

THE QUALITY OF READING IS NOT STRAINED: AN INSTRUCTIONAL
APPROACH TO COMPREHENSION MONITORING

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ABSTRACT

The quality of reading in a technologically advanced society is now of critical importance. This paper examines some processes underlying comprehension, which is synonymous with reading, and discusses their induction in a series of studies of theoretical and practical importance. The notion of executive control of strategies, especially the monitoring of skills, provides a useful representation of comprehension processing. These control processes are seen as crucial for effective comprehension, and their use (and training) are part of the metacognitive development which contributes significantly to the novice's capacity to use strategies flexibly. Some educational applications and implications for policy issues are briefly canvassed.

INTRODUCTION: THE POLITICS OF READING

The demands of Australia's increasingly technologically oriented society on the reading skills of the young are now becoming apparent. It is no longer enough for young readers to be taught that reading is mere decoding of words (a view which is inadequate for reasons which will become apparent), for most of the current developments in technology demand more and more of members of advanced cultures, so far as reading skills are concerned. For individuals and the culture to survive, reading must be seen as a process of constructing meaning from text by the use of high-level cognitive strategies that are now better articulated in our research on comprehension. There is now increasing evidence that cognitive processes underlying comprehension are better understood and can be developed in those whose reading ability is inadequate to the demands of high-technology culture.

SOME GENERAL PROCESSES UNDERLYING COMPREHENSION

In information processing models of cognition most theorists make some reference to a mechanism concerned with the oversight and control of the whole system, or at least of that part of the system functioning at any time. Because of phenomena like purpose, motivation and evaluative aspects of retrieval, it is postulated that a central mechanism must oversee the system. It must schedule resources and initiate action, probably rather slowly and in serial fashion, with awareness of the system's demands and of its own functioning (Bobrow & Norman, 1975). The computer analogy underlies or helps to structure this conceptualisation, of course. Most programmes consist of a number of sub-routines whose application will vary from one situation to another. The choice of register may in some cases depend on a complex set of conditions, which themselves will need to be evaluated by a separate routine - called the 'executive'. There is no question of an infinite regression here, however, as the highest or executive routine is not used by any other, nor does it use itself. Its task is to use the rest of the programme and data and its form need not be very sophisticated or even substantial. Such analogies have proved to be very useful in the development of cognitive psychology but do not imply that the existing computer models are necessarily isomorphic with psychological processes. In the present case it must be made clear that a programme's executive routine must be clarified by the programmer from the beginning, and major developmental changes like the human ability to 'turn around on one's own schemata', acquired by man through experience, are not so formed in the case of the computer (Neisser, 1967). As a result psychologists now possess a model of thinking at two levels, a fast, automatised and parallel form which deals with routine processing, and a slower, conscious or voluntary mode operating serially and only called into play when task demands are very novel, when a new competence must be acquired or when errors are detected.

One of the functions of such a control mechanism is to monitor processing, a task involving predicting, checking, testing, revising and evaluating. These are resource demanding functions which are only likely to operate when the subprocesses they control are automatised so that workspace can be freed for them. Monitoring cognitive processes is best seen as a strategic activity, that is, a deliberate, purposeful procedure with the aim of ensuring the smooth and effective operation of the subroutines being monitored. There are differences between novice readers and experts, the latter being more likely to have automatised their skills thus leaving space for monitoring, while the former are either less likely to possess or use strategies at all, or to use ineffectual ones (Baker & Brown, in press (a)). It is not necessarily claimed that novices do not possess any strategies, only that they are less likely to use them in relevant situations; this is more likely to happen when task demands are too great. It is therefore likely to be the case that very difficult tasks make novices of us all.

Much of the discussion so far has focussed on an aspect of cognitive functioning that emerged in the seventies as a result of John Flavell's pioneering work in memory development (Flavell, Friedrichs & Hoyt, 1970; Flavell, 1971). The term metamemory was coined to refer to children's understanding and control of their memorial functions, within the framework of a new interest in the acquisition of rules and strategies, and in the context of a concern with children's production deficiencies and mediational deficits (Brown, in press). In the mid-seventies the idea of metacognition was developed to express the notion of a person's "understanding of knowledge, an understanding that can be reflected in either effective use or overt description of the knowledge in question" (Brown, in press). Flavell describes it as "knowledge and cognitive activity that takes cognitive phenomena as its object" (Flavell, Spear, Green, & August, 1981). The essential concepts involved here are not easily untangled and the whole idea of metacognition has been described as 'fuzzy-edged' (Wellman, 1981), but there appear to be at least the following aspects needing consideration:

