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Reasoning in Trobriand Discourse[1]

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Introduction:

The question of the nature of reasoning among so-called 'primitive' peoples has a long history in anthropology and philosophy. In the years since the publication of Malinowski's ethnographies of the Trobriand Islands [2], the Trobriand people have appeared several times in the literature of primitive thought as an example of a people whose mode of reasoning is in some fundamental way different from that of Western civilization. Trobriand thinking has been characterized as being irrational, concrete rather than abstract, and dominated by right hemisphere (affective/integrative) rather than left hemisphere (rational/analytic) processes.

The strongest and most detailed claims have been made by D. D. Lee (1940, 1949). Working exclusively from Malinowski's published materials, Lee asserts that, "To the Trobriander, events do not fall of themselves into a pattern of causal relationships, as they do for us." (1949:406) She contends that the language of the Trobriands lacks terms which posit relations among propositions and claims,

> This does not mean that the Trobrianders are incapable of explaining a sequence in terms of cause and effect, but rather that this relationship is of no significance. (1949:407)

Lee's denial of the concept of causal relations leads her to assert, with regard to motivation, that the Trobrianders not only do not interpret acts in terms of intents, but that they do not in fact even have intents. "The Trobriander performs an act because of the act itself, not for its effects." (1949:408) Lee concludes her 1949 paper as follows:

> Whether they are given or read into reality by us, temporality, causation, teleology, and relationship in general have neither meaning nor relevance for Trobriand behavior. (1949:415)

Such claims may seem credible when evaluated only in the light of the limited data Lee presents, and, in fact, many anthropologists are impressed by her arguments. For one who has lived in the Trobriands, learned the language, and experienced the complexity of everyday life there, however, these claims are absurd. In this paper I will present an analysis of an example of natural Trobriand discourse. From this analysis, I will draw what I think are some more reasonable conclusions about the nature of Trobriand reasoning. In addition, I will provide an explanation of the source of Lee's mistaken conclusions and consider some issues concerning the conditions under which we are likely to be justified in making inferences about other people's thinking.

The analysis presented here will focus on deduction, the sort of inference which involves the assignment of a degree of likelihood to one proposition on the basis of the likelihoods of other propositions. In our society, the rules of deduction in symbolic logic are exemplary inference forms. In classical symbolic logic, only two degrees of likelihood are considered; a proposition is either true or else it is false. The rules of deduction in this system are a special case of inference as defined above. While they are widely taken as a normative standard, they are not in fact accurate descriptions of how most of us make inferences most of the time. We often think in terms of a continuum of likelihoods, and we make plausible inferences where strong inferences are not available.[3] That is, rather than infer that something is strictly true or false on the basis of some observation, we may instead only be able to infer that it is likely or unlikely. I am making no claims here about the nature of the mechanism by which the adjustment of likelihoods is accomplished. Whether it is Bayesian or otherwise is a topic for another paper. What I am arguing is that even in naturalistic settings, we can observe adjustments of likelihoods, and assess the direction (up or down)—if not the amount—of change in the likelihood of a proposition. A rough model of inference then, contains these elements: (1) a proposition which relates two or more concepts (e.g. P implies Q), (2) a new bit of information, either retrieved from memory or gleaned from the interpretation of the world of experience, concerning the likelihood of one of the concepts related by the first proposition (e.g. P is very likely), and (3) a procedure for determining what impact the new information has on the other concept related in the first proposition (e.g. Q is also very likely).

Some sort of inference must be utilized any time one makes an assertion, or attempts to support an assertion,

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about the likelihood of an event or state that has not been directly observed. This means that inference is involved in virtually every instance of planning. Much of the apparent richness of our experience derives from our use of inference to fill in and elaborate our representations of the world.[4] Sometimes we use inference to establish the likelihood of events which are technically observable, but which have not actually been observed. Other times inference tells us about events, such as the intents and desires of other social actors, that we can never observe directly.[5]

That people make inferences is easily demonstrated by pointing to those things we all do that require inference. Specifying just where, how, and on the basis of what information people make inferences is, however, somewhat more difficult. A major problem in the study of inference in natural discourse is that much of discourse is composed of syllogisms in which one or more premises are left unstated. If I say to you, "Socrates is mortal because he is a man," you know what I mean. But it is not necessary for the purposes of communication to explicitly state the missing major premise, vis., that all men are mortal. That premise is implicit in your understanding of what I have said even though it does not appear in the discourse. Given a community of speakers with some shared set of understandings about how the world works, it would be both redundant and tedious for each of them to exhaustively specify all of the premises used in his reasoning when he is communicating that reasoning to his fellows.

The task of identifying inferences in natural discourse, then, must involve a specification of the premises on which the inferences are based. In the following section I will present a brief excerpt of discourse from an important area of Trobriand life. I will also attempt to demonstrate that an ethnographically informed model of the cultural knowledge about the events in this domain can provide the premises missing from the discourse itself, thus permitting us to analyze the inferences that are being made.

Cultural Premises:

Consider an example from the domain of Trobriand land litigation. The cultural premises that underlie reasoning about claims to land concern the conditions under which rights in land can be transferred from one person to another. The full set of premises for this domain is much too large and complex to present here. A small subset of those premises, however, accounts for a large fraction of the inferences made in litigation. A simplified account of that subset will be presented here.

There are two necessary, but not sufficient, conditions for a legitimate transfer of rights in land. The first is simply that the person who is giving rights in land must, at the time of the transfer, have rights to give. That is, this person must have previously and legitimately acquired the rights, and must not yet have transferred the rights to someone else. When this condition is met, the land is said to be TUPWA, "still remaining" with respect to that person. Once a person has transferred his or her rights in land to someone else, that land is no longer TUPWA; it is said to be KASESILA, "decided upon" or "allocated" with respect to that person. The satisfaction of this first condition is summarized in Trobriand discourse by the term TUPWA.

The second condition is that the person who is to acquire rights must have provided the rights holder with an instance of at least one of several classes of exchange inducements called POKALA. Regardless of the form taken, POKALA as an inducement is given with the hope, but without the guarantee, of a reciprocal presentation. This second condition for legitimate transfer is summarized in discourse by the term POKALA or by any of the more specific terms for its sub-categories.

A basic premise, then, is that a legitimate transfer of rights in land implies both that at the time of transfer the land be TUPWA with respect to the person giving the rights, and that the aspiring rights holder have provided POKALA to the person giving the rights. A second premise is that whenever a legitimate transfer has taken place, the recipient of the rights in land does in fact have those rights. This one seems so trivial as to not deserve mention, yet it is an important premise upon which many inferences are based.

