A COMPUTER ASSISTED METHOD OF INVESTIGATING INTONATIONAL CORRELATIONS IN ADJACENT UTTERANCES

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0. Abstract
The intonation of adjacent turns in dialogs conveys information of at least two types: it indicates the sentence type of the utterence and in addition the individual attitude of the speaker towards the propositions or parts of them. Is this information subject to direct mapping between prosodic and modal categories? Or is it the result of a process of complex inference? Experiments show that the choice between these alternatives or their combination depends on the communicative task.

1. The Problem

The multiple functions of intonation represented in a linguistic model can be classified into two subsets: The one captures the assignment of sentence type (question, assertion, exclamation etc.), the other signals the various attitudes of the speaker towards the propositional content of the utterance - something which results in a vast, open class of illocutionary forces.

More research has been done in the second sector than in the first, the functions of which are fewer in number; they are conveyed additionally by means other than intonation. Thus it seems impossible to formulate tasks for empirical investigation. The second field, which we will call the subjective modality, seems to be subject to individual variation; the number of categories is unknown, indeed it seems questionable whether they are categories at all.

In this paper we present a method of experimental research in this second area, making use of digital technology to make an entire communicative situation repeatable and subject to modification, in a way similar to the propositions formulated by HERTRICH and GARTENBERG 1989. The evidence we will adduce will prove to favour one of the following alternatives: Can we ascribe the modal categories postulated directly to an utterance and its intonation contour? Or is the interpretation the result of a complex process of inference. Furthermore, what kind of information seems necessary? A similar alternative has been formulated by LEVINSON 1983 under the heading conversational vs. discourse analysis.

The first result of our experiments, making use of a non-quantitative interpretation, shows evidence for the inferential model. As to the set of information to be used, there seems to exist a high degree of variation; even in case of the absence of sufficient information, the modal utterences and their adjacent combinations are interpretable, since there appears to be a set of "default" knowledge.

2. The Method

The material consists of 12 microdialogs consisting of 4 turns each, and a preceding description of the situation. As to the organisation of the material in the form of a data base cf. SAPPOK 1990. The situation consists of a variable combination of propositions, the dialogs having always the same lexical form, as can be seen in the samples shown in Chart 1.

		S+R	R+S
poly vymyty			
1.1. A+,B+,A»B		a	1
1.2. A+,B-,A»B		b	2
1.3. A+,B±,A»B		c	3
1.4. A-,B-,-»?		d	4
3.1. A±,B±		i	9
3.2. A+,B-,?rad		j	0
poly vymyty			
		S+R	R+S
kleenka isporchena			
2.1. A-,B-,A»B		e	5
2.2. A-,B+,A»B		f	6
2.3. A-,B±,A»B		g	7
2.4. A+,B+,+»?		h	8
4.1. A±,B±		k	q
4.2. A-,B+,?rad		l	w
kleenka isporchena			
		S+R	R+S

Chart 1. Correspondences of attitudes, situations and symbols (as described in the text).

The description of the situation and the text of the dialogs were presented visually in written form to pairs of Russian native speakers who performed them orally according to the instructions. The resulting utterances were digitalized and reorganized for the user in the form shown in Chart 2, making use of the computer program developed by KNIPŠIL'D 1990. The display shows the instruction categories in symbolic form; Ivanova's prior behaviour has been good (poly vymyty) or bad (kleenka isporchena), the assignment of turns to the speakers changes from S+R to R+S. The following symbols show keys to be pressed, after which the resulting dialog can be heard.

Ситуация 1.1.

A. и B. хорошо относятся к Ивановой.

A. хочет усилить это отношение.

A. – Ты замечаешь, что полы вымыты?
B. – Да-а. А кто это сделал?
A. – Иванова.
B. – Иванова?
A. – Да, Иванова.

Ситуация 1.2.

A. хорошо относится к Ивановой, а B. плохо. A. хочет изменить отношение B. к Ивановой на хорошее.

A. – Ты замечаешь, что полы вымыты?
B. – Да-а. А кто это сделал?
A. – Иванова.
B. – Иванова?
A. – Да, Иванова.

Chart 2. Instructions for two microdialogues as presented to the speakers

3. The Experiments

The instruction is assumed to determine the intonation of the turns. Various combinations of the turns and descriptions of the situation are used to construct of stimuli to be presented to the subjects. We shall describe in detail two experiments representing extreme positions, