

A TEXT-BASED ANALYSIS OF NON-NARRATIVE TEXTS*

Most linguistic theories are concerned with the rendering explicit of what ordinary speakers find intuitively acceptable. Specifically, a linguistic theory is to provide rules for sentence well-formedness. A step forward is taken by recent researchers into text well-formedness. The conditions for text well-formedness can be viewed as requirements on either the surface structure or the semantic organization of the text. This study is a research into the constraints on the semantic structure of the text.

In this study text well-formedness is defined in terms of the Relevance Requirement. On this view, a text is well-formed if all its main assertion propositions are relevant to a Topic of Discourse (DT). Thus, Relevance is viewed as a relation between a proposition or a set of propositions and a DT. To be able to account for text well-formedness, then, it is necessary to make explicit the notions of Relevance and DT. My suggestion here is to explicate the above notions in cognitive terms. Specifically, I propose here the application of categorical organization (in the sense established by Rosch) to non-narrative texts. Such texts, I argue, get organized in the way categorial concepts are formed.

1. Introduction

The main thrust of psychological research into the structure of texts is concerned with the schematic organization of the events and scenes that make up narratives. A scheme (or frame, to use Minski's 1975 term) is a cognitive structure – an organized representation of a body of knowledge – which is spatially and/or temporally organized. Most recent research concerning text processing attests to the fact that narrative texts are processed in terms of schema (Rumelhart 1975, for instance). On the basis of Mandler's (1979, 1984) distinction between schematic and categorical organization, I propose here the application of categorical organization to non-narrative/

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expository texts. For the purpose of this paper, expository/informative texts are those that convey maximum information in the most economical and efficient way, in terms of processing. Such texts, I will argue, get organized in the way categorical concepts are formed.

Like schematic organization, categorical organization refers to hierarchically arranged cognitive structures, which govern our understanding of the relationships among superordinate, subordinate and coordinate classes. Since I propose to study text organization in categorical terms, the main concern of this paper lies in the rules that govern categorical classifications (see Section 2.3.1.2). However, before attempting the projection of categorical organization on the structure of non-schematic texts, let me first propose a processing discourse model. The following (Section 2) therefore, is a brief discussion of my previous attempts (Giora 1985a, 1985b, 1985c) to draw a context set (discourse model) for the text.

2. A Discourse Topic Oriented Context Set for the Text

Giora (1985a) models a context set for the text along the lines suggested by Reinhart (1981) for the construction of the context set for the sentence. Reinhart views the context set for the sentence as organized under local entries in the form of Sentence Topics (STs). The context set for the text, however, is viewed as organized under global entries in the form of Discourse Topics (DTs). The DT of a given text segment is defined as the element relative to which the whole set of propositions (of that segment) is taken to be "about". Given this view, the discussion of discourse organization, then, has to cope with the notion of DT. The treatment of DT discussed here is handled within the framework of a theory of Relevance.

2.1. *On the Definition of Relevance*

Given the assumption that informative/expository texts convey information in the most economical and efficient way, the Relevance Requirement is viewed as a necessary condition for text well-formedness. Thus in a previous work of mine Giora (1985b) I show that a text or a text segment is well-formed i.e., coherent if all its main assertion propositions are either relevant to a DT or marked either as digression or as subordinate to the immediately preceding main assertion proposition. Thus Relevance is viewed as a relation between a proposition or a set of propositions and a DT.

It means that for a set of propositions to be relevant they must be interpretable as being "about" that DT (for a different view see Appendix).

Clearly, an explicit formulation of the Relevance Requirement stipulated above necessitates both the explication of the notion of DT and that of the "aboutness" relation. I will start by specifying the notion of pragmatic "aboutness".

2.2. *Pragmatic aboutness*

Rather than treating the relation of "being about" from a philosophical perspective (Goodman 1972, for instance), the formulation of the relation of "being about" is viewed here as derived from what we know about text processing. The assumption is that the way readers process a text, that is, the procedures a reader puts into effect while interpreting what the text is about, are conducive to the formulation of the aboutness relation.

Following Strawson (1964) and Stalnaker (1978) Reinhart (1981) views the processing model for the sentence as reflecting the way our knowledge expands – the way we add the propositional content of a sentence or an utterance to our knowledge store. The process of expanding our knowledge according to Reinhart is twofold: we first assess the truth value of a proposition about to be added to our knowledge store. Having found no reason to reject it as false, we then add it to the set of propositions already in our context set. Going beyond Strawson and Stalnaker, Reinhart claims that these two procedures are Topic-oriented.

Thus, to assess the truth value of 'all crows are black', for instance, we check the members of the set of crows to see if any of them is not black, rather than checking the non-black things to see if any of them is a crow. Though in principle both of these strategies are feasible, in practice we follow the first because we view the formulation that 'all crows are black' as classified under crows, and it is our knowledge of crows that we search in order to assess this proposition. The strategy of assessing the truth value of a given message is thus Topic-oriented, in the sense that it is our knowledge of the Topic of a given proposition that affects the process of verification.

The addition of the propositional content of a statement is similarly relative to a Topic: It is implausible to assume, for reasons of cognitive economy, that we store lists of propositions (the range of recall being seven items or so), and Reinhart thus suggests that the storage procedure, too, be construed as Topic-oriented. She argues this by reference to the catalogue

metaphor, where Topic functions as an entry under which we classify and store information. Topics, then, instruct the reader of the construction of a context set: having assessed a proposition relative to its Topic constituent, the reader stores it under an entry corresponding to that Topic. A Topic, then, is attributed the *cognitive function* of an entry which is interpreted as an instruction from a writer to a reader on how to construct a discourse model.

The account of sentence processing is thus viewed as centering around the notion of Sentence Topic: for a sentence to be “about” a Topic is to be *assessed* and *stored* relative to that Topic.

2.3. On the Construction of a DT-Oriented Context Set

Along the lines suggested for the construction of a context set for the sentence, we proceed now to a description of the context set for the text. The cognitive principles which are viewed here as restricting the construction of the context set for the sentence are assumed for the construction of the context set for the text as well. However, the passage from the sentence level to the text level necessitates some modification of the underlying concepts. Thus, instead of an organization under local entries in the form of Sentence Topics, the context set for the text is viewed as organized under global entries in the form of DTs. In this view, for a text to be “about” a DT it is to be assessed and stored relative to that DT.

Procedures for building a DT-oriented context set for the text can be taken to mirror the procedures for DT construction. Polanyi (1985) can be viewed as an attempt at constructing the context set in semantic terms. Given the text in (1) below (Polanyi’s example), the steps taken in processing it, as described by Polanyi, reflect both the linear and hierarchical construction of the context set for the text. In Polanyi’s analysis each incoming message is processed in terms of the given DT – the Semantic Values of the Discourse Constituent Unit in question (to use Polanyi’s terms) – which it either matches or reformulates:

- (1) a. John is blond
- b. He weighs about 215
- c. He’s got a nice disposition
- d. He works as a guard at the bank
- e. He loves ice-cream

Given (1)a–e Polanyi maintains that we first process (1)a “John is

blond” as a primitive discourse unit in terms of the Semantic Values ⟨John, Now, blond⟩. When we process (1)b “He weighs about 215” we accommodate (1)b’s Semantic Values ⟨John, Now weighs 215⟩ with the Semantic Values of the previous proposition and realize that what they have in common is Physical Attributes. We then create a new coordination Discourse Constituent Unit with the values ⟨John, Now, Physical Attributes⟩. When “he’s got a nice disposition” is to be integrated, the new discourse unit (made up of 1a–c) has reformulated its Semantic Values. Taking the lowest common denominator of the Values of (1)a–c, we come up with ⟨John, Now, Generally Known Attributes⟩ as its Semantic Values. Proposition (1)d “He works as a guard at the bank” concerns “employment” of “John”, “Now”. ⟨John, Now, works as a guard at the bank⟩ can be seen as an expansion of ⟨John, Now, Generally Known Attributes⟩. Therefore we coordinate (1)d with the previous discourse unit. (1)e encodes a proposition “John loves ice-cream” allowing it to be coordinated within the ⟨John, Now, Generally Known Attributes⟩ discourse unit because “loving ice-cream” is a knowable attribute of an individual.

The analysis provided by Polanyi can be taken to reflect the process of text integration. In light of the steps she takes in processing the passage I suggest that the building of the discourse model or the context set for the text, that is, the addition of a newly introduced proposition to the context set be viewed as follows:

- (a) we either integrate the content of the newly introduced proposition with the immediately preceding one, that is, the most recent, or,
- (b) we integrate it with the DT of the hitherto constructed discourse unit.

When accommodated with the immediately preceding proposition, the newly created discourse unit must be integrated with the DT of the hitherto established segment. When a newly introduced proposition cannot be integrated in either way it is conceived of as irrelevant. In other words, it cannot, unless otherwise signalled, as required by the conditions on text coherence (Section 2.1.), be accommodated with a proposition in mid (i.e., neither recent nor DT-initial) position.

