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The Informant Net in Junction Grammar: A Discovery Aid

Kenneth R. Lee

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One of the major influences on discoveries that are made in linguistic research is the view the linguist has of the nature of language. The earliest theories were built on language as an expression of the free will of man. Since this free will was not considered to be subject to the laws of causation, many of the constructs postulated as underlying language could not be tested experimentally. The free will was considered to be rational, however, and therefore concepts underlying a sentence were expected to combine in accordance with the rules of logic.

In the early 1920's the influence of the work of B. F. Skinner and other systems of conditioning changed the view of language to language as a system of stimuli and responses. Methods and theories were restricted by making surface forms the only allowable data, underlying forms were strictly taboo. This freed linguistics from the subjectivity and untestable hypotheses that had plagued it before, making its results and methods more objective, but, as Chomsky noted, the linguistics that developed based on this viewpoint was inadequate to account for many of the phenomena of language. In his theory Chomsky reaffirmed not only the theoretical usefulness, but also the theoretical necessity of underlying forms, however, his formulation considered just one part of part of language -- syntax, and studied language as a static system operating in a vacuum.

**Junction Theory's View of Language**

In Junction Theory the real world is seen as a first level of representation, that is, the thing represented by the thing itself. From the real world information is extracted and kept as concepts -- a second level of representation. On the conceptual level concepts are related to each other forming a conceptual structure. Language is used to convey something about the conceptual structure to another person, attempting, as it were, to show him the world as the first person views it.

For example, if person A sees a large four-legged animal wagging its tail by a large rock, he may share this perception with person B by saying: "See the big dog over there". Person A, in essence, asks person B to include in his conceptual structure a dog that is big and can be seen
from person B’s current location. Person A also indicates a desire that person B orient himself so that he perceives the same thing. Finally person A indicates that the dog is at some distance from himself and person B and that he actually believes the dog is there.

In most contexts person B would look and see the dog for himself. What if person B does not see the dog? One possibility, if person A is a young child who might use the term "dog" differently than most speakers, is that person B would look for an entity that person A might use the term "dog" for, perhaps a horse. If, on the other hand, person B assumes that person A would use the term "dog" the same as he and assumes that person A was sharing an actual perception, (i.e., that person A wasn't lying or telling story), then person B would be expected to respond with a sentence such as "Where?" or "What dog?". In other words, person B would communicate to person A that his perception does not match the perception person A communicated to him.

The Information Net

In the formulation of language proposed by Junction Theory the conceptual structure can be represented by one or more information nets. Junction trees (hereafter called J-trees) encoded into linguistic strings are used to transfer information about the conceptual structure. The purpose of this paper is to demonstrate the usefulness of this view in generating important and productive questions in linguistics theory and to suggest how hypotheses thus formulated might be tested. Some knowledge of Junction Theory is assumed and therefore the structure of J-trees will not be presented in detail nor will details of the structure of the information net. These will be mentioned only as needed to support the purpose of the paper. The reader is referred to the first issue of Junction Theory and Application, specifically the articles by Eldon G. Lytle, if more information about Junction Theory is desired.

Briefly the information net functions as follows. Suppose person A sees a man carrying a cane who is walking along a stream. As the man walks he swings his cane. Let us further suppose the man is a friend of person A named Mortimer. In the information net an instance of walking is related to the man and the walking is located by a stream. The information that the man was carrying a cane would also be indicated, as well as the information that the man was not only carrying the cane, but swinging it also. Finally the man is identified as a particular man whom person A already knows (and presumably has a lot of other information about from past experiences) and who person A identifies as "Mortimer".
The Communication Process

Communication of this information, or some part of it, to another person is represented in Junction Theory as follows. Person A constructs a J-tree according to the information in his information net and his expectation of the structure and content of the other person's information net. This J-tree guides the construction of a linguistic string which is spoken or written. The linguistic string is analyzed by the other person and a J-tree constructed. The J-tree then acts as instructions as to how the other person should set up his information net. An important point to note that the function of the J-tree is to instruct the other person how person A's information net is constructed. The following examples illustrate this point.

Suppose person A meets person B who is a friend of both person A and Mortimer, and person A wants to let person B know he saw their friend. He would say something like "I saw Mortimer by the stream", expecting "Mortimer" to be enough to identify the individual in question to person B. If person B knows two Mortimers he would probably indicate that "Mortimer" is not enough to uniquely identify the individual by asking something like "Which Mortimer?". Person A's answer would presumably add something to further identify the person in question.

Now suppose that the man person A saw was unknown to person B. In this case person A would not expect person B to have any knowledge of the individual in question. The J-tree constructed would produce a sentence such as: "I saw a man by the stream", indicating that person B should set a reference for an individual who is male and relate this to a position by the stream.

Changing the situation again, assume that person B does not know the man, but that person A and person B saw him by the stream before. In this case person A might say: "I saw the man by the stream", expecting person B to know about a man by the stream. The J-tree constructed asks person B to retrieve a reference already entered into person B's information net.