1. Cognitive and metacognitive functions are interchangeable. A specified activity - asking oneself questions about a passage - may involve the cognitive strategy itself (summarising a text), the monitoring of this strategy (a metacognitive procedure), and an awareness that this strategy is the right one for the occasion (also a metacognitive procedure) (Brown, in press). There is therefore a danger that any sort of strategic activity used in any task domain will be labelled metacognitive. There is a lengthy list of reading strategies discussed in two recent reviews that at least give this impression: 'clarifying the purpose of reading', 'modifying reading rate...', 'identifying important aspects of a message' are examples, called 'some of the metacognitive skills involved in reading' or referred to less confusingly in the statement, '...most characterisations of reading include skills and activities that involve metacognition' (Baker & Brown, in press (a); Baker & Brown, in press (b)). Brown herself recognises this problem, however, in a later paper (Brown, in press). It is important to be clear, therefore, that cognitive strategies function to enable the person to make cognitive progress, while metacognitive strategies are concerned with overseeing the process of cognition itself (Flavell, 1979).
2. Knowing about one's cognitive processes is clearly a metacognitive function. This knowledge may be tacit (Polanyi, 1958), or may be conscious and therefore (presumably) statable and often considered late developing, connected by Piagetians with the notion of reflective abstraction (Piaget, 1976).
3. The effective use of a cognitive process, ie., its use in appropriate circumstances, is a reflection of the person's ability to regulate or control their processing. Here the idea of executive control illuminates the notion. It seems necessary to impute some knowledge or awareness of the processes and also of the importance or value of regulating them, but there is no necessary implication that this awareness must be

conscious (see the discussion of multiple and reflective access in Rozin, 1976). It is at this point that the overlap and interdependence of the two processes of metacognition are most apparent; as we shall see, self-knowledge and self-regulation are two clusters of activities that appear to be involved in the concept. This control process involves planning, monitoring and checking activities, and it is assumed that these are not necessarily storable nor age dependent (Brown, in press).

There is therefore now increasing acceptance of the need to distinguish between two aspects of metacognition, the first being knowledge of one's processes, and the second the control of these. These two clusters of activities may be best regarded as subsystems existing in a somewhat uneasy relationship in the conceptualisation so far discussed, and their integration seems to await further development in cognitive developmental theory. It may be best to refer to the process or knowledge that is being examined by the subordinate terms and abandon the blanket usage (Brown, in press), or to limit the term metacognition to the knowledge cluster (Wellman, 1981). There are further problems with the whole notion: is the relation between cognition and metacognition hierarchical; is metacognition its own domain; can it be seen as structural; and there are also a number of developmental issues. These are discussed briefly in a chapter with the interesting title, 'On applying metacognition to metacognition about metacognition: a redundant reaction?' (Feibel, 1978).

It is with the second cluster of regulatory or control activities that we are mainly concerned, for it is now clear that efficient comprehension is related in some way to one's capacity to keep track of the success of one's reading and to remedy any failure to understand. The nature and direction of this relationship is still not clear, as most work completed so far has been correlational in design, so it is important not to make claims about cause-effect relations nor to rush in to make educational applications without noting this warning (Whitehurst, in Flavell, Speer, Green, & August, 1981).

The process of comprehension of written discourse may be construed as taking the message input, the surface structure of the text, and generating a synthesised code in the form of propositional representations in procedural or declarative form that act as a bridge between working and long term memory. This is a constructive process akin to that of hypothesis testing and formation, where the existing world and language knowledge of the reader interacts with the text, in concept-driven and data-driven fashion, to facilitate the process of formation, testing, modification and confirmation of the propositions in the hypothesis (Lachmann, Lachmann, and Butterfield, 1979). Thus comprehension becomes the active construction of hypotheses which are tested against the data (the text), in a deliberate and planful manner. Since novice readers regularly fail to monitor and remedy their comprehension failures as efficiently as more mature readers, it ought to be possible to test some of the claims made about comprehension monitoring by means of instructional studies which examine the conditions of acquisition of comprehension and monitoring strategies. The procedures used in such studies could then be applied to the classroom with the aim of encouraging children to use higher order comprehension skills.

