

THEME VS. CONTEXT¹

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Psycholinguistic research has often found that there are differences in the processual strategies employed in dealing with ambiguous sentence structures (for a complete review of this experimental paradigm, see Kess and Hoppe, 1981). Some early studies had even suggested that there might be a hierarchy of ordering in the processing of ambiguity at different linguistic levels in language, for example, the lexical, the surface structure, and the underlying structure levels. These findings revolve around the contrast made between ambiguous and unambiguous sentences, insofar as psycholinguistic differences have been reported for processing the two sentence types. The basic comprehension question comes down to a theoretical dispute between whether individuals process one meaning for a given ambiguous sentence (the single meaning approach) or compute both or multiple meanings of an ambiguous sentence (the double or multiple meaning approach), despite their being unaware of the ambiguity. The ultimate question, of course, is how are ambiguous sentences resolved? Given their absolute pervasiveness in the language and the relative ease which they are dealt with, the processes underlying this task must also be important components in explaining sentence comprehension in general.

The study of ambiguity has been a central issue in the formulation of generative linguistic theory, and has consequently been an area which serious psycholinguistic study has also focussed upon in the past two decades. However, the results have been to some degree equivocal in that a reading of the experimental evidence provides no easy answer as to whether ambiguous sentences make for differences in processing and comprehensional strategies. Many psycholinguistic studies have noted that sentences which are ambiguous will exhibit processing differences in a variety of tasks. For example, they have been said to differ from normal unambiguous sentences in such tasks by usually taking longer to deal with or process in the manner prescribed by the experimental design. The implication that arises from such results is that ambiguous sentences are more difficult to deal with, and like negative sentences, this may be ascribed to the fact that they are inherently more complex in some cognitive sense.

Either way one looks at the question, it presents an interesting face. If ambiguity is not really a practical processing problem, why is it not? When considering the many possible readings that so many sentences can have, how do we manage to ignore all or most of the readings and finally decide on the correct one? This version, corresponding to the seemingly common-sense single-reading view seems intuitively correct, but what underlies such

single-reading decisions is yet open to definition. Context is the obvious candidate, but we have yet to provide a full computation of what an exhaustive and exclusive context can always be counted on to be. On the other hand, if the counter-intuitive multiple-reading approach is correct, then there are likely to be obvious implications for this fact. We should find out what they are with due haste, though very little direct effort seems to have been expended in this direction to date. If more than one reading is processed, and this affects processing times or whatever, we wonder how, why, and whether ambiguity always makes for processing differences? Unlike negatives, which also seem to exhibit this feature of processing complexity, ambiguities do not exhibit overt markers; and the number of potential ambiguities is startling when one begins to look for them.

The question regarding ambiguity may be restated as follows: Is it the case that at some level of performance all possible readings of an ambiguous sentence are processed, one of which is finally selected at some point in the overall comprehension process? Or is it the case that ambiguous sentences are treated exactly like unambiguous ones and that only one reading is ever computed for any given ambiguous sentence? The latter version leads one to expect that some contextual circumstance so severely constrains the possible readings of the sentence that only one is possible. If only one reading is possible, there should be no differences at all in the treatment of ambiguous sentences as opposed to unambiguous sentences.

There is, of course, a third possible model of ambiguity comprehension, one which places sentences in a larger discourse context. An interpretation is thus immediately given to a sentence, it being the most likely or most plausible one. That interpretation is then rejected only in those instances where some conflict occurs between the first choice interpretation and other information. Thus, though a single interpretation may be chosen which eventually turns out to be the wrong one, it is still the case that a single-reading interpretation is made. In such cases, the first interpretation is rejected and a processing search for the correct interpretation is set into motion for the next likely choice (see Kess and Hoppe, 1981, for a review of the variants of the ordered access hypothesis). This ordered approach notion not only provides some explanation for 'garden path' sentences, but also for our treatment of sentences for which no immediately germane theme is available. For an example of the former, Lashley's classic 'garden path' sentence (1951) Rapid/raytI / with his uninjured hand saved from loss the contents of the capsized canoe is typical of one reading being seized upon, only to be contradicted backwards by the extraction of a following theme. The re-tracing of syntactic steps is apparent here and suggests a way of resolving the comprehension of somewhat more common ambiguous sentences by forward theme advancement in discourse.