Linguistic evidence for such procedures for discourse model construction comes from Ariel (1985) and Levy (1982). Ariel shows that pronouns – the marker used for the most salient discourse entities, is also the one usually used for the DT constituent. Where pronouns do not refer to the most available/recent antecedent (either in the same sentence or in the previous one) 81.59% of them are references to higher level DTs. Similarly, Levy

shows that the discourse constituent most often pronominalized is the DT of a given text segment.

Having established a hierarchical context set serially constructed we can now consider the notion of DT more closely.

2.3.1. On the Definition of DT

2.3.1.1. On the Formulation Condition

Given the cognitive view of DT as the entry organizing the context set for the text so that each of the propositions of the set is hierarchically connected to it, Giora (1985b, 1985c) show that a DT, unlike a Sentence Topic, must be formulated as a proposition or as a nominalization containing at least one argument and one predicate. Having already argued for the propositional character of the DT in previous works I will only show here that for a DT to be an NP only is insufficient. To this end consider the text of Gertrude Stein (2) below. Though interpretable as being about an NP constituent as a DT (i. e., Ida's husband), the text in (2) cannot be assigned a coherent reading:

- (3) This first time she married HER HUSBAND came from Montana. HE was the kind that when HE was not alone HE would look thoughtful. HE was the kind that knew that in Montana there are mountains and mountains have snow on them. HE had not lived in Montana. HE would leave Montana. He had to marry Ida and HE was thoughtful.

(Gertrude Stein 1941 : 44)

An NP DT thus cannot function as an entry under which propositions in a given segment get assessed and classified. Such organization leaves the various predicates unorganized. A well organized text is one where both the various STs and their related predicates can be interpretable as being about a DT. Only a propositional DT can fulfill the function of an organizing entry in the discourse. The question now arises as to the procedures for the construction of this DT proposition in the text.

2.3.1.2. On the Semantic Conditions

As stated in the beginning, the goal of this work is to throw light on the procedures for the construction of the DT proposition in an informative,

non-narrative text. In view of the DT-oriented discourse model, the DT construction is taken to reflect procedures of text processing. My suggestion as regards text processing is that DT construction be handled in the terms used for the description of categorical organization. That is, in this view text structuring is not unique but obeys more general principles of organization that govern various phenomena.

In what follows I will delineate various descriptions of category formation and abstracting processes. I will concentrate on those principles that seem conducive to the understanding of the structure of written texts.

2.3.1.2.1. Categorical Organization

2.3.1.2.1.1. Principles of Organizations

Categorical organization exists when two or more things (objects, events, ideas) are treated as similar or equivalent. Two or more objects (for example) are viewed as similar if they share one or more features. According to the traditional view the shared features are criterial. According to another view (Rosch 1975, Tverski 1977), it is not enough that items share a set of criterial features. What similarity implies is rather the combination of the measures of both common and distinctive features. (Distinctive in the sense that one set of items is distinguishable from another.) In this view, items that share a set of common and distinctive features will form a category.

Aside from organization in terms of similarity consider another principle of categorization wherein items do not all have any criterial attributes in common. Wittgenstein (1953) proposed that we view categories (both natural and artificial) as exhibiting family resemblance. Family resemblance obtains where members of a category are related by a series of overlapping attributes. Thus, for a set to exhibit a family resemblance relation, only pairs of items have to be similar. In Tverski's terms, family resemblance is a linear combination of the measures of the common and the distinctive features of all pairs of objects in the category (Tverski 1977 : 348). Rosch & Mervis (1975) demonstrate that superordinate categories, both natural and artificial, such as furniture or fruit, are structured along the principle of family resemblance.

Given the principles of similarity and family resemblance, we can now proceed further and consider the principles of the internal structuring.

2.3.1.2.1.2. Internal Structuring

Rosch (1975) and Rosch & Mervis (1975) and Adelson (1985) show that natural, artificial and abstract categories are hierarchically organized. Category membership is not full and equal for all items that meet the category definition. Rather, certain members are “better” exemplars, more typical or representative of the category, than are others. In both category types, whether classified in relation to the family resemblance or the similarity principle, the best category exemplars, called prototypes, are those members which have the largest sets of common and distinctive features shared by the other category members. In short, prototypes are those members of a category that most reflect the redundancy structure of the category as a whole. That is, if categories form to maximize the category resemblance of attributes, prototypes maximize such resemblance within the category.

