C h a p t e r Fourteen

THE DEFINITENESS HIERARCHY AND STRENGTH OF ANAPHORIC LINK IN POLISH*

In a psycholinguistic experiment designed to test the psychological reality of the paragraph, Koen et al. [1969] established that some signals for paragraph organization are formal, rather than semantic. Following these authors' general approach, Coleman [1982] conducted an experiment to test the effect of the noun-pronoun alternation on paragraphing. The experiment demonstrated that, in English, 'a pronominal reference has the effect of establishing a stronger anaphoric "link" to an earlier coreferential NP than does a full nominal reference' [Coleman, 1982: 450]. Coleman attributed this effect to the greater definiteness of the full noun phrase anaphor.

Lakoff [1968] established a hierarchy of definiteness of noun phrases, ranging from (1a) to (1d), which was later amended by Cole [1974] to include (1e):

(1) (a) Proper names
(b) Definite descriptions
(c) Epithets
(d) Pronouns
(e) Zero noun phrases

Cole declared that this constituted 'a scale of inherent anaphoricity', with proper names the least anaphoric and zero noun phrases the most anaphoric of noun phrases. He put forward an Inherent Anaphoricity Hypothesis, which stated that 'the scale is invariant for all speakers, and correlates with the extent to

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* Alina Kwiatkowska, University of Łódź.

which a given type of definite NP uniquely specifies its referent' [Cole 1974: 669]. In other words, the hypothesis assumes a negative correlation between inherent anaphoricity and definiteness.

Coleman [1987] observes that, as the notion 'anaphor' is essentially relational in character, it is natural to expect some correlation between inherent anaphoricity and the strength of the relation between the anaphor and its antecedent. The results of Coleman [1982] suggest that the correlation does, in fact, exist. Coleman therefore proposes the following Anaphoric Relation Hypothesis:

(2) (a) The strength of the relation between a given anaphor and its antecedent bears a negative correlation to its inherent anaphoricity, and (equivalently)
(b) the strength of the relation between an anaphor and its antecedent bears a positive correlation to its breadth of referential domain. [Coleman 1987: 3]

The first part of this hypothesis follows from Cole, and will follow from the second part. The second part has to be empirically verified. Coleman conducted an experiment designed to test for the relative strength of the anaphoric relation exhibited by a proper name, a definite description containing a restrictive adjective, a simple definite description, an epithet, and a pronoun. Results showed the rank order of four of the five levels of definiteness to correlate with the strength of anaphoric relation (which is a significant correlation).

The present study is an attempt to find out whether a similar experiment conducted in Polish will yield the same kind of results, thus giving greater generality to the hypothesis. Using Polish also offers us an advantage of being able to test the complete hierarchy of definiteness, including zero noun phrase, which Coleman could not use. The experimental design is that of Coleman [1982, 1987]; a new text has been constructed, however, for the Polish version.

The experiment uses several variants of one basic text. The text has been constructed in such a way that of the sentences it contains, roughly the first half discuss one common theme, and the second half, another. Separating these two sections is a transition sentence (TS), which contains an anaphor for the re-

ferent on which the first half of the text is thematized, and an initial occurrence of the other referent. The text variants differ only in the choice of a particular anaphor in the transition sentence. It is either a proper name, a definite description containing a restrictive adjective, a simple definite description, an epithet, a pronoun, or a zero noun phrase:

(3) (a) Kasia
(b) moja młodsza córka
(c) moja córka
(d) spryciula
(e) ona
(f) ø (zero NP)

Moja młodsza córka Kasia bardzo nie lubi odrabiać lekcji. Zrobi wszystko, żeby tylko odwlec moment, w którym będzie musiała otworzyć książkę i zabrać się do nauki. A już najbardziej nie cierpi matematyki. Uważa, że tabliczka mnożenia to przeżytek, dobry dla kujonów, którzy lubią sobie niepotrzebnie zaśmiecać pamięć. Kasia woli używać kieszonkowego kalkulatorka. On przynajmniej jest niezawodny, nigdy nie zapomina ile jest siedem razy dziewięć. Jest szybki, łatwy w obsłudze i zabawny ze swoim mnóstwem guziczków. Miesci się w każdej torbie, w kieszeni, albo pod ławką podczas klasówki. Jest więc na pewno bardziej pożyteczny niż jakaś tam głupia tabliczka mnożenia.