A Land Dispute:

In July of 1976, two men disputed each other's claims to rights in a particular piece of garden land. A village court was convened to hear the case. Each man made a presentation to the court in which he gave an account of the sequence of events he believed led to his having rights in the land. The two accounts began with the same historical events, but they diverged with respect to a transfer of rights about thirty years in the past. Both litigants described a POKALA presentation by a third man to a woman who previously held rights in the garden (see Figure 1, t1). The first litigant to make his presentation to the court maintained that this POKALA attempt was unsuccessful; that it was not responded to with a transfer of rights. He claimed that the garden remained TUPWA at this point (t2), and that the woman later gave the garden to him in response to his subsequent POKALA (t3). The second litigant maintained that the rights to the garden were transferred to that third man in response to his POKALA (t3), making the garden KASESILA with respect to the old woman. This litigant claimed that he later acquired rights to the garden, not from the woman, but from that third man who had provided the earlier POKALA (t2-t4).

As stated, the claims of both litigants are plausible. They each describe a possible history of the garden which conforms to the principles of land tenure. In the course of the testimony of witnesses it became clear that the POKALA attempt by the third man some thirty years ago was indeed successful and was followed by the transfer of rights in the garden to him.

The following is a translation of an excerpt of the court decision directed to the losing litigant:

> With regard to this garden: Well, within the argument, if it had been TUPWA, you all understand. You all know how it is with POKALA and TUPWA. But this garden was not TUPWA. It was already KASESILA, and this is the source of it . . . My hearing of it, my unbiased opinion is this: If it had been TUPWA, no one would worry, [the second litigant] would not take it today, it would be your thing. But because it was previously decided upon, fine, I say, let it be KASESILA.[6]

FIGURE 1
Litigant

TIME	L1	L2
t1	Old Woman ○ POKALA △ Third Party	Old Woman ○ POKALA △ Third Party
t2	Old Woman ○ NO RESPONSE △ Third Party	Old Woman ○ RIGHTS TRANSFER △ Third Party
t3	TUPWA Old Woman ○ POKALA △ L1	Old Woman ○ KASESILA POKALA △ TUPWA △ Third Party L2
t4	Old Woman ○ RIGHTS TRANSFER △ L1	○ △ Third Party △ L2 RIGHTS TRANSFER

Analysis:

The decision begins with a hypothetical condition, "If the garden was TUPWA," and explicitly invites the listeners to make the appropriate inference, "You all know how it is with POKALA and TUPWA." What they all know is that POKALA and TUPWA together are the necessary conditions for a transfer of rights. This is, of course, the major underlying premise. The first (losing) litigant's POKALA to the old woman is not questioned, so that if it were true (at time t3) that the garden was TUPWA, then the necessary conditions for a transfer of rights would have been met. This permits the plausible inference that the likelihood of the old woman actually transferring rights to this litigant is increased. From the increase in the likelihood that the old woman transferred her rights to this first litigant, it can be inferred from the second underlying premise that the likelihood of his actually having rights in the land is increased.

The opening hypothetical condition is followed by a disjunction to an assertion of fact. "But, this garden was not TUPWA." This is an assertion that the necessary conditions for a transfer of rights to the first litigant were in fact not satisfied. From this, a strong inference can be made that the land was not transferred directly from the old woman to the first litigant. Since the first litigant's claim rests on this transfer, proving it false reduces the likelihood of his holding rights in this garden to zero.

The statement, "It was already KASESILA," refers to the transfer of rights to the third party some thirty years ago. From the assertion of this proposition it can be inferred that the third party did acquire rights to the garden in question. This proposition satisfies one of the necessary conditions for the transfer of rights from that third party to the second litigant. An increase in the likelihood of the second litigant's claim can be plausibly inferred from this proposition.

"If it was TUPWA, no one would worry, (the second litigant) would not take it today." Here we have the hypothetical premise linked directly to a stated conclusion. This conclusion is derived from the hypothetical premise and the implicit premise as follows: from the hypothetical proposition that the garden was TUPWA at the crucial point in time (t3), it can be inferred that the third party did not acquire rights in the garden. That allows the strong inference that the third party could never have transferred his rights to the second litigant. That inference would clearly destroy the second litigant's argument.

"If it had been TUPWA, it would be your thing." This is yet another inference from the counterfactual hypothetical proposition which lies at the center of the first litigant's argument. The inference structure here is precisely as it was in the first statement of the decision. It provides for the plausible inference of the first litigant's claim being true.

Finally there is one more disjunction from the hypothetical to the factual. As shown earlier, the assertion of the garden status KASESILA allows inferences which show the second litigant's claims to be plausible and the first litigant's claims to be impossible.

Understanding this brief fragment of discourse requires a total of twelve inferences. Six are weak plausible inferences, and six are strong deductive inferences. All of the inferences are based on the simplified major premises of land tenure defined earlier in terms of causal and temporal relations among abstract classes of events. The act of either understanding or producing this bit of discourse requires 1) the ability to treat concrete instances as members of abstract event classes, 2) a comprehension of the nature of the causal and temporal relations between abstract event classes, and 3) the ability to determine the truth values of hypothetical concepts in accordance with their logical relations to other concepts whose truth values have already been established.

Discussion:

From this analysis, and from many others like it performed on discourse from other domains, I conclude that while Trobrianders' beliefs about the world are, in some domains, very different from our beliefs, it is unwarranted to infer from a difference in content that the way Trobrianders reason about what they believe is substantially different from the way we reason about what we believe.

If that is the case, why is it that Lee arrived at such a different conclusion about the nature of Trobriand reasoning? The answer to this question lies not in the nature of Trobriand reasoning, but in the nature of our procedures for knowing about reasoning. Lee based her conclusions on her analysis of Malinowski's published materials. Even if we ignore the problems Lee faced in working on linguistic data without a knowledge of the language in which it is expressed, Malinowski's materials contain some important artifacts with respect to reasoning. Virtually all of Malinowski's verbatim transcriptions of "native" discourse are traditional narratives and magical spells. The reason for this is quite simple. Malinowski was limited to a paper and pencil technology in data collection. Spontaneous discourse passes much too quickly to be captured in full by simultaneous transcription. Narratives and magic, on the other hand, being memorized formulas, can be recited for the note-taking ethnographer at a pace with which he or she can cope. But narratives and magic are generally poor in inference. The comprehension of narrative discourse requires inferences, but the inferences are not themselves made explicit in the discourse. Magical spells, it turns out, are like telegraphic speech, so devoid of overt specification of relations that they often seem cryptic even to Trobrianders. Litigation, and other speech contexts which require explicit explanations of the relations among events, are much richer in inference than these other domains. I cannot help but think that some opinions about Trobriand thought are in part an artifact of the preponderance of magic and narrative and the dearth of natural conversation in Malinowski's published texts. Malinowski is, of course, not to blame. Natural conversation is virtually impossible to capture without the help of a tape recorder. It strikes me as a bit ironic, however, that our opinion of their intellectual abilities may have been in some way dependent upon the state of our own technology.

