in following their own way and regulating their own activity relates to the previous history of adult–child interaction.

The paper by Leseman and Sijsling is relevant to this issue because it offers insights into how analyses of mother–child interaction might relate to the independent activity of the child in test situations. They ask how strategic control and self-regulated problem solving emerge from mere executive performance. In seeking an answer to this question, they suggest that notions such as contingency and distancing need to be integrated. They argue that the more the adult withdraws from concrete directives and manipulations of task materials, the more likely it is that the child will subsequently take over task responsibility and show self-regulation. However, they also argue that parental provision of conceptual instruction—akin to Sigel's concept of parental distancing—should follow a different pattern. Briefly, parental withdrawal is seen as effective in relation to executive performance but not in relation to high level distancing instructions which should be maintained.
Their analyses offer support for the integrative perspective advocated. They also suggest that differences in the instructional strategies of parents from different social backgrounds help to explain correlations between cognitive functioning and socio-economic factors.

This latter hypothesis, however, raises the classical issue of drawing causal inferences from correlational data. They organise their interpretation of correlations between adult and child behaviour on the assumption that different patterns of parental interaction lead to differences in children’s level of cognitive functioning. If, however, we assume that children who develop more rapidly are easiest to teach, the following interpretations emerge: Children with higher cognitive levels of functioning at age 3.0 years follow maternal instructions more reliably than less cognitively advanced children. They also produce more higher level communicative acts and are more successfully autonomous. Their mothers, meanwhile, perform less executive acts (because high cognitive level children are showing autonomy) provide more higher level communications (in response to their child’s more frequent high level communications) and follow their child’s perspective more often (because the child has proved itself likely to be successful in autonomous activity). Low scoring children are more difficult to instruct because they are less likely to be successful in autonomous activity and, hence, their behaviour is more chaotic. Consequently, their mothers find it difficult to follow the child’s perspective and to attune their instructions to the child. Put another way, children who learn easily and follow instructions reliably create a more enabling tutoring environment for themselves.

We are not claiming that this interpretation is valid. However, on the evidence available, it is as plausible as one based on assumptions of the causality of maternal behaviour. Elbers observes that “we badly need concepts for capturing truly co-operative aspects of interaction”. Perhaps if we had these, we could also formulate new ways of talking about cause and effect in social interaction.

González, and Nilholm and Säljö also examine relations between socio-economic factors, parental instruction and child performance but they adopt a different stance from Leseman and Sijsling in relation to inferences about cause and effect. Nilholm and Säljö analyse the teaching strategies of mothers drawn from three different occupational groups (teachers, nurses and factory workers) to determine how frequently they display a strategy of teaching (called Child As Performer or CAP) in which the objective “seems to be to intervene in such a way that the child is in a position to perform as much of the task as possible on his/her own”.

Their results turn out as predicted in that they indicate that mothers trained as teachers are more likely to evidence the CAP strategy than those trained as nurses who, in turn, exhibit more than mothers trained as industrial workers.

In interpreting their results, however, they argue that it is important not to use “structural variables” such as social class or maternal education as explanatory factors. Differences in patterns of mother–child interaction “should not be construed in the sense that the professional and/or social status of the mother cause the regulation of what happens in the dyads in specific ways. Rather, what happens is better understood by saying that the mother and child structure the situation differently and thus exploit a specific set of potentials in a task which is open to many different interpretations”. Consequently, the researcher/theorist needs to be aware of the fact that observed interaction always assumes a “meta-contract” (whether to teach, play or whatever). Such contracts are social constructions which might well be construed differently by different social and cultural groups.
Hoogsteder, Maier and Elbers also argue that there is a need to move beyond moment-to-moment analyses of parent–child interaction in order to further our understanding of the social construction of knowledge and activity. They offer a conceptualisation of mother–child interaction in terms of “modes and episodes”. The argument that children experience different modes of interaction with their parents is surely true. As González’ analyses illustrate, the modes of interactions that children enter into with their mothers or fathers is influenced by the nature of the task and the way in which tasks are conceptualised by the dyad. What we now need is further evidence of the kind sought in this edition to demonstrate whether or not the proposed types of modes and episodes have different developmental consequences.