This paper suggests that when potentially ambiguous sentences are embedded in larger discourse units with logically germane theme structures, they are immediately assigned a single reading and do not differ from other sentences in the comprehension stage. Very simply, thematic constraints must operate in discourse processing in such a way as to make the comprehension of ambiguous sentences parallel to unambiguous sentences.

To a certain degree, the often equivocal experimental results we have seen are thus a function of the experimental design. Like much earlier linguistic research, many psycholinguistic investigations into ambiguity typically considered processual dimensions of sentences which appeared in complete or semi-isolation. Those which have employed context are few and the context minimal; most importantly, the context was typically not the continuation of a recognizable thematic organization. Logical and thus comprehensional constraints are imposed by thematic structures in the longer well-integrated discourse sequence. According to Van Dijk's (1977) analysis of the pragmatics of discourse, such macro-structures have two major cognitive functions, that of reducing and integrating information as well as organizing it. The application of the notion of thematic structures to the problem of ambiguity resolution offers an explanation of how sentences with multiple readings are dealt with in processing larger well-integrated sequences. Psycholinguistic discussions to date have dealt with the form of disambiguation and not the format; the notion of macro-structures at the higher processing levels answers the way in which disambiguation must proceed for many ambiguous sentences. The model is analogous to visual perception in Gestalt terms, where the whole is greater than the sum of its parts. In this case, the whole is provided by the organizing gestalt of the discourse theme or themes, so that only one interpretation is allowed, with one reading settled upon immediately. This interpretation explains why sentences which are in fact ambiguous are rarely perceived to be ambiguous in running discourse. Many grammatical or semantic possibilities are not even considered, having been ruled out by their failure to logically relate to a theme.

Attention must be paid to the relevance of context within larger units of discourse. But simply thinking of preceding verbiage as sufficient context is not enough--theme is the key word, not context. Typically, experiments with context have offered a single preceding word or possibly even an entire sentence as context. Upon closer examination, however, even such sentential contexts can be seen to break down into a single word or two which is potentially relevant to the single reading in question. Now it is true that one can tune ambiguous sentences to different degrees of bias by manipulating the semantic variables, and some illustration of this is even provided in this paper. It is not the case, however, that an ambiguous sentence has two equally probable meanings. There may be some value to this experimental heuristic when dealing with sentences in isolation, but even here hearer-readers

seem to employ an ordered access approach. Even if ambiguous information were relegated to the working memory with all of the readings intact and possible until decision point, it is likely that such information is presented to the working memory in an efficient hierarchically-ranked ordered sequence, depending on frequency and plausibility considerations. This must take place even in the absence of context, since there is a generally ordered ranking in terms of likelihood variables for syntactic and semantic items.

As soon as sentences appear in discourse context, however, the illusion quickly disappears. Here one can again make use of Van Dijk's (1977) eminently sensible suggestion that discourse in language consists of sequences of sentences, the properties of which are logically and informationally accounted for only in reference to those preceding sentences of which the individual token is but a continuance. This view casts individual sentences in the role of tiles in a mosaic, the complete picture of which is seen only by looking at the totality of the piece, and which in turn gives each individual tile its particular meaningfulness. The view of the sentence as the basic or optimum unit for description is often limiting in the psycholinguistic analysis of production and comprehension, for sentence processing is often satisfied only in reference to a larger set of abstract themes within the text. Such theme considerations aid the cognitive tasks of organizing the input for both processing and memory storage for eventual retrieval. The question then becomes not so much whether a given sentence in discourse is ambiguous or not, but whether the thematic proposition can be clearly stated in respect to the sentence. The potentially ambiguous sentence then is processed as a logical consequence or implication of that theme or subtheme. Note that one can still have ambiguity in the sentence despite the presence of large amounts of so-called context. The sentence Many New Yorkers would never miss the ballet remains ambiguous despite being placed after a paragraph of generally related prose. The following paragraph (1) offers an example of this.

