ON THE INDEPENDENCE OF DISCOURSE STRUCTURE
AND SEMANTIC DOMAIN

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1. THE STATUS OF DISCOURSE STRUCTURE

Traditionally, linguistics has been concerned with units at the level of the sentence or below, but recently, a body of research has emerged which demonstrates the existence and organization of linguistic units larger than the sentence. (Chafe, 1974; Goguen, Linde, and Weiner, to appear; Grosz, 1977; Halliday and Hasan, 1976; Labov, 1972; Linde, 1974, 1979, 1980a, 1980b; Linde and Goguen, 1978; Linde and Labov, 1975; Polanyi, 1978; Weiner, 1979.) Each such study raises a question about whether the structure discovered is a property of the organization of language or whether it is entirely a property of the semantic domain. That is, are we discovering general facts about the structure of language at a level beyond the sentence, or are we discovering particular facts about apartment layouts, water pump repair, Watergate politics, etc? Such a crude question does not arise with regard to sentences. Although much of the last twenty years of research in sentential syntax and semantics has been devoted to the investigation of the degree to which syntactic structure can be described independently of semantics, to our knowledge, no one has attempted to argue that all observable regularities of sentential structure are attributable to the structure of the real world plus general cognitive abilities. Yet this claim is often made about regularities of linguistic structure at the discourse level. In order to demonstrate that at least some of the structure found at the discourse level is independent of the structure of the semantic domain, we may show that there are discourse regularities across semantic domains. As primary data, we will use apartment layout description, small group planning, and explanation. These have all been found to be discourse units, that is, bounded linguistic units one level higher than the sentential level, and have all been described within the same formal theory. It should be noted that we do not claim that the structures found in these discourse units is entirely independent of structure of the semantic domain, because of course the structure of the domain has some effect.

2. TREE TRANSFORMATIONS IN DISCOURSE PRODUCTION

The discourse units mentioned above have all been found to be tree structured. This is a claim that any such discourse can be divided into parts such that there are significant relations of dominance among these parts. These trees can be viewed as being constructed by a sequence of transformations on an initial empty tree, with each transformation corresponding to an utterance by participants, which may add, delete, or move nodes of the tree. The sequence of transformations encodes the construction of the discourse as it actually proceeds in time.

We now turn to a discussion of the discourse units which have been analysed according to this model.

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2.1 SPATIAL DESCRIPTIONS AS TOURS

In an investigation of the description of spatial networks, speakers were asked to describe the layout of their apartment. The vast majority of speakers used a "tour strategy," which takes the hearer on an imaginary tour of the apartment, building up the description of the layout by successive mention of each room and its position. This tour forms a tree composed of the entry to the apartment as root with the rooms and their locations as nodes, and with an associated pointer indicating the current focus of attention, expressed by unstressed you.

It might be argued that the tree structure of these descriptions is a consequence of the structure of apartments rather than of the structure of discourse. However, there are apartments which are not tree structured, because some rooms have more than one entrance, thus allowing multiple routes to the same point; but in their descriptions, speakers traverse only one route; that is, loops in the apartment are always cut in the descriptions.¹ Thus, although some of the tree structure may be attributable to the physical structure being described, some of it is a consequence of the ease of expressing tree structures in language, and the difficulty of expressing graph structures.

The tree structure of apartment descriptions is constructed using only addition transformations, and pointer movement transformations (called "pops" in Linde and Goguen (1978)) which bring the focus of attention back from a branch which has been traversed to the point of branching. The construction of the tree is entirely depth first.

2.2 SPATIAL DESCRIPTIONS AS MAPS

In describing apartment layouts, there is a minority strategy, used by 4% of the speakers (3 out of 72 cases of the data of Linde (1974)) describing the layout in the form of a map. The speaker first describes the outside shape, then sketches the internal spatial divisions, and finally labels each internal division. This strategy can also be described as a tree construction, in this case, a breadth first traversal with the root being the outside shape, the internal divisions the next layer of nodes, and the names of these divisions the terminal nodes. Because there are so few examples, it is not possible to give a detailed description of the rules for construction.

2.3 PLANNING

We have argued that the structure of apartment layout descriptions is not entirely due to the structure of the semantic domain; however, a question remains as to whether it is the restriction to a limited domain which permits precise description. To investigate this, let us consider the Watergate transcripts, which offer a spectacularly unrestricted semantic domain, specifically those portions in which the president and his advisors engage in the activity of planning. (Linde and Goguen, 1978). Planning sessions form a discourse unit with

¹ In more mathematical language, the linear sequence of rooms is the depth first traversal of a minimal spanning tree of the apartment graph.

discernable boundaries and a very precisely describable internal structure. Although we can not furnish any detailed description of the semantic domain, we can be extremely precise about the social activity of plan construction.

Because the cases we have examined involve planning by a small group, the tree is not constructed exclusively by addition, as are the types discussed above. Deletion, substitution, and movement also occur, as a plan is criticised and altered by all members of the group.