Goody (1977) has argued that the development of logic:

> seemed to be a function of writing, since it was the setting down of speech that enabled man to clearly separate words, to manipulate their order, and to develop syllogistic forms of reasoning . . . (1977:11)

Goody is right that it is the setting down of speech that enables man to separate words and manipulate their order. The notion of syllogistic reasoning as a thing to be described is a meta-linguistic concept, and language must be objectified for the development of meta-linguistic concepts. This is the key to Lee's problem. In analyzing Malinowski's material Lee was unable to find syllogistic reasoning for at least two reasons. First, Malinowski was unable to set down a written record of the sorts of speech in which syllogistic reasoning is made explicit, and second, having never lived in the Trobriands, Lee had no access to, and thus could not make explicit, the implicit premises underlying the discourse which was recorded.

But if Goody means that the ability to do syllogistic reasoning depends on writing, then he is also wrong, because he has confused the technology required of the analyst for a *description* of reasoning (setting down a written record) with the technology required for the *performance* of reasoning. Just as writing is required for a

description of the syntax of a language, but not for the performance of grammatical speech, writing is necessary only for the description, not for the production of syllogistic reasoning.

The failure of non-literate peoples to solve experimenter-posed syllogistic tasks is not indicative of an inability to do syllogistic reasoning, but of the failure to conceive of syllogistic reasoning meta-linguistically as a "structure" of reasoning which can be applied in abstraction to novel as well as familiar situations. In this paper I have argued, I hope successfully, that when reasoning in a domain which is structured by a set of meaningful cultural premises, non-literate peoples do employ syllogistic forms of reasoning which are formally indistinguishable from the everyday reasoning of Western man.

NOTES:

1. The research reported here was conducted by the author in Milne Bay Province of Papua New Guinea in 1975 and 1976 under a dissertation research grant from the Social Science Research Council. The analysis in this paper is taken from my doctoral dissertation, Hutchins (1978). My thanks to Michael Cole for his criticism and advice on this version of the material.

2. Malinowski published seven books and several articles on the Trobriands between 1922 and 1935. The most important of these for this paper are (1922, 1929, 1935a, 1935b).

3. See Polya (1954) and Collins and Larkin (1977) for two views of plausible inference.

4. The recent literature of discourse comprehension is rich in demonstrations of the importance of inference to fill out interpretations. (cf. Bobrow & Norman, 1975; Schank & Abelson, 1977)

5. cf. Hutchins 1974.

6. The text reported is a translation by the author of a case excerpt which was originally recorded on stereo tape. The transcription prior to translation was made by the author and checked with informants. The relational terms are given the same translations as those used by Malinowski (contra Lee).

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Product and Process in the Evaluation of Early Preschool Intelligence[1]

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For a long time the cognitive competence of young children has been evaluated on the basis of the kinds of manual tasks they can solve (e.g., Gesell, 1926). One advantage of this approach is that it circumvents the need to rely exclusively on verbal exchange between experimenter and subject, and the use of language-free methods is a necessity for testing children in the process of acquiring language or children with language disabilities. Within this context, however, the manual task has not been fully exploited, and, moreover, as usually employed it has the potential for masking, rather than revealing, underlying abilities. Typically the child's final solutions are assessed, and not the process by which those solutions are achieved. The development of those processes, a sequence of different strategies, has similarly been ignored.

The drawbacks of this paradigm were elegantly demonstrated in an experiment by Karmiloff-Smith and Inhelder (1975; cf. Pea, 1978). In that study 4½- to

5½-year-old children were more successful at balancing blocks in some contexts than were 5½- to 7½-year-old children. Once the children's *strategies* were analyzed it emerged that the younger subjects were solving the problem by trial and error, while the older subjects were testing a (faulty) hypothesis about the mechanics of the situation. The older children's fundamental comprehension of the relations involved was thus more, rather than less, astute than that of the younger children. The study of children's methods for solving problems has a substantial history in Soviet research (e.g., Leont'ev, 1977; Paddya'kov, 1974), and its importance has been given lucid expression in the recently translated work of Vygotsky (1978; see also Werner, 1937). There is much to be gained by following this line of inquiry.

A study of early cognitive development based on children's block construction procedures is described below. The study concerns the development of classification between 1 and 3 years of age. As in Karmiloff-Smith and Inhelder's block balancing experiment, the child's accomplishments by themselves may be only partial, if not misleading, indicators of the child's conceptualization of a problem. In the context of classification, spatial groupings may be considered outcomes, or accomplishments. As such, spatial groupings may be only partial indicators of the child's underlying representation of a set of materials. Knowledge of how those groupings are realized may reveal areas of competence, or difficulty, which an analysis solely of products might bypass.

Most of what is known about classification in early block play concerns the kinds of arrangements children construct. Existing analyses of these arrangements suggest that preschoolers are sensitive to similarity, but have only a very limited concept of a class. When presented with a large array of objects classifiable along several dimensions (e.g., color, form, size,) 2- to 3-year-old children spend much of their time constructing arrays with no clear pattern to them (Inhelder and Piaget, 1964; Vygotsky, 1962). Sometimes these arrangements are interspersed with partial groupings of identical objects (e.g., a stack of four of the six squares present). Other partially systematic arrangements appear as well, e.g. alignments in which individual objects share some feature with immediately adjacent objects, but in which no consistent criterion applies to the whole group; 'graphic' designs, e.g., symmetrical arrangements. The conclusion drawn from this behavior is that young children are not really classifying under some general rubric, but are simply relating adjacent items to one another in a segregated fashion; at best elements participate in a figural, but not a logical, whole. The focus has not been on *how* conceptual thinking develops, but only a concern for *when* it develops. In much simpler tasks containing two disjoint classes of objects, children in the second year group items which are the same (Nelson, 1973; Ricciuti, 1965). The conclusion drawn from this observation is that infants can order objects on the basis of their similarities and differences (Ricciuti, 1965). This conclusion does not contradict that contention based on the more complex tasks that young children only relate individual items to one another with no comprehensive overall scheme. By simply continuing to look for an object like the one previously placed, i.e., by attending to one type at a time, the child could end up with a succession of coherent groupings.