To illustrate this let us consider a study of artificial category formation by Reed (1972). Reed trained subjects to categorize the ten cartoon faces in figure 1 below. The five faces in the top row belong to category 1 and the lower five faces – to category 2. The faces vary in terms of height of mouth, length of nose, distance between the eyes and height of forehead. After this study phase, the subjects were presented with twenty four new

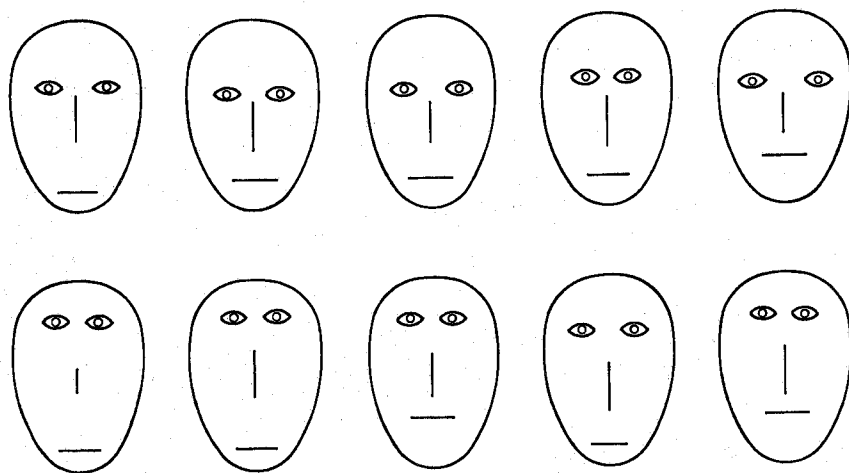


Figure 1. The faces in the two artificial categories in Reed's experiment (1970) studying schema abstraction with respect to faces. The faces in the top row are from category 1, and the faces in the bottom row are from category 2 (From Reed, S.K. Pattern recognition and categorization Cognitive Psychology, 1972, 3, 382-407.)

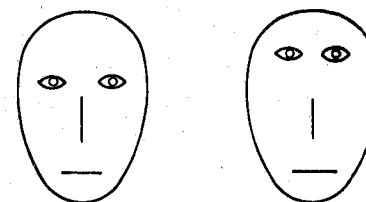


Figure 2. The prototypes for category 1 and category 2 in Figure 1 (From Reed, S.K. Pattern recognition and categorization. Cognitive Psychology, 1972, 3, 382-407.)

faces similar to the studied faces and asked to judge whether these new faces were members of either category 1 or 2. Among the twenty four new faces were two faces (figure 2 below) that Reed called the category prototypes. These two faces had the average mouth height, length of nose, distance between the eyes and height of forehead of the members of their category. Results showed that subjects were 90% correct in their classifications of the prototypes but only 61% accurate in the classification of the control faces.

The prototype, then, is the member sharing the highest amount of feature sets with the other members of the category, and is thus the member that can best represent the category. Putting it differently, the prototype maintains the maximum conceptual/featural intersections with the other members of the set. As such it reflects the redundancy structure of the set. Compared to the members that are less typical, i.e., less similar to each other and thereby to the prototype, the prototype is of the least informative structure – it does not have features the other members do not share. Those features which serve to distinguish members from each other we delete, while abstracting the prototype. In abstracting the schema of the “bird” set, for example, which is best represented by “robin”, we delete all the features of “robin” which “robin” does not share with the other members of the set, e.g. color, or the set of features which various members of the set have but “robin” does not. That is, we delete the set of features that does not reflect the redundancy structure of the set. In short, category structuring is hierarchical; some members are better exemplars than others. The process of abstracting the category prototype or representative member entails deletion of differentiating features.

2.3.1.2.1.3. Point of Reference

Apart from signifying the hierarchical structure within the category, the prototype can be described from a functional perspective. Rosch (1975) and Tverski (1977) show that the prototype, or the schema member of the set, functions as a reference point for the entire set. It is the member in both natural and artificial categories in relation to which the other instances of the category are organized. In judgement of similarity it is the prototypical member which constitutes a point of reference relative to which degrees of similarity are measured. In propositions like "q is similar to p" subjects select the prototypical member to replace p. We say "North Korea is similar to Red China" rather than "Red China is similar to North Korea", or "An ellipsis is like a circle" rather than "A circle is like an ellipsis" (Tverski 1977).

In sum, given that category internal structuring is hierarchical, category members get classified relative to a central member with which they share the largest number of similar (and distinctive) features. Where a category is formed along the family resemblance principle the category members considered most typical are also those sharing the largest set of common and distinctive features (Rosch & Mervis 1975). The process of abstracting the category prototype or schema includes classification of similar features (relative to a member sharing the highest amount of those features) and deletion of unmatched differentiating ones.

2.3.1.2.1.4. The Availability Hypothesis

We saw that semantic and perceptual categories are formed and defined in terms of one or more central members or prototypes. Such organization seems suggestive of a model of memory for concepts. Indeed, findings show that prototypical members are more salient: retrieval of prototypical members is faster than that of peripheral members. Statements in the form of "An x is a y" were more rapidly judged as true when x was a central member (a "good" example) of y than when x was a peripheral member (not a very "good" example) of y (Rosch 1973). Rosch et al (1976) demonstrate that the most prototypical items are the items first and most frequently produced when subjects are asked to list the members of the category.

Similar findings abound in various researches. For instance, better recall was found for categorized (vs uncategorized) word lists by Bousfield, Cohen and Whitmarsh (1958). They showed that lists with high probability category members (i.e., the prototypes) are recalled better. Bower, Clark,

Lesgold & Winzenz (1969) showed that hierarchical organization effects recall enormously. Their subjects were presented with words of four hierarchies as in figure (3) below. Two conditions of learning were compared. In the organized condition the four hierarchies were presented in upside down trees as in figure (3) below. In the random condition subjects saw four trees, but the words in the trees were filled by random combinations of words from the four categories. Results showed that in terms of the numbers of the words recalled, the organized group had enormous advantage over the random group. The organized group did not only recall many more words but it also recalled them in their order of presentation going down the tree from top.

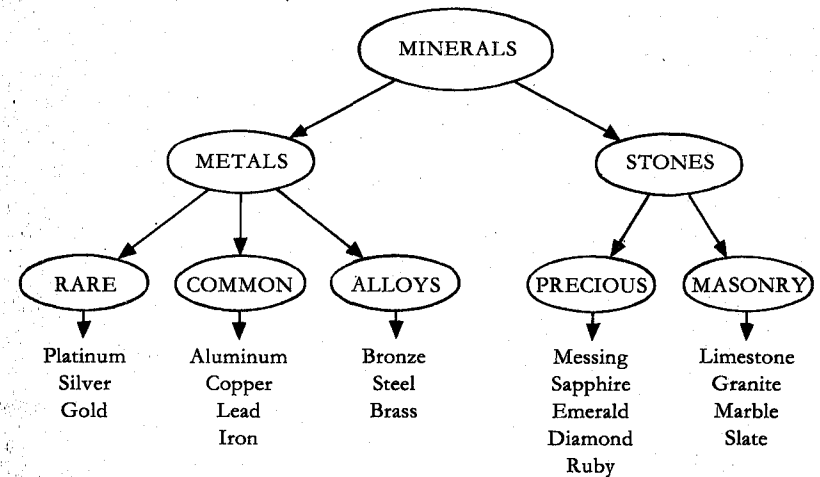


Figure 3. A hierarchical tree presented to subjects in the free-recall experiment of Bower et al. The relationships among the items in the tree are categorical. (From Bower, Clark, Lesgold, and Winzenz, 1969.)

Nelson (1974), Posner and Hays (1977), Mervis (1976) show that children learn typical members of a category faster than atypical ones. Furthermore, children learn categories more easily when a typical rather than atypical member of the set is presented first (Mervis 1977). Organization, then, relative to the prototypical member of the set seems to be accounted for in terms of memory structure. The best exemplar, – the member bearing maximum feature intersections with the various members of the set is more accessible and can, therefore, function as an entry in relation to which the rest of the category members get classified and stored.

What I should show now is the relevance of the principles of categorization discussed above to text processing. Or rather, that text organization can be taken to reflect processes of categorization. The processes of text understanding will be viewed then as deriving from a larger principle of organization, the model of memory for concepts serving as a model of memory for texts.

2.3.2. The Maximal Conceptual Intersection Requirement

One principle shown already to typify category organization is the hierarchical ordering. My claim is that like the category internal structuring, the text too gets organized relative to a member – the DT proposition in relation to which the other propositions in the set get assessed and stored. The DT proposition, like the category schema or prototype, is the exemplar member of the set. It represents the whole set and reflects its redundancy structure. This follows from the cognitive function of the DT proposition (Section 2.3 above). Viewed as an entry organizing the context set for the text so that all the propositions in the set are treated as related to it, the DT proposition must maintain the maximum conceptual intersections with the various propositions in the set (The Conceptual Intersection Requirement). At the text level the DT proposition must be formulated as a generalization.