(1) People who live outside of New York tend to think that the city has a strong feeling for culture. Many think that of all places in North America the arts occupy a special niche there. Naturally, the performers are keen to keep this spirit alive. How wonderful it would be for a dancer to always have an appreciative audience, an assured and sympathetic following. Knowledgeable ballet enthusiasts know the arts scene there. Many New Yorkers would never miss the ballet.

If the paragraph is changed by one sentence, the ambiguity disappears because the logical sequencing of the discourse only allows the sentence to be taken as an extension of the new preceding counterpoint sentence The truth, however, is very different indeed. In addition, though the preceding paragraph could be

otherwise kept the same, one could also set the bias further by slightly altering the third sentence, substituting ...certainly wish that the myth were true for ...are keen to keep this spirit alive. Note the differences effected in paragraph (2) by these changes.

(2) People who live outside of New York tend to think that the city has a strong feeling for culture. Many think that of all places in North America the arts occupy a special niche there. Naturally, the performers wish that the myth were true. How wonderful it would be for a dancer to always have an appreciative audience, an assured and sympathetic following. The truth, however, is very different indeed. Many New Yorkers would never miss the ballet.

That this can also occur in surface and underlying ambiguity is obvious, as paragraph (3) exemplifies, for the surface structure ambiguity The old men and women did not cooperate. It could be possible, of course, that two readings are processed when the discourse theme is neutral to the intended reading of the sentence, but from the point of view of processual parsimony it is likely that even here a single reading is selected.

(3) Planning the social events for a hospital ward can be difficult. At Christmas time we always arrange at least one get-together party, a social when we decorate the tree, and a festive Christmas dinner. We try to get the patients into the Christmas spirit by asking everyone to give a present to someone else in the home. Unfortunately, last year the whole thing was a failure from beginning to end. The old men and women did not cooperate.

The point to be made, of course, is that ambiguity is not resolved a priori at the level of context, simple by the ambiguous sentence being surrounded by sentences. Notice that in paragraphs (1) and (3) the mere fact of having a context does not necessarily serve to completely disambiguate the sentence, despite its being 70 to 80 words long and even being generally related. Resolution depends upon the accessibility of an unambiguously stated, logically relevant discourse theme or subtheme. However, it may also be the case that even when sufficient information to make the correct inferences is present, the expectation ratio may not be sufficiently high to always produce the appropriate reading. Take paragraph (4) as an example.

(4) The boat was sinking fast. With insufficient life-jackets to go around, the captain had to decide who should use the available life-saving equipment. He decided that the crew, the children, and the young men should have first priority. Not surprisingly, this de-

cision caused much tension and dissension among the passengers. Fights and arguments broke out everywhere as the life-jackets were being distributed. There was chaos everywhere. The old men and women did not cooperate.

Here there are two possible readings: The elderly people did not cooperate and The elderly men and the women did not cooperate. It is still possible for some hearer-readers to have the first reading instead of the second, through having only incompletely processed all the incoming information. Very simply, the dominant themes of the boat sinking and chaos reigning relegate the information relevant to our ambiguity to a fairly minor status in our discourse. It is then the potential ambiguity of the sentence, coupled with the low-level status of the relevant information, which may allow a reading which is incorrect in the strict sense. Had the relevant information been moved up to dominant theme status, however, it is not likely that the first reading would occur.

What this paper does claim, then, is that for discourse sequences in which there is an easily recognizable and relevant dominant theme the possibility of any second reading is diminished to the point of processing it just as any other single-reading sentence. In these instances, a dominant theme is seen as overriding all aspects of the discourse, organizing the contribution of each sentence to the theme itself. Furthermore, other expectations deriving from frequency of appearance, past experience and general world knowledge, and connotative bias are not forceful enough to intrude into the comprehension stage. In these instances, ambiguous sentences are given but a single reading. One can contrast the preceding failure to clearly disambiguate with the following sentences which are readily relegated to discourse themes allowing only one reading of the sentence. Examples are offered in each of the areas of lexical (paragraphs 5 and 6), surface structure (paragraphs 7 and 8), and underlying structural (paragraphs 9 and 10) ambiguity. Themes are listed after the paragraph in parentheses.