The strategies that the child uses to discover the similarities and differences among actions, objects, or symbols during the pre-school years are largely unexplored. There is a stratum of *procedural* data omitted from these accounts. If this information were available, it might temper the present conclusions or might permit more penetrating inferences about underlying classificatory schemes. It also might provide some insights into the way language, a system dependent on classification, develops. The symmetry of the 2-year-old does not look like a classification in formal appearance since similar elements are not grouped together, and since subgroups are not coordinated in a matrix-like form. On the other hand, perusal of Inhelder and Piaget's protocols indicates that when children make symmetries, e.g., two squares surrounded by four triangles, with each triangle flanked by a circle, they often add one class at a time. The child's handling order thus follows directly along class lines, and spatial placements are systematically related to that ordering. This suggests that the child could be classifying material, but marking the classification in a nonstandard way.

Class groupings pose an equally interesting problem. It is not necessarily the case that children arrive at groupings of multiple classes by attending to one feature at a time, as suggested above. It is conceivable that the child might be guided by a more simultaneous apprehension of the categories in the array in making his placements. This determination can at least be approached by knowing the order in which the child adds the objects to the array. However, such information is not indicated in sufficient detail in existing accounts. In the study to be reported changes in the order in which objects were manipulated in the production of class groupings suggested a shift from a successive to a more simultaneous approach to organizing multiple classes. The existence of the 'simultaneous' strategy by age 2½ calls into question the claim that preschoolers do not conceive of classes as conceptual entities, but only relate individual items to one another in a successive, uncoordinated fashion.

The present investigation was based around young children's spontaneous and elicited ordering of simple two-class arrays similar to those used by Ricciuti (1965) and Nelson (1973). These tasks were selected because

they readily elicit categorizing behavior in the 1- to 3-year age range. Since the interest of the study was in children's procedures for classifying, and not in whether children could achieve classifications, it was desirable to use as simple and obvious a task environment as possible. Further, prompted by the possibility that regular arrangements other than class groupings might signal underlying classification, all systematic arrangements made by the subjects were analyzed, and some tasks were set up to provoke alternative arrangements, e.g., one-one correspondence between dissimilar elements. Class sorting and one-one correspondence will be discussed here, although additional forms were observed.

METHOD

Subjects

Forty children were tested cross-sectionally, eight each at 12, 18, 24, 30 and 36 months. Age cohorts were evenly divided by sex.

Materials

The children were presented with six grouping tasks. Each task contained two classes with four items in each class. Two tasks contained solid objects (cylinders and columns: blocks and plates), two contained one set of solid objects containable in a second set of ring shapes (finger-puppet dolls and circles; small columns and rectangles), and two contained one set of solid objects containable in a second set of receptacles (sailors and boats; spoons and cups). Tasks permitting containment between the classes were included to encourage combining dissimilar objects, thus providing a basis for the construction of between-class correspondences, e.g., a doll in each ring. In the ring-containment tasks these constructions could be composed either by placing the solid objects in the rings or by placing the rings around the solid objects. These options did not exist in the receptacle-containment tasks. Without the functional pull of containment, the solid-object tasks were thought to provide a context more facilitative for grouping than for separating similar objects. These task variations were included primarily to insure production of a diversity of constructions, and only secondarily as experimental manipulations of interest in themselves. Task effects as such will not be considered here. Task types were administered in alternating order and were counterbalanced for order of presentation within age.

Procedure

Subjects were escorted to a laboratory playroom by a parent and were seated across a small table from the female experimenter. Each task began with a 2½-minute spontaneous play phase in which the items were presented in a scrambled array, with the instruction to "Play with these." The noncontainment tasks were followed by a random-order sort exercise (in this exercise the experimenter puts out one item from each class and gives the child the remaining items one at a time in a scrambled order), and the ring-containment tasks were followed by a provoked correspondence probe (in this procedure the experimenter combines two dissimilar objects, e.g., a doll in a ring and then hands the remaining objects in a near alternating order to the subject). The spontaneous results will be highlighted here.

Scoring

All data were scored from videotapes. Spontaneous behavior was segmented into different constructions. Two criteria determined the bounds of an individual construction: (a) the initial bringing together of at least two objects, and (b) preservation of the same order of objects within the construction. As long as the child continued to add objects to a construction without changing the order of any of those objects already present, only one construction was scored. Each construction was subsequently scored for its static class properties (e.g., one class grouped, two classes grouped, one-one correspondence, mixed) and for the order in which elements in different classes were added to the construction (only one class placed, two classes placed one at a time, two classes placed in mixed order). The unit of analysis was thus determined by the pattern of the subjects' ongoing behavior, not by an external manipulation (as in the case of the elicitation probes) or by the boundaries of the task, and not by an arbitrary chunking procedure like time sampling. In the spontaneous phases external control existed only in the inherent structure of the stimulus array, which was relied upon to facilitate certain kinds of organization.

A second observer scored a portion of three tapes at each age. Inter-observer reliability ranged from $r = .86$ to .97 on all measures.

Sorting

All children engaged in spontaneous spatial grouping of identical elements in all tasks. In fact, the frequency of class grouping, relative to other kinds of constructions, changed little with age. However, the extent of individual groupings, and in particular, the manner in which they were produced, changed considerably.

At 12 months class groupings were haphazardly constructed and incomplete. They largely involved direct placement of only one object (in contact with one or two others), rather than the accumulation of several objects in one location. The most systematic ordering shown by these subjects was not in their spatial arrangements. Their clearest class grouping occurred instead in the order in which they selected objects for direct manipulation in the course of particular tasks (cf. Riciutti, 1965). Each child continually selected items from the same class, generally the one with more salient tactilo-kinesthetic feedback (e.g., the small finger puppets, as opposed to the rings), in at least one task. While the

older subjects also showed a significant bias to sequentially select items which looked the same, they managed to sample both classes in the course of a task (e.g., dolls, then rings, then dolls, etc.), and they extended this pattern to a wide variety of tasks (Sugarman, in preparation).

The spatial groupings produced by the 18-month-olds were more exhaustive than those produced at 12 months, and often consisted of all four of a kind. But at both 12 and 18 months what consistent class groupings there were were limited almost entirely to the arrangement of only one class. These children would group items from one class, but dismantle the construction before arranging anything else.

Arrangements in which two classes were grouped and separated were the dominant form of grouping at the three older ages. However a distinct shift occurred during this time in grouping procedure. With the exception of one 24-month-old, all children producing two-class groupings below 30 months did so by arranging one class at a time. In contrast, more than half the 30- and 36-month-olds shifted between classes as they sorted, e.g., putting two dolls to one side, three rings to the other, two dolls with the doll group, and the remaining ring in the ring group. In the random-order sort probe this strategy was elicited mainly from those children who had used it spontaneously. It should be noted that the occurrence of mixed-order sorting was not confounded with the tendency of the older children to sort more exhaustively in spontaneous play. Mixed-order sorting occurred with as few as four objects (two of each kind).

Correspondences

Children began to make functional one-one correspondences between dissimilar objects, by containing one set in the other, at 18 and 24 months. While there was an increase to 24 months in the number of subunits incorporated in a correspondence (four, as opposed to two or three at 18 months), the changes in construction procedure were most striking.