That the DT proposition must be a generalization was already observed by van Dijk (1977). In his view the relations that obtain between the DT proposition and the other propositions in the text can be treated in terms of entailment. He further observed that the DT proposition should not be too general. Schank (1975) too believes that the DT must be a generalization, of either cohesive (super topic) or non cohesive (meta topic) nature. Schank suggests that we view the DT as an intersection of concepts.

The maximal Conceptual Intersections Requirement I postulated above seems to provide for an explicit modification of the notion of generalization. Given that categorical organization maximizes the similarity between the category members, generalization means maximal semantic or featural connectivity. The passage from the various category members that is, from the various propositions, to the set schema or prototype, namely, the DT proposition, involves a generalization – a first/basic level abstraction of common features.

To confirm the Conceptual Intersection Requirement for discourse I performed some textual countings. Out of 40 paragraphs of an accidental collection of passages I surveyed (Alexander 1967), 35 (i.e., 87.5%) con-

tained a DT proposition which the rest of the propositions were cohesive or partly cohesive with. In those paragraphs the DT proposition took the form of a generalization.

To further confirm the Maximal Intersection hypothesis I conducted an experiment checking readers' intuitions as to the appropriate DT. The prediction was that readers will prefer the prototypical proposition – that is, the one that maintains the maximal conceptual intersections with the other propositions in the set.

The prototypical proposition (3a below) was constructed as a generalization which is cohesive or partly cohesive with the rest of the set. Both its argument and predicate generalize the various arguments and predicates of the set.

The Subjects were 33 graduate students of both sexes. They were presented with a passage that did not contain a DT proposition. They were asked to read the passage at their own speed, and then choose one proposition (a–d) which best represented the discourse so that it could be interpreted as the proposition the discourse is about. The various DTs (a–d) were presented in a randomized order. Apart from a prototypical proposition, they included a statement of specific information (3d), a highly generalized proposition (3c) and one with a general predicate but a specific argument (3b).

Results showed that 66% preferred the proposition (3a), where both the predicate and the argument are generalizations but such as remain closely connected with the various propositions in the text. 22% preferred the proposition which generalizes the predicate (3b). 9% selected the proposition which is too highly generalized (3c), and no one chose the specific proposition (3d):

- (3) Men of all ages spend hours of their leisure time installing their own fireplaces, laying out their own gardens, building garages and making furniture. Armed with the right tools and material, newly-weds gaily embark on the task of decorating their own homes. Some really keen enthusiasts go so far as to build their own record players and radio transmitters. Shops cater for the do-it-yourself craze not only by running special advisory services for novices, but by offering consumers bits and pieces which they can assemble at home.
 - a. So great is our passion for doing things for ourselves that we create our own surrounding.
 - b. Some really keen enthusiasts create their own surrounding.

- c. Humans are active.
- d. Newly-weds gaily embark on the task of decorating their own homes.

Studies of similarity which treat two or more things as equivalent in terms of their common and distinctive features will serve here to account for the Maximal Conceptual Intersection Requirement. The proposition that retains the maximal conceptual intersections is the one that represents the set of common (and distinctive) features of the set. The rest of the propositions get classified in relation to that set of common features. In view of this theory of similarity it is clear why (3d) cannot represent the set as it does not specify any attribute or feature it shares with the other propositions in the set. What it does specify has, in fact, to undergo deletion.

In a different way, (3c) too is a poor DT proposition. Though both the predicate and argument propose features the other propositions in the set do share, yet to reach such an abstraction subjects have to make an extra effort. The passage from the specific propositions in the text to (3c) is comparable to the passage from a subordinate to a superordinate category. It requires deletion of a great number of features. Thus, for example, the passage from "poodle" to "dog" necessitates deletion of some low hierarchy features such as color or quality of the hair. However, the passage from "poodle" to "animal" requires deletion of a much greater number of features in addition to the deletion of the low hierarchy features, such as number of legs, existence of a tail etc. In short, a too general proposition in the form of (3c) represents a much greater set than the specific text in question.

The reason why (3b) was preferred as the second best choice lies in its properly abstracted predicate. The predicate does obey the Maximal Conceptual Intersections Requirement. It is suggestive of a common feature that typifies the only and entire set in question. The argument, however, does not.