2.4 EXPLANATION

A discourse unit similar to planning is explanation. (Weiner, 1979; Goguen, Linde and Weiner to appear.) (By explanation we here include only the discourse unit of the form described below; we exclude discourse units such as narratives or question-response pairs which may socially serve the function of explanation.) Informally, explanation is that discourse unit which consists of a proposition to be demonstrated, and a structure of reasons, often multiply embedded reasons, which support it. The data of this study are accounts given of the choice to use the long or short income tax form, explanations of career choices, and material from the Watergate transcripts in which an evaluation is given of how likely a plan is to succeed, with complex reasons for this evaluation.

Like apartment descriptions and small group planning, explanation can be described as the transformational construction of a tree structure. Since in the cases examined, a single person builds the explanation, there are no reconstructive transformations such as deletion or movement of subtrees; the transformations found are addition and pointer movement. Pointer movement is particularly complex in this discourse unit since explanation permits embedded alternate worlds, which require multiple pointers to be maintained. Explanation structure appears to be the same in the three different semantic domains, suggesting that the discourse structure is due to general rules plus a particular social context, rather than being due to the structure of the semantic domain.

3. CRITERIA FOR EVALUATING DISCOURSE STRUCTURES

The criticism might be made of these tree structures that an analyst can impose a tree structure on any discourse, without any proof that it is related to what the speaker himself was doing. We would claim that although we have, of course, no direct access to the cognitive processes of speakers, there are two related criteria for evaluating a proposed discourse structure.

3.1 TEXT MARKING

One criterion for judging the relative naturalness of a particular analysis is the degree to which the text being analysed contains markers of the structure being postulated. Thus, we have some confidence that the speaker himself is proceeding in terms of a branching structure when we find markers like "Now as you're coming into the front of the apartment, if you go straight rather than go right or left, you come into a large living room area," or "On the one hand, we could try ..." The opposite case would be a text in which the division postulated by an analyst on the basis of some a priori theory had no semantic or syntactic marking in the text.

3.2 FRUITFULNESS OF THE ANALYSIS

A second criterion is whether some postulated structure is fruitful in generating further suggestions for how to explore the text. Thus, the tree analyses of apartment layout descriptions, planning, and explanation,

give rise to questions such as how various physical layouts are turned into trees, how trees are traversed, the social consequences of particular transformations, the apparent psychological ease or difficulty of various transformations, the relation of discourse structure to syntactic structure, etc. (see Linde and Goguen, 1978) By contrast, an unfruitful analysis will give rise to few or no interesting research questions, and will not permit the analyst to investigate questions about the discourse unit which he or she has reason to believe are interesting.

4. GENERAL PRINCIPLES OF DISCOURSE STRUCTURE

Given that these postulated structures are useful models of what speakers do, we may ask how it is that speakers produce texts with these structures. It is known that children must learn to produce well-formed narratives. It might be hypothesized that each discourse unit must be separately learned, and that each has its own unrelated set of rules. However, there is evidence that there are very general rules for discourse construction, which hold across discourse units, and which can be used to construct novel discourse units. The test case for such a hypothesis is the production of a discourse unit which is not a part of speakers' ordinary repertoire, but rather, is made up for the occasion of the experiment. Such an experiment was performed by asking people to describe the process of getting themselves and their husbands and children off to work in the morning. (Linde, in preparation) These "morning routines" are typically well-structured and regular; everyone appears to do them the same way. We know that the speakers had never produced such discourses before, since we never in ordinary discourse hear such extended discussions of the details of daily life. (Even bores have their limits.) Therefore, the regularities must be the product of the intersection of a particular real world domain, in this case, multiple parallel activities, with very general rules for discourse construction.²

4.1 META-RULES OF DISCOURSE STRUCTURE

We are by no means ready to offer a single general theory of discourse structure; that must wait until a sufficiently large number of discourse types has been investigated in detail. However, the following rules have been observed in two or more discourse units, and it is rules of this type that we would like to investigate in other discourse units.

1. The most frequent subordinator for a given discourse unit will have the most minimal marking in the text, most frequently being marked with lexical and. Moreover, it will not be necessary to establish this node before beginning the first branch, but only when the return to the branch point is effected.
2. All other node types which subordinate two or more branches, such as exclusive or or conditional, must be indicated by markers in the text before the first branch is begun.
3. Depth-first traversal is the most usual strategy.
4. Pop markers are available to indicate return to a branch point or higher node; it is never necessary to recapitulate in reverse the entire traversal of a branch.

² This is interesting for the light which it sheds on natural structures for the description of concurrent activities.

5. CONCLUSIONS

The reason for being interested in regularities of discourse structure, particularly regularities which hold across a number of discourse types, is that they suggest universals of what is often called "mind," and, more practically, they also suggest features which might be part of systems for language understanding and production. Indeed Weiner (to appear) has constructed a system for the production of explanations of U.S. income tax law based on the transformational theory of explanation discussed in section 2.4. There is, moreover, the possibility of designing meta-systems, which might be programmed to handle a variety of discourse types.

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