Initially correspondences were constructed by maneuvering only one class, e.g., placing a doll in every ring (or a ring around each doll). This was the basic procedure at 18 and 24 months. However, in addition, four 24-month-olds moved some of the pairs together after the fact.

Two new construction procedures emerged at 30 months, and were observed only in the behavior of the 24-month-old sorting in mixed order before that time. Both the 30- and 36-month-olds combined subunits into a larger whole while constructing them individually, e.g., drawing two rings together, placing a doll in each one, adding another ring to the line, placing a doll in that ring, etc. Also, some children used both classes to construct individual subunits, e.g., placing a ring around doll, and then a doll in a ring. These two procedures for obtaining between-class correspondences were used only by children who used the mixed order procedure in sorting classes, and could be provoked only among that same group.

DISCUSSION

These two sets of results imply that between 1 and 3 years children's classification of two-class displays of objects proceeds from a sequential, stimulus bound organization of the elements to an anticipatory representation of the two classes in the array.

The ordering produced by the 12-month-old subjects was tied to the pursuit of a particular type of object and was limited largely to direct action. Thereafter ordering was less constrained by the salience of particular objects and, in addition, class organization was realized in ways which were to some degree independent of action, i.e., spatial arrangements. However, although there was a departure at 18 months from grouping purely in action, at both 18 and 24 months spatial classifications were themselves bound to specific procedures. Correspondences between dissimilar elements were produced simply by repetition of the same act of combination. Spatial sorting into classes was accomplished only if the classes were organized in action in the process. From the point of view of the products produced, there was a break between 18 and 24 months. At 18 months spatial classifications were limited mainly to single classes, while at 24 months two classes were routinely organized. However, from the point of view of construction procedure, there was a continuity between these two groups. Even though the 24-month-olds organized two classes in space they dealt with them one at a time.

By 30 months there was an unhinging of procedure and outcome. Children produced separate groupings of each class even though they handled the objects in a mixed order. They produced identical subunits in correspondences by different methods, and they moved flexibly between different levels of construction (the graphic whole and its parts) and between the two classes. These procedures yielded the same results as did the procedures used at 24 months. However, use of the later appearing procedures entails a more complex representation of the set, namely, keeping in mind two categories: e.g., mixed order sorting requires deciding which of two groups an object belongs with, while the procedure of sorting one class at a time can be generated simply by keeping in mind a particular kind of thing.[2]

The present findings indicate that by 2½ years classification consists of more than successive comparisons between individual objects. Although the knowledge necessary to performing the procedures outlined does not constitute a hierarchical understanding of classes, preschoolers appear to apprehend categories as such, in simple settings. Their concept of classes seems to entail a rudimentary grasp of complementarity: what is not-A is B, and what is not-B is A. Even by 2 years children distinguish not-A from A: when handed objects

in a mixed order children this age sometimes grouped one type and rejected those things which did not belong. What is missing is the immediate, positive reclassification of the rejected items.

The attention to process in this study has implications beyond those for the nature of preschool classification. A series of distinctly cognitive changes was documented in a period left largely untapped by cognitive developmental researchers, or for which relative homogeneity has been assumed (Piaget, 1962).[3] This is the period between 1½ and 3 years, just after the initial appearance of the oft-cited landmarks of representational cognition (symbolic play, directed search for objects hidden and displaced several times, etc.). Major changes in language development have been extensively researched in this period, and it has remained an open question whether these developments are accompanied by cognitive growth outside language itself, which might be related to the course of language acquisition. In the present instance non-linguistically manifested cognitive developments were closely paced by parallel developments in verbal category coordination and other forms of inter-propositional coordination, although some children achieved top-level nonlinguistic performance with only rudimentary language skills (Sugarman, *op. cit.*) However, the generalizability of this pattern remains to be explored.

The dearth of research in this particular period has stemmed in large part from the lack of a suitable methodology for measuring cognition more complex than 'sensorimotor' intelligence. Systematic attention to the methods by which children generate a variety of organized products in their play may provide sensitive measures of cognition where an orientation toward what they produce has been relatively insensitive to cognitive competence and cognitive change. An orientation toward process, for these and other comparative purposes, means initially suspending judgment about the meaning of a particular product. It may be that solutions or products which look widely disparate in the first instance (e.g., symmetries and class groupings) may turn out to be equivalent once the process by which these outcomes are attained is taken into account. Alternatively, similar products may constitute different resolutions of a problem. In any case, the competence represented by a solution, or seeming lack thereof, should be judged by the subject's methods, and not just by *a priori* assumptions about what reaching a particular solution entails.

NOTES

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2. It could be argued that the mixed order sorting strategy can be executed by thinking of one class at a time, but losing track of each in turn, e.g., collecting and grouping a few dolls; discovering a ring and then finding others to put it with; discovering an isolated doll, searching for others like it, finding the original doll group, and adding the stray doll to it. While a successive approach of this sort could, in principle, account for individual cases of mixed order sorting, it cannot explain the developmental sequence obtained.

3. A prominent exception to this generalization is the Soviet school. The third year of life is seen as a period of reorganization, *after* language gets under way. This development is construed largely in terms of the reorganizing function of language, which begins by accompanying behavior and then comes to precede and regulate it (Luria, 1961; Vygotsky, 1978). At least in the works in English translation it is not clear to what extent this regulating function could be achieved by representational forms other than language. Another group of researchers who differentiate this period are Greenfield and her colleagues, in a study of 1- to 2½-year olds' strategies for seriating cups (Greenfield, Nelson, and Saltzman, 1972). These authors found shifts in nesting cup strategies which parallel the classification strategies found here, and which were replicated in this study. Notably, children used unidirectional nesting procedures when they were also constructing classes successively. They used more flexible nesting strategies, which required the coordination of the 'greater than' and 'less than' relations, when they were also coordinating classes.

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Cognitive and Pedagogical Implications of Orthography

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Psychologists and educators seeking a theoretical and practical understanding of reading have come to appreciate its enormous complexity as a set of highly integrated perceptual and cognitive skills. One important aspect of reading theory and instruction is how readers learn to use orthographic structure, and how they use this orthographic knowledge in fluent reading. Orthographic processing has usually been studied by devising simple experimental tasks to separate some particular information processing activity from other components with which it normally interacts in fluent reading (see Baron, 1977; Rozin & Gleitman, 1976). A more global, comparative approach complements this "divide-and-conquer" method of experimental psychology. In particular, a comparison of the writing systems of various languages challenges the notion of an "optimal" orthographic system which underlies many proposals for spelling reform and the teaching of reading. Different writing systems impose different cognitive demands on their learners and fluent users, and the relationship between orthographic structure and orthographic processing is not as simple as it may seem. Taken together, these considerations imply a new theoretical conception of "reading readiness" and suggest some new directions in reading research and instruction.