As predicted, the preferred choice is the proposition that retains the maximal conceptual/featural intersections with the various propositions in the text in that it represents the largest set of common features. In other words, it represents the redundancy structure of the set. It is thus clear that the DT is the least informative message in the text which, at the same time, retains maximal connectedness with various propositions in the text. Like the prototype or schema member of a category, it is a representation of what all or most of the set members share. It is in this sense that we can call it a generalization.

2.3.3. On the Linear Condition or the Reference Point Function

The Maximal Conceptual Intersection Requirement follows from the cognitive function of the DT proposition, which, like the prototype member, governs the set and functions as the reference point in relation to which the similarity/relevance of the other propositions in the set is measured. Further confirmation as to the point of reference role may come from a study of the DT linear placement. If the DT proposition is indeed the entry governing the set, then its preferred position must be text initial. Positioned in the end it must slow down processing as the reference to the DT proposition must be postponed to a later stage. Furthermore, DT final ordering in a non cohesive text requires extra effort on the part of the reader who must spend time on constructing the DT while reading.

To verify this, I conducted a series of experiments which tested the hypothesis that text initial is preferable to text final position for the DT proposition and is thus functional in processing of input material. For this purpose two groups of subjects were presented with two pairs of different passages (in the form of 4a and 4b below) with each constituting a coherent sequence. The passages were divided into pairs identical in every respect except for the place of the DT proposition. In one set it came first, and in the other it was put at the end of the paragraph. Each group read two different passages taken from a textbook on the Bible. One pair of passages was familiar to the subjects (30 high-school seniors), while the other was unknown to them. Subjects were asked to read the passages at their normal rate, and were told that they would be asked to respond to the "main idea task". When they finished reading, they were given questions on understanding of the passage – but they were scored only on the time needed for reading each passage as a whole.

I predicted that the time it should take to read the two versions would differ only on the unfamiliar material. No differences were expected for the familiar passages, on the assumption that readers identify the DT of a familiar passage quite early on, even when the structure is DT-final.

The passages selected were deliberately not highly cohesive, since cohesiveness tends to facilitate identification of DT. The results were indeed in accordance with my predictions. The familiar passage showed no differences on the versions: reading time on the DT-first version averaged 64 seconds while the DT-last version averaged 64.6. As for the second, unfamiliar passage, reading time differences were significant: 69.2 seconds for the DT-initial, as against 79.4 for the DT-final version.

- (4) a. *The most important role of the secondary character in the Biblical narrative is to bring out either the negative or the positive characteristics of the protagonist.* The Book of Ruth tells of Naomi's two daughters-in-law: Orpah and Ruth. Orpah's return to Moab brings out Ruth's loyalty and generosity. The secondary character of the saviour brings out the generosity of Boaz who saved Ruth. The secondary character of Job's wife serves to emphasize Job's righteousness. Structurally, Job's story does not require that there be a wife, and indeed she is not mentioned in the end of the story in the Book of Job.
- In the story of Eldad and Midad, Joshua Ben-Nun explains to Moses that those two go prophesying in the camp, and he asks Moses to arrest them. Moses' response: "Are you jealous on my behalf? Let all the people of God be prophets so that God bestows his spirit on them" brings out the difference between Joshua and Moses and serves to emphasize Moses' modesty.
- The story concerning the fetching of the shrine by David from Oved Edom to Jerusalem reveals that Michal, Saul's daughter, who, looking out of the window, saw David dancing and hopping in front of the shrine, despised him in her heart. Michael's pride serves to bring out David's simplicity and humility.
- In the story of Naaman and Elisha, the greed of Elisha's servant brings out Elisha's compassion.
- In the story of David and Bat-Sheva, Uriah the Hittite's demeanor brings out David's sin, and in the Book of Jonah the behaviour of the sailors brings out Jonah's sin in trying to escape God.
- (4) b. The Book of Ruth tells of Naomi's two daughters-in-law: Orpah and Ruth. Orpah's return to Moab brings out Ruth's loyalty and generosity. The secondary character of the saviour brings out the generosity of Boaz who saved Ruth. The secondary character of Job's wife serves to emphasize Job's righteousness. Structurally, Job's story does not require that there be a wife, and indeed she is not mentioned in the end of the story in the Book of Job.
- In the story of Eldad and Midad, Joshua Ben-Nun explains to Moses that those two go prophesying in the camp, and he asks Moses to arrest them. Moses' response: "Are you jealous on my behalf? Let all the people of God be prophets so that God bestows

his spirit on them" brings out the difference between Joshua and Moses and serves to emphasize Moses' modesty.