INSTRUCTIONAL STUDIES AND THEIR APPLICATION

Recent studies which have sought to identify and manipulate the variables involved in comprehension monitoring have shown that there are grounds for increasing confidence in our ability to improve comprehension in poorer readers. The purpose of these studies is twofold. First, theoretical issues concerning the identity, acquisition and effects of the variables already discussed can be explored experimentally; second, by carrying out this work in classroom settings, findings can be much more readily applied educationally.

The underlying assumption of instructional studies is that attempts to improve learner's spontaneous performance on academically based tasks will reveal the learner's capabilities in

the domain examined. By demonstrating effects of hypothetical variables through performance gains, the weaknesses of the hitherto dominant correlational studies can be overcome. In general, the final performance of subjects in these studies matches that of spontaneous users. There seem to be at least two possible general approaches to improving performance, either by directly adding substantially to the child's knowledge, or by instructing children in ways of enhancing their knowledge for themselves. The second option has been used in the work to be reviewed: the emphasis is on the improvement of the learner's awareness and self-control of their own learning processes, and, more specifically, on helping younger and lower achieving children to use strategies that they would not otherwise use spontaneously. Some essential features of successful studies are first, that they include practice in the self management of the strategies relevant to the task, and second, that the children should be fully informed participants in the whole procedure by being helped to understand why it is important to be strategic. This approach therefore avoids a blind training routine, one in which children are inducted into a strategy without any understanding of its importance or value, and as a result, fail to use the skill subsequently, or to transfer it to similar situations (Brown, Campione & Day, 1981). Two key criteria, then, are durability of the instructional competences and their generalisability to other circumstances.

Until recently most studies have been carried out in laboratory settings under conditions far removed from the classroom situation, so that their conclusions are not readily applicable educationally, but a recent series of studies culminated in a successful intervention in a classroom setting (Palincsar & Brown, 1982). The children involved were eighth graders with average decoding skills but were one or two grade levels behind in comprehension of text, as measured by standardised tests. The view that was examined was whether their weakness in comprehension was caused by an absence of self-regulatory skills that impeded their independent performance in learning. These skills, it was argued, begin to develop in out of school settings in naturally occurring learning situations, so that where children have not experienced such learning they are at risk at school, which presupposes learners' ability to profit from such interactive and reciprocal learning settings (Brown, Palincsar & Armbruster, in press).

Such settings may be observed in homes where mothers read to the very young child regularly, interacting with the child in a specific fashion. The mothers appear to engage in a dialogue where initially the mother is very much in command and engages the child by accepting any response from it as appropriate turn taking behaviour, then slowly shifting responsibility to the child. For instance, when the child begins to label pictures, the mother acts as if it has uttered words, not babble. When words actually are used she steps up her demands and asks for the names of the items in the pictures. What seems to be happening is a combination of modelling, stepping up of demand according to performance, and ceding to the child the right to take control of the whole process (Wertsch, 1978; Ninio & Bruner, 1978).

Now in the classroom, it is argued, teachers assume something of this role, expecting the children to be able to react accordingly. It was therefore decided to use a reciprocal teaching procedure similar to the pattern of interaction just described, to enable the children to develop the interactive skills while also acquiring the target comprehension strategies. In this way it was expected that they would be able to carry over these competences to the classroom. This instructional method, then, constituted the essential procedure of the study.

The actual content of the teaching consisted of four activities that were considered to be capable of fostering both comprehension and comprehension monitoring. These activities were summarising, questioning, clarifying and predicting. They were seen as comprehension fostering in that all are involved in comprehension itself. Thus the first involves a focus on major content, while both questioning and predicting use inferencing, and clarifying words that are not understood involves the use of prior knowledge. They are comprehension monitoring in that all make the learner check to see how well she is doing in constructing meaning from text. For example, summarising enables one to see how far the main point has been established, while self questioning leads students to a more active monitoring of their own comprehension.

In an initial study four eighth graders were taught on a one to one basis by the experimenter over a ten day period. The reciprocal procedure was incorporated by presenting the instruction as an interactive learning game where teacher and child took turns in leading a dialogue about a segment of text. If a new passage was involved, the experimenter asked for a prediction about the meaning based on the title, and, if it had already been treated, the child had to summarise the topic. Next a decision was made about who was to take the teacher role for the session, and then the passage was read silently by both. Next the teacher summarised the content, clarified any difficulties and developed a question that a teacher may wish to ask about that segment, and finally made a prediction about what might appear in the content of the next passage. A constant reminder was given of the value and importance of the skills being acquired, as instruction proceeded.