THE OPTIMAL ORTHOGRAPHY

Implicit or explicit in most proposals for the teaching of reading is the assumption that the optimal orthography is one in which the relationship between spellings and sounds is simple and invariant. From the thirteenth century, when Orm attempted to mandate spelling reform in Old English, to the present day, numerous attempts have been made to revise the orthography of English to produce a one-to-one correspondence of letters and phonemes (see Venezky, 1970). One of the most influential proposals is the Initial Teaching Alphabet devised by Pitman (Downing, 1965). The ITA adds a number of letters to the conventional alphabet and modifies some of the usual correspondences to produce an invariant letter-to-phoneme system. Beginning readers start with the ITA, and then move toward the traditional orthography. Support for this approach is mixed, however; ITA readers often have difficulty making the transition between alphabets, and may be deficient in their ability to exploit non-phonological constraints in reading material (Downing, 1967).

Despite their general lack of success, these "reform" proposals are often regarded as well-motivated. Their seeming plausibility may rest on the narrow perspective of considering a single language, which imparts a restricted view of what an orthography is and what it ought to be. A direct letter-to-phoneme orthographic principle may neither be better nor more natural than any other convention for spelling-to-sound correspondence (Chomsky & Halle, 1968; Klima, 1972). The fundamental questions are Optimal for whom? or Optimal for what? For fluent readers? For beginners? For second language learners? A comparative context provides some interesting answers and makes many of the claims about the optimal orthography for English seem untenable.

Spoken languages are very rich in the kinds of information they contain. An orthographic system does not represent all aspects of the structure of the spoken language (e.g., stress, intonation), and at the same time, it might represent aspects of structure which are not explicit in the spoken language (e.g., word boundaries, syntactic and semantic categories). Different orthographies choose a wide variety of linguistic structure to represent most prominently; most writing systems tend to emphasize either morphemes (e.g., Chinese), syllables (e.g., Japanese), or phonemes (e.g., English). If a letter-to-phoneme system is optimal, what accounts for this diversity in orthographies?

Goals for Writing Systems

Part of the answer lies in the recognition that the ability to predict sound from spelling is only one of a number of goals which may be embodied in a writing system. This goal may seem paramount to beginning readers who want to use their knowledge of the spoken language to

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recognize unfamiliar words, but it may conflict with their ultimate goal of getting meaning from print. The notion that writing systems evolve according to goals which may conflict or change suggests that the concept of an optimal orthography is too simplistic. A writing system may be more or less appropriate for a given purpose in a given language.

The Japanese syllabary may be the most learnable orthography, and it is credited with the absence of reading disability in Japan (Makita, 1968; Rozin & Gleitman, 1977). Nevertheless, written Japanese also employs morphemic characters derived from classical Chinese; if learnability were the sole principle involved, a pure syllabic orthography would probably prevail over a writing system with mixed orthographic conventions. In any case, in the absence of comparative studies of the comprehensibility of different orthographies by fluent readers, it is premature to give learnability precedence over readability.

Related to learnability as a goal for a writing system is universality — to be easy for literates in other languages to learn. The artificial language Esperanto was designed specifically for this purpose; it exploits the cognates in modern European languages and uses their common alphabetic spelling-to-sound structures. However, universality need not imply an alphabet; national unity for a billion Chinese people is possible largely because their morpheme-based orthography allows them to read a common language that they speak as many dissimilar tongues.

In general, the structure of spoken languages places constraints on the realization of the goals of writing systems. A syllabic orthography works for Japanese because the language has only a few hundred syllables, mostly of the consonant-vowel kind. In English, constraints on syllable formation are far fewer, and there are thousands of syllables of varied structure. Thus a syllabic orthography for English would provide scarcely more economy of symbols than the character-to-morpheme orthography does for Chinese. Nevertheless, this morpheme-based writing system may be the optimal orthography for Chinese. Spoken Chinese is largely monomorphemic (i.e., there are few compounding or derivational processes), treats tone or pitch as linguistically significant, and has a small segmental phonemic inventory (see Chao, 1968). These features produce words with little internal structure, so an analytic orthography based on sound would not be a very useful writing system. On the other hand, English has a rich inflectional and derivational morphology (Aronoff, 1976; Marchand, 1969), which an alphabetic system capitalizes on to make words which share meanings tend to look alike. Thus Chomsky and Halle (1968) argue that the *lack* of a direct letter-to-phoneme correspondence in English makes the orthography optimal; for example, *electric* and *electricity* share the C to preserve their morphemic identity even though the letter is pronounced differently in the two contexts.

Another goal for a writing system is the preservation of culture. American readers of English can make sense of Shakespeare after almost 400 years, and can read the writings of contemporary Britons, Australians, and other English-speakers throughout the world. If the English alphabet strictly followed spelling-to-sound correspondences, historical sound changes and dialect differences would make Othello incomprehensible and some current speakers of the same language as difficult to understand in print as they as now are in speech. The English alphabet represents underlying morphophonemic segments rather than surface phonemes (Chomsky & Halle, 1968), which makes it more effective in maintaining continuity across time and space.

COGNITIVE DEMANDS OF ORTHOGRAPHIES

The idea that writing systems develop according to general goals of a language community is attractive. But a language community is composed of individuals, and learnability or readability as desirable features for an orthography ultimately reflect the needs of people to read and write. It may be more appropriate to evaluate writing systems in terms of the cognitive or intellectual demands that they impose on individual readers, writers, and learners.

Cognitive demands of Chinese. For example, a symbol-to-morpheme orthography like Chinese consists of a large number of essentially arbitrary relations which must be learned by beginning readers and remembered by fluent ones. The memory demands are severe; rather than learn the associations for twenty-six alphabetic characters, Chinese beginners must learn thousands to achieve fluency. In addition, Chinese readers can make little use of their spoken vocabularies to transform a recall task into a recognition one. Nevertheless, the memory task for Chinese is straightforward; it takes little insight to understand what reading is all about, since a written symbol corresponds to a morpheme in essentially the same way that the name of an object or person corresponds to its referent.

Cognitive demands on readers and writers. Chinese is an exception among the world's writing systems in its use of a large number of complex characters. Most writing systems have evolved from morphemic or logographic systems through a process of abstraction and simplification which reduces the number of separate characters (see Gelb, 1952; Rozin & Gleitman, 1977). One force behind this trend is the interaction of the cognitive demands that writing systems place on readers and those they impose on writers. Orthographic structures which make reading easy tend to make writing difficult, and vice versa (Smith, 1973). As the orthographic unit evolves from the morpheme to the phoneme, there is a trade-off between the ease of production and the ease of recognition. If there is an arbitrary relationship between symbol and sound, it is difficult for writers to accurately recall and reproduce the appropriate symbol, but such complex characters may be visually distinctive and hence

relatively easy for readers to recognize. In an alphabetic writing system, however, the phonic principle is a major concession that readers make to writers to make the task of production easy while eliminating many visual clues for word recognition.