Although contingency is based on microanalyses of moment-by-moment interaction, there is evidence that it also relates to more general characteristics of parental style. Pratt, Kerig, Cowan and Cowan (Pratt, Kerig, Cowan, & Cowan, 1988) reported that parents who exhibited what Baumrind (Baumrind, 1967) terms an authoritative parenting style were more contingent in their teaching on three different tasks (a block construction task, a classification task and story retelling) than nonauthoritative ones. Thus, measures of tutoring contingency correlate with global judgements about parental style (and learning outcomes). What we currently lack is a convincing theory as to how and why such different “levels” of analysis of parent–child interaction are empirically connected.

Contexts for Learning

Mercer, this issue, suggests that most “neo-Vygotskian” research concerning interactions between adults and children has been located in homes and nurseries rather than classrooms, where, he argues (and illustrates his thesis) the processes of teaching and learning are embedded in different ground rules and relationships. We do not disagree with Mercer’s analyses of differences between teaching and learning interactions in different contexts. However, equally important is the fact that his analyses concern group interactions whilst concepts such as contingency and distancing arose out of dyadic interaction. It is possible that such concepts have utility when applied to individualised teaching in classrooms.

For example, in a recent investigation of writing instruction using Clay’s (Clay, 1993) Reading Recovery programme, Hobsbaum and colleagues (Hobsbaum, Peters, & Sylva, 1996) have analysed the tutorial practice of teachers who participated in a successful application of the programme. Their analyses focused on lessons in which “The teacher and child . . . work together to produce a written text, with the teacher providing contingent assistance and prompting the child to take over more responsibility for the task as their skill and knowledge develop.” They identified three phases of instruction in which the teacher’s role progressively changed from goal setting and close, detailed intervention to a more reactive role. “The phases identified indicate that the interactive framework is a process of scaffolded learning.”

Whilst scaffolding and contingency provided an effective analytical framework for examining practice, Hobsbaum and her colleagues point out that there are differences between the original conceptualisations, based on short-term, laboratory investigations and extended teaching in the classroom. Unlike the laboratory situation “the teacher’s scaffolding of the reading task occurs in a context where the task itself becomes ever harder”. Thus,
they argue, “scaffolding of one brief task e.g., David Wood’s blocks . . . and scaffolded teaching which takes account of growing curricular demands” differs because “in the former, ‘fading’ of adult control is common whereas in the latter the learner may take control of sub-components but the teacher retains responsibility for extending the objectives and increasing the difficulty of the task.” Theoretically, this disagreement is not a deep one. Teaching still involves fading with respect to individual learning goals. A second difference is that in the child’s writing activity, unlike laboratory tasks, “the task itself is unpredictable in content, dynamic in nature and continually involves new, un-planned for material”. The observation is significant in that it illustrates the complexity of what we have termed domain contingency in tasks which do not have a simple structure or a single solution.

Concluding Comments

The papers presented in this special edition are premised, implicitly or explicitly, on the assumption that collaborative interactions play a fundamental, formative role in human development. Investigations of adult–child interactions which have been motivated by the theoretical goal of understanding how and when co-operation can lead to specific learning outcomes for the child have made substantial progress. Although disagreements about details remain, the thesis that analyses of the micro-structure of moment-to-moment interactions can enhance our understanding of the co-operative basis of learning has good empirical support.

As the content of the current edition shows, however, attempts to move beyond an analysis of moment to moment interaction both to identify any more global structure in co-operative interactions and to establish general effects on children’s cognitive development have encountered problems. We have some rich and exciting data on patterns of relations between style of co-operation and cognitive development, but have still to agree on a general conceptual framework to explain these relations. Cross-cultural observations of the kind offered by Paradise also raise some fundamental issues about the possible cultural specificity of our empirical findings. Nonetheless, some suggested ways forward are offered in this edition. As Nilholm and Säljö observe, “research on mother–child interaction is at the cross roads”. In fact, various routes have been identified in this collection of papers to give some sense of where researchers might want to travel in the future.

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References