During initial stages of the treatment student response was constrained and they experienced great difficulty with the dialogue. The experimenter had to use a variety of prompting techniques or to construct questions or paraphrases for the student to mimic. As the study progressed, however, the children became capable of playing their role and steadily improved performance over the ten sessions. Praise and feedback were given constantly. In early sessions 46% of questions generated were judged as non-questions, but by the end of the study only 2% were so judged. Similar improvement occurred in constructing summaries, from 11% adequate to 60%. There was also a shift from questions taken verbatim from the text to genuine paraphrases of gist. Each day the students were tested on similar passages with ten questions asked; there was improvement from 15% correct to 80%-90%, which dropped to 60% after six months. This score returned to the original level after one session of reciprocal teaching, however. A test was also made to determine how these skills generalised by using probes in social studies lessons, and it was found that they had improved by an average of 25 percentiles.

This work was followed up in a second study using the main features of the first but incorporating three groups of two children. As well, a criterion level of 75% correct on four out of five days was set, and explicit knowledge of results was provided in the form of graphs, and also texts of transfer were given. The instructional period was approximately twenty days, with long term follow up to check durability after two months. Control groups were also used, these receiving the regular instruction scheduled for them in reading. The response of the students was uniformly encouraging, only one failing to meet the 75% target, having reached 50% in twelve days. The quality of the dialogues improved as in earlier studies, while generalisation probes in science and social science had variable but improved results. The transfer tests, on a pre and post test basis, also showed significant improvement.

The final study in the series was a replication of the second in a classroom setting during scheduled reading time, with the teachers acting as instructors, after training by the experimenter. The four regular reading groups were used, ranging in size from four to seven. Using the same procedures all groups reached criterion within fifteen days, while similar improvement in dialogue quality and transfer of skills was also found.

The design of this study confounded many of the variables involved, of course. Either the reciprocal teaching procedure alone, the activities or any one or combination of them, or the awareness training may have been sufficient to achieve the result. Brown considers that three aspects are significant: one is skills training, practice in the use of appropriate cognitive skills of comprehension, which she regards as an essential component in any instructional package; a second is self-control training, assistance in learning to monitor the use of these skills; and the third is awareness training, information about the usefulness of the skills (Brown, Palincsar & Armbruster, in press). The two criteria of durability and generalisability were met quite adequately, and the success of the procedures in a classroom setting makes educational applications much more feasible.

Currently componential analyses are being carried out to determine more certainly the significant variables, and there is some indication that instruction in the skills

separately generates a stepwise progression in learners to the criterion point we have mentioned, while using all four together results in the same level as that achieved in the original study (personal communication). To date no work has been completed on the role of the reciprocal procedure, which contains elements of modelling, feedback, and explicit instruction.

This series of studies appears to have broken new ground in the training of cognitive skills. Underlying cognitive processes, having been identified theoretically as a first step are then examined correlationally, with proficient readers being found to perform well on the processes, while poor readers find these activities more difficult. Finally, learners who lack the strategies are instructed in the relevant procedures and performance gains measured. If the theory is adequate and the training satisfactory, and the underlying processes are valid, those instructed should demonstrate performance similar to that of spontaneous users. As a result we gain a clearer understanding of some of the mechanisms of reading, and also have available some valuable procedures for use in classroom settings (Brown, Palincsar & Armbruster, in press).

POLICY IMPLICATIONS

There are many sources of pressure on teachers to produce quick, easily measurable results in their classes. It is well known that many publishers have vested interests in selling large-scale systems based on poorly formed, little or no theoretical positions about comprehension, while from other quarters the claim is made that comprehension can be learned rather like nonsense syllables are memorised, or by means of blind training procedures with all the weaknesses discussed here. We have relied far too much on outcome measures in our study of what is a process - the process of reconstruction of meaning in reading. The field generally deserves holistic enquiry strategies, but the superstructure of materials and indeed of pedagogy has developed on the basis of a more product oriented, non-integrative approach (Wolf & Tymitz, 1976/7).

Those responsible for forming curriculum policy must scrutinise the evidence that has been obtained from studies using instructional designs that have been discussed here, and should note the impressive and highly usable competences that have been acquired by low performing children before easily acceding to such pressure. To achieve the higher levels of reading competence needed in the last decades of the century, we must support materials and pedagogical development that is based on the sort of evidence discussed here.

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