Cognitive demands of English. Alphabetic orthographies make use of word-internal sound structure and therefore have non-arbitrary relations between units in the spoken language and units in the writing system. Thus there is great potential for generalizations or rules which minimize the need for memory storage. If readers could learn a small set of rules (e.g., a set of twenty-six correspondences between single letters and single phonemes), their memory problem would be trivial, and they could readily make use of their spoken language to associate unfamiliar squiggles with words they already know. Unfortunately, there are two complications to this simple idea which make learning to read English far from easy.

First, the spelling-to-sound correspondences in English are complex (Venezky, 1970). The same letters can correspond to different functional spelling units or graphemes (compare EA in *reach* with EA in *react*), and the same grapheme can have a number of different phonemic correspondences (as does EA in *veal, bread* and *steak*). If readers were to learn rules to obviate the learning of individual pronunciations, they might have to learn hundreds or even thousands of them, and the tantalizing memory economy of the alphabet vanishes. In addition, the ability to induce complex context-sensitive rules of this sort may be beyond the cognitive capacity of adults, let alone children trying to read at the age of five or six (Brooks, 1978; Reber, 1977).

A less obvious cognitive constraint on learning to read an alphabetic orthography arises from the abstractness of the correspondence between letters and phonemes. Unlike the character-to-morpheme mapping in Chinese, the letter-to-phoneme relation in an alphabetic system is difficult to grasp; phonemes do not exist as separate acoustic events in speech, and most cannot even be produced in isolation. Rozin and Gleitman (1977) suggest that the phonemic principle is "inaccessible to awareness" for the beginning reader. This makes the task of "blending" the phonemes represented in an alphabetic orthography an intellectual feat which overwhelms their cognitive capacities (see also Savin, 1972).

An unfortunate corollary to the cognitive difficulty involved in using an alphabetic orthography is that achieving the phonemic insight can instill in beginning readers the wrong idea of what reading is all about. A paradox is often observed in which beginners change from "reading for meaning" to "reading for decoding"; instead of guessing unfamiliar words from context, readers often temporarily regress as they learn to code and slavishly sound out every unfamiliar word until they lose track of the meaning of the sentence (Biemiller, 1970; Weber, 1970).

A cognitive-historical reading curriculum

Gleitman and Rozin (1977) recently presented a thorough analysis of the history of writing in terms of the changing cognitive demands that different orthographies place on their readers and learners. In an accompanying paper, Rozin and Gleitman (1977) propose a novel reading curriculum based on their cognitive-historical analysis of writing. Gleitman and Rozin suggest that the evolution of writing from pictographs to logographs, from logographs to syllabaries, and from syllabaries to alphabets required four major intellectual insights:

1. The idea that meaning can be represented by visual symbols.
2. The idea that an efficient mapping of symbols to meanings requires the mediation of spoken language.
3. The idea that complex units can be produced by "blending" smaller orthographic units.
4. The idea that these basic orthographic units can be phonemes.

Rozin and Gleitman suggest that contemporary reading instruction confounds these four cognitive steps, and that it is preferable to let "ontogeny recapitulate cultural history" by using a reading curriculum which teaches the four principles one at a time. Rozin and Gleitman begin reading instruction with picture interpretation to teach children the idea that symbols can represent meaning. They next use a rebus to demonstrate the mapping between visual symbols and spoken language. They introduce a syllabary to teach the idea of blending before they finally employ the alphabet which requires blending the relatively "inaccessible" phonemes represented by that notation.

Rozin and Gleitman's analysis is somewhat weakened by its failure to consider the ability of deaf children to read an alphabetic orthography; indeed, such an accomplishment would be impossible if the mediation of spoken language were a prerequisite for learning a mapping of visual symbols to meanings. Thus the second cognitive requirement for reading in their curriculum may depend on the nature of the natural language that children learn. In this more general framework, Rozin and Gleitman's analysis makes the interesting prediction that deaf children who learn sign language should have a head start in learning to read over their speaking peers whose natural language gives them no idea that meaning can be represented visually.

LANGUAGE STRUCTURE AND LANGUAGE USE

The cultural and cognitive principles which underly the structure of orthographies interact in complex ways. These needs or demands also change — historically for a society, and developmentally for an individual member of the language community. These two points imply two general principles which are not always observed in theoretical and educational practice. First, there is no simple relationship between the nature of an orthography, be it morphemic, syllabic, or alphabetic, and the way in which readers represent and use that orthographic

structure. The second principle is that how adults read has no necessary relationship to how beginners read or to the teaching of reading. I shall consider these two principles in turn.

The fact that English spelling is approximately letter-to-phoneme does not imply that readers of English use this alphabetic principle in either reading or pronunciation. The "rules" of English orthography and phonology (e.g., Chomsky & Halle, 1968; Venezky, 1970) are *linguistic descriptions* of the spelling-to-sound structure of the language. While such proposals may suggest hypotheses about the *linguistic knowledge* that a reader of the language might have, they were not intended as psychological representations of that knowledge. Whether readers "know the rules," and whether they represent this knowledge explicitly as rules, remain empirical issues. Indeed, the evidence for the use of spelling-to-sound rules as they are typically proposed is equally consistent with the suggestion that readers use specific rules for multiletter spelling patterns or use analogies with existing words (Baron, 1977; Brooks, 1977; Glushko, in press). Brooks (1978) has argued that the conditions under which beginners learn to read are not well-suited to the analysis and explicit representation of the spelling-to-sound structure of the language.

Similarly, the symbol-to-morpheme orthography of Chinese does not imply that a phonological code plays no role in reading Chinese. Chinese readers have difficulty understanding sentences with characters with similar-sounding names (Tzeng, Hung, & Wang, 1977). Chinese words may be recognized on the basis of purely visual characteristics, but they appear to be translated into a sound-related code in working memory. Some form of phonological storage may be involved in sentence comprehension in all languages (see Kleiman, 1975), regardless of the nature of the representation by which the lexical items are accessed from memory.