Fig. 1. Text variant with Kasia in TS

Since the text is experimenter-designed, the experimenter has control over the independent variable (the form of the anaphor), and is able to test the effect of that variable on textual cohesion (the dependent variable). It is assumed that stronger anaphoric relations will contribute to greater cohesion.

A total of 120 subjects were tested in the experiment. 20 subjects read each variant. The subjects were all native speakers of Polish. They were asked to mark an X at the beginning of any sentence discussing a new topic ('oznacz znakiem X początek zdania, które rozpoczyna nowy temat'). The experimenter could then measure the relative frequency with which the subjects marked a discourse boundary just before the transition sentence, and determine whether the frequency correlated with the ranking on the definiteness hierarchy.

Table 1 shows the results of the experiment.

T a b l e 1

Strength of discourse boundary before TS

		DEFINITENESS →						
		zero	pron.	epithet	simple defin. descr.	def. descr. +adj.	proper name	
# BOUNDARY BEFORE TS	NO	17	16	12	8	8	6	
	YES	3	4	8	12	12	14	
		20	20	20	20	20	20	120

The effect of varying the definiteness of the anaphor in the transition sentence on the discourse boundary immediately before the TS follows a fairly clear pattern. The relative rank according to the frequency with which a discourse boundary was marked before the TS generally corresponds to the rank on the definiteness hierarchy, though the two kinds of definite description are tied.

To determine whether the correlation between the two variables is significant, we have used an ordinal measure of association, gamma (γ). With gamma, we take into consideration pairs of observations. If we know the rank of one member of the pair relative to the other member on one variable, the question is: can we also predict the rank of one member of the pair relative to the other member for the second variable? Gamma attempts to measure our ability to do this. In our case, if we know the order of ranks on the variable 'definiteness' for a pair of anaphors, can we also predict the order of ranks for that pair on the second variable, the number of boundaries before the TS, i.e., the relative strength of the anaphoric relation? Note that what we are trying to predict is the rank of one item on the dependent variable relative to that of another item, rather than the actual rank of items. An incorrectly predicted order of ranks for a pair of observations would constitute an error. The higher the so-called Proportional Reduction in Error (PRE), the higher the degree of association between the two variables. (For a discussion of PRE measures, see Ott et al., 1983).

Gamma is defined as follows:

$$(4) \quad \gamma = \frac{Ns - Nr}{Ns + Nr}$$

where Ns is the number of pairs of observations where the ordering is the same on both variables, or concordant pairs, and Nr is the number of pairs of observations where the ordering is reversed on both variables (discordant pairs). If Ns equals Nr, gamma equals zero, which means there is no association between the variables. If Ns is greater than Nr, gamma is positive. Perfect positive association equals 1.

For our data, the number of concordant pairs is computed in the following way: beginning with the cell in the upper left hand corner of Table 1, we move to the right and below, multiplying the number in the first cell by the sum of numbers to the right and below. Then we move on across the row and do the same thing for the other cells. The sum of all these multiplications equals Ns:

$$(5) \quad Ns = 17 \times (4 + 8 + 12 + 12 + 14) + 16 \times (8 + 12 + 12 + 14) + 12 \times (12 + 12 + 14) + 8 (12 + 14) + 8 \times (14)$$

To compute the value of Nr, we reverse the procedure, beginning in the upper right hand corner of the table and moving across the row, multiplying the number of entries in each cell by the number of entries in all cells to the left and below. The sum of these multiplications equals Nr:

$$(6) \quad Nr = 6 (12 + 12 + 8 + 4 + 3) + 8 (12 + 8 + 4 + 3) + 8 (8 + + 4 + 3) + 12 (4 + 3) + 16 (3)$$

For our data, the value of gamma equals 0.54, which tells us that the error of prediction can be reduced by 54 per cent if we use the order of ranks on the independent variable (definiteness) to predict the order of ranks on the dependent variable (number of boundaries just before the TS). We may give further meaning to this magnitude of the value of gamma by conducting a statistical test. In our case, we obtain $z = 2.3$, which is significant at the 0.01 level (i.e., we may be 99 per cent sure that the correlation is not due to chance).

We may therefore conclude that there is a strongly significant relationship between the order of ranks on the independent

and the dependent variables. The results of the experiment confirm the Anaphoric Relation Hypothesis; verification is also provided for the Definiteness Hierarchy and Cole's Inherent Anaphoricity Hypothesis, making possible a unified account of the observations of Lakoff (1968), Cole [1974] and Coleman [1982, 1987].