Entry and Recovery and the Information Net

These examples are each examples of identifying an individual to person B. The difference between the second and third examples is traditionally the difference between definite and indefinite reference. In Junction Theory the definite/indefinite distinction is just the indication of the difference of directionality of the modalization junction. A left subjunction corresponds to definite reference and a right subjunction to an indefinite reference.
In his paper "Information Processing Stimulated by Nouns" (Meador, 1977), Lee Meador relates the directionality of the modalizer junction to the processes of entering information into and restoring information from the net. A right subjunction (indefinite reference) indicates the information in the referment is to be used in setting up an entry in the net. A left subjunction (definite reference) indicates that the information in the referment is to be used to locate an entry already in the net. In this case the notion of directionality of subjunction was postulated in Junction Grammar before its use in relation to the net, yet its use in the net strengthens the hypothesis of the existence of the distinction. The ease with which the distinction fits into the new area and the power it gives suggests also that an actual phenomenon of language is represented.

Indirect Objects and the Information Net

In another situation considerations of the structure of the net led to a hypothesis about the structure of J-trees. The author was considering the verb and PV referments, and specifically the place of the indirect object in these referments. At the time indirect objects were expressed in the J-tree as interjunctions in the verb referment. This did not seem correct, yet no convincing evidence could be found to the contrary. Later the role of the verb in the information net was considered. From this it seemed reasonable that the verb represents a process and that the PV represents the linkage of this process, a subject, a direct object (if one existed), and an indirect object (if one existed).

Adjunctions seem to indicate a linking in the net, and, as expected, the direct object is expressed as a noun referment in an adjunction in the PV. The indirect object, as already noted, was expressed as an interjunction in the verb referment. Interjunctions seem to represent addition of information, often to restrict the scope of a referment that identifies the entry (or entries) in the net. Expressing the indirect object as an interjunction in the verb referment claims that the indirect object restricts the scope of the verb referment. This restriction was claimed to be the "direction" of the process expressed by the verb towards the recipient of the process.

From their role in the information net it seemed that the both the direct and indirect objects should be adjunctions in the PV. Because of this the notion of the "directionality" of the indirect object was re-examined. It was noted that the same sort of "directionality" is found in the sentence pair: "I gave him the book" and "He gave me the book" as is found in the sentence pair: "I saw him" and "He saw me" and, if books are allowed to own people, as in the
sentence pair: "I gave him the book" and "I gave the book him". This evidence was convincing that the indirect object and direct object do need to be handled in a similar manner as had been suggested by their role in the information net. Consequently the hypothesis was made that both the direct and indirect objects are expressed as adjunctions in the PV. (Unknown to the author, this result had previously been reached by Eldon Lytle).

Other Areas of Inquiry and the Information Net

The information net would also be helpful in exploring the possibility that the traditional parts of speech (verbs, nouns, etc.) may be manifestations of different data types. Lee Meador's paper made the assumption that those things described as nouns could be handled as arrays and elements of arrays. Adjectives and adverbs seem to be well represented by variables (some allowing only discrete values while others allow a continuous range of values). Nominalizations and related linguistic phenomena would be a change from one data type to another. The manner in which the parts of speech function in the net, and especially the manner in which nominalizations function could very well provide support for or discount this hypothesis, or suggest ways to test this hypothesis.

Direct reference would be another area where the concept of the information net could be useful. In the first example of the three examples given above, the individual in question is identified to person B by direct reference through the term "Mortimer", much like the term "dog" refers to a furry quadruped of a certain kind, while in the other two examples the individual is identified by giving some of his characteristics and arriving at the entry from these. The question of direct reference would be important in the net. The manner in which it is resolved should lead to claims as to how it would be expressed in J-trees and to how it would be expected to function in language.

Simulation of the Information Net

Thus far the information net has only been semi-formalized; there are many questions yet to be answered. One major problem in linguistic research is that "obvious" information is often filled in by the researcher, many times unconsciously. This would be a special problem in working with the information net since the phenomena considered generally are unconscious, or at best, semi-conscious. For this reason the use of computers to simulate the information net is advisable. The use of the computer forces the formalizations of the researcher to be precise. Areas of imprecision would be
identified in the programming of the computer or appear as invalid forms or as valid forms that cannot be generated. In this way new areas of inquiry would be uncovered, presumably not only for the information net, but also for the structure of the J-tree.

Once a system to simulate an information net is constructed and the rules for constructing J-trees from the information in the net, it would be possible to test the adequacy of the Junction Theory representation of the communication process as well as to advance discourse analysis, the use of contextual information in the translation process, and other areas.

Some Cautions

There is a pitfall in the approach to language outlined in this paper to guard against -- that one part of the formulation not be subjected to verification by language as it actually is used. Since there is another part to the formulation, a cherished idea can be protected by blaming inconsistencies with actual linguistic phenomena on the other part. The researcher must also leave himself open to the possibility that the failure of a particular part of theory is not due to either part, but that the underlying concept is false, although it is believed and appears reasonable that when one part leads to a false hypothesis, the other will point toward a more correct hypothesis. Finally, if the information net is simulated on the computer, the researcher must take into account the possibility that the program does not accurately simulate the process postulated. The best hypothesis will produce no valid results if the hypothesis is not represented by the program.

Summary

The view a researcher in linguistics has about language effects the discoveries he may make. The view of language in Junction Theory has been useful in illuminating several problems in linguistics and holds the promise of discovering the solutions to several others. The results of formalizing the structure and functioning of the information net holds the promise to illuminate problems in other areas as well. There is still much that can be done with the information net before the limits of its usefulness can be assessed.
References