To infer from experiments with adult readers how beginners read or ought to be taught would ignore the considerable differences in the cognitive capacities of the two populations. Five-year-olds with pre-operational logical ability may face in reading a hopeless task of memorization, only to have it transformed into a much simpler exercise as emerging operational cognition allows them to extract analytic regularity. In an alphabetic orthography, these five-year-olds must first overcome the cognitive stumbling block of understanding the abstraction of the phoneme, but if they encounter English as a second language when they are fluent readers of Spanish, French, or Russian, this intellectual barrier is long behind them. Psychology knows too little about the fundamental changes in the representation and use of knowledge that must result from thousands of hours of practice at reading, but at least it recognizes that it can no longer ignore them (LaBerge & Samuels, 1974; Rumelhart & Norman, 1977).

READING READINESS

If the "optimal" orthography depends on the nature of the spoken language and the cognitive capacities of a language user, the "reading readiness" is no universal condition or unitary skill. A child's readiness to read depends on the language being read. The major insight of Rozin and Gleitman's (1977) reading curriculum is that the "idea of reading" is more intuitive in a logographic or morpheme-based orthography than in an alphabetic one. In a sense, they suggest that children are ready to read Chinese before Japanese, Japanese before a "regular" alphabetic orthography like Spanish or Finnish, and only later can progress to English with its complex spelling-to-sound structure. Studies of bilinguals learning to read orthographies of different types should confirm this claim.

Even for beginners in a given language, reading readiness is multidimensional. Different reading teachers may emphasize different aspects of adult reading skills; the teacher who views reading as an oral performing art and thus emphasizes decoding imposes different perceptual and cognitive prerequisites than the teacher who emphasizes comprehension from the beginning. In any case, a framework which focuses on the interaction of the target orthography and the cognitive preparation of the beginning reader pinpoints the need for individualized reading instruction.

A new reading methodology

These brief comments about the optimal orthography, cognitive demands, and reading readiness highlight the large gap between reading research in the laboratory and the application of that research in the classroom. The problems of evaluating a theoretically-based reading curriculum *in vivo* are severe (Rozin & Gleitman, 1977), while "rigorous" classroom experimentation tends to be obtrusive. Though classroom experiments are mercifully short, this technique leads to cross-sectional rather than longitudinal study, which would be preferred in a context so full of individual differences.

These and other barriers to a scientific pedagogy of reading may be eliminated by computer control of some aspects of reading instruction. The repetitive aspects of learning to read — practice at sounding out words and seeing difficult words in print — would be better controlled by a computer which could tailor the instruction to individual needs and cognitive capacities. Unlike the computer-assisted instruction of the past decade, which required large and costly computers, microprocessor-based systems are fast becoming portable and inexpensive. For the cost of the movie projector and television now found in many classrooms, computer experimentation and instruction may soon be possible (Bowles & Hollan, 1978). Rather than facing the difficult task of translating experimental reading research into educational practice, psychologists and teachers may soon be able to merge unobtrusive experimentation with reading instruction.

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COULTHARD, M. *An introduction to discourse analysis*. London: Longman, 1977.

Sinclair and Coulthard present a system for the description and coding of classroom discourse, based on Halliday's conceptions of the organization of language. A distinction between *levels* of grammar, discourse, and non-linguistic organization is argued for. Grammar includes the traditional structural elements organized into a hierarchy of *ranks* including sentence, clause, and word. Non-linguistic organization refers to the situation (for the classroom, ascending ranks of topic, period, and course). Between the levels of non-linguistic organization and grammar, but overlapping these two levels at their respective lower and upper ranks is the functional level of discourse, the object of this reported research.

The lowest rank of discourse is the act, that unit connected with what a speaker is using an item for, e.g., to elicit a response, to bid for the floor, to give a clue, etc. It is difficult to see how some of these acts, e.g., the act of an "aside," can be termed a use of language. Above the level of act is that of move, of which there are just five classes: framing, focussing, opening, answering, and follow-up (the latter three moves, with different names, are found in almost every description of classroom discourse). The moves themselves have internal structure consisting of optional signal and prehead, obligatory head, and optional post-head and select. Each of these structural pieces of the move are realized by characteristic functional acts.

Next up the rank hierarchy are exchanges, of which there are two major classes: boundary, those which function to signal the beginning or end of a stage in the lesson; and teaching exchanges. Teaching exchanges may be categorized according to function, e.g., teacher inform, teacher direct, pupil elicit, listing, re-initiation, reinforce, repeat, etc. These exchanges are composed of sequences of opening, answering, and follow-up moves or some subset or iterative set of them. In a much more speculative and less well-illustrated discussion, the two highest ranks of transaction and lesson are touched on.

Some sample analyzed texts are given. Finally the authors present an interesting discussion of a possible model for discourse, pointing out most importantly the successively more difficult problem of associating speaker goals and choices (discourse meaning?) with characteristic surface linguistic patterns as the analysis moves up the rank scale of the discourse level.

Coulthard's book is perhaps inappropriately titled. It should be called *Introduction to Interactive Discourse Analysis*, for there is no discussion of monologue discourse. The book is a literature review and serves nicely as an introduction to linguistic and sociolinguistic work on (mostly English) discourse analysis. The book consists of brief chapters on different aspects of discourse.

There is a chapter (11-29) briefly reviewing philosophical and linguistic work on speech acts, a chapter (30-51) briefly reviewing work by Hymes and other sociolinguists concerned with the ethnography of speaking, and a more lengthy chapter (52-92), especially good for the uninitiated, reviewing and presenting some critique of the conversational analysis work of Sacks, Schegloff, Jefferson, and Labov among others. The classroom interaction chapter (93-115) presents a review of Sinclair and Coulthard's book, along with some very important criticisms, especially the observation that long stretches of monologue discourse in the classroom are not handled very well by the descriptive system. The next chapter (116-137) reviewing work on intonation, particularly that of Brazil, convinces the reader that any description or analysis of discourse that ignores suprasegmental information will miss much of the speaker's intended message. Finally, there are very brief chapters on discourse analysis and language teaching (138-153), the acquisition of discourse (154-169), and the analysis of literary discourse (170-181), which uses as examples conversational discourse from a play.

As noted at the beginning of this review of Coulthard, a chapter or two on monologue or expository discourse is sadly lacking, This is understandable, however, as there has been little satisfactory work in this area, perhaps because while it is fairly simple to see the motivations and goals of the participants in a talk exchange, it is much more difficult to get inside the head of a writer. In the case of written material judged somewhat incoherent, we cannot necessarily know what was intended in the first place, and so, unlike conversational discourse, where the analyst may note that the listener has initiated a repair sequence, monologue discourse, being uninterruptable, poses greater problems for the analyst. Coulthard, in his concluding remarks, does speak to this issue. He notes, importantly, that analysts of written discourse have for the most part ignored the fact that readers do interact with the text, stopping and asking questions about previous material or about what will be coming next. Further, the writer might indeed anticipate some of the reader's interaction and so consider this in the construction of the text. Thus, an interactive model is a possibility for written or monologue discourse.

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