The story concerning the fetching of the shrine by David from Oved Edom to Jerusalem reveals that Michal, Saul's daughter, who, looking out of the window, saw David dancing and hopping in front of the shrine, despised him in her heart. Michael's pride serves to bring out David's simplicity and humility.

In the story of Naaman and Elisha, the greed of Elisha's servant brings out Elisha's compassion.

In the story of David and Bat-Sheva, Uriah the Hittite's demeanor brings out David's sin, and in the Book of Jonah the behaviour of the sailors brings out Jonah's sin in trying to escape God. *The most important role of the secondary character in the Biblical narrative is to bring out either the negative or the positive characteristics of the protagonist.* (Translated from a Hebrew high school text of Bible studies)

Findings show then that initial mention is functional in processing, particularly when factors facilitating processing are neutralized, that is, when material is new and the degree of cohesion is such as it does not disclose the DT of the passage early on in the reading process. Under such circumstances, DT-initial mention shows up clearly as preferable to DT-final mention in the structuring of texts.

In sum, with respect to content, the DT proposition, like a category prototype, stands out as the proposition in the context set that retains the maximum relatedness with the other propositions in the set. It is the proposition that holds the greatest number of common features with the rest of the propositions in the set. In view of the maximal relatedness of the DT proposition to the rest of the set, it is clear that it functions as the entry governing that set. Being a reference point, the DT must be the first in the set.

Looked at differently, the procedures for DT construction suggested above form a mirror image of those procedures whereby DTs are identified by readers. Consequently those findings we have just now discussed can be used to formulate the procedures for DT identification: While reading a text in an attempt to interpret what it is about the reader is to look for a generalization in the beginning of the text.

APPENDIX

For Sperber and Wilson (1984) relevance is a matter of degree. The degree of relevance is a function of the number of implications entailed by a proposition in a given context. For them, a proposition is relevant in a context if and only if it has at least one contextual implication in that context. In addition to the particular proposition and a finite context, the act of processing involves a set of non-trivial inference rules as input. These rules derive the full finite set of non-trivial implications of the union of the proposition with the context as an output. The more contextual implications a proposition has in a context, the more relevant it is in that context. In cases where two propositions have the same number of contextual implications their relative degree of relevance is determined by the amount of processing in the sense of the number of steps taken to derive the said contextual implications. In terms of human organism, it is probably, related to the amount of effort made. For Sperber and Wilson, then, the relevance of a proposition is the function of the number of its contextual implications weighed against the amount of processing required to derive these contextual implications. The maximally effective exchange of information is thus one that yields the maximum amount of information per minimal effort.

My criticism of Sperber and Wilson's approach to relevance is that it is a reduction of the notion of relevance to the notion of informativeness. Despite the intuitive appeal of such a logical mechanism for distinguishing between various degrees of relevance, the judgements they make along these lines do not seem to accord with our intuitions. I suggest, rather, that an approach that views coherence of a text in terms of relation to Topic of Discourse (DT) would be more plausible.

Consider the relevance of (2), (3) and (4) below to the context of (1). (1) and (2) are cited in Sperber and Wilson, while I have added (3) and (4). (2) and (3) and (4) differ from one another in the number of contextual implications, but not in the amount of processing they require:

- (1) C1 Jackson has chosen the date of the meeting.
C2 If the date is February 1st, the chairman will be unable to attend.
C3 If the chairman is unable to attend, Jackson's proposal will be accepted.
C4 If Jackson's proposal is accepted, the company will go bankrupt.
- (2) The date of the meeting is February 1st.

- (3) The date of the meeting is kept secret.
- (4) The company will go bankrupt, anyway.

According to Sperber and Wilson, (2) has four contextual implications in the context of (1). But (3) and (4) do not have any non-trivial contextual implications in the context of (1). Yey, intuitively, (2) and (3) and (4), all seem equally relevant in relation to the context of (1).

In spite of the difference in the degree of informativeness, the intuitively felt similarity in the degree of relevance of all these propositions, (2), (3) and (4) can be explained within a theory that views relevance as a relation to DT. Given the context of (1), each proposition in turn seems to predicate something about a DT. By contrast, a theory that views relevance as informativeness and aims to account for relevance in terms of a number of contextual implications seems unable to explain the fact that (2), (3) and (4) are all felt to be relevant to the context of (1).

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