(5) When the Broadmead tract was opened to development, many local people wanted to restrict housing to two-acre holdings. The real estate companies, on the other hand, wanted to see largescale development in the area with four houses built per acre. The real estate salesman was delighted when city council approved the new zoning bylaw calling for building sites of no more than 4000 square feet. The salesman wanted lots of that size.

Themes: (Real estate development occurred.)
(Building sites were of a certain size.)

(6) The Pendleton sweaters in size 40 had sold out in three days and the new shipment from the factory included only three in that size. It was too late to order

any more in; the factory had already started to produce summer stock. The salesman called all the other clothing stores to locate as much stock as he could for the many eager customers he had waiting. The salesman wanted lots of that size.

Themes: (Sweaters of a certain size were a popular sales item.)
(The salesman was searching for more.)

(7) Whatever the reason, poor Mayor Jones had obviously grown enormous during his ten years in office. He had grown so gross that his wife began to be embarrassed by his size. When the town's new swimming pool was opened, the mayor and his wife were asked to take the first dip. Mrs. Jones thought about it, and about her husband's size. Then she refused to go. The stout mayor's wife stayed home.

Themes: (The mayor was fat.)
(The wife was embarrassed.)

(8) When her husband was elected mayor, Mrs. Jones decided that she would have to lose weight. She wanted to go to the inaugural ball in a beautiful dress, but she had grown so fat that she couldn't find a gown to fit her. She dieted and exercised, but to no avail. As soon as she lost a pound she would gain two. The night of the ball arrived. The stout mayor's wife stayed home.

Themes: (The wife was fat.)
(The wife stayed home.)

(9) In twenty-five years as an architect, Mr. Doe had never before received the least recognition for his work. His colleagues were surprised that he decided to submit his design for the new satellite community to the district planners. He did not expect his plan to be chosen, but he thought his ideas were innovative as well as practical. When the selection was finally made, the modest architect was soon famous. The planning of the community was brilliant indeed.

Themes: (Mr. Doe was an architect.)
(Mr. Doe submitted plans for the new community.)

(10) What a way to celebrate the centennial year! The best thing about the party was that everyone in town helped plan it and everybody had a hand in it. The whole town divided up into neighbourhoods which each planned a part of the festivities. Some districts planned the entertainment, while others organized the re-

freshments. One group even arranged a parade with a special guest star. Everyone enjoyed himself thoroughly. The planning of the community was brilliant indeed.

Theme: (There was a celebration.)
(The community planned the celebration.)

We expect the important information to be extracted, thus organizing processing for comprehension around these critical points. The information processing task is reduced by the heuristic of theme selection from the ongoing discourse. Theme constraints provided a unifying backdrop to which continuing input can be linked and through which inferences can be made on the incoming speech. Not all speech input requires inferences, nor is all linked directly to the main themes, but whenever the input is relevant to the theme in question, comprehensional decisions are made as to where the new piece fits. Discourse themes not only organize the comprehension of complex informational input at the time of processing, but probably also pre-organize it for entry into memory. To complicate the processing side of ambiguous sentences by insisting upon a multiple-reading interpretation in all cases seems to unnecessarily over-qualify comprehension procedures. This may happen in some, but certainly not all cases. When present, relevant discourse themes exert their own contextual constraints, limiting ambiguous sentences to a single reading. The real question for psycholinguistic analysis, then, is more how semantic and pragmatic considerations contribute to inferring relevant themes which in turn constrain the possible readings of a sentence to a single interpretation, not whether both readings are concurrently processed. To answer this question will require us to replace the notion of context with the more refined and useful concept of theme if we are to understand the processing of ambiguous sentences.

NOTES

1. An earlier version of this paper was presented at the VI International Congress of Applied Linguistics, held at the University of Lund, Sweden, August 9-15, 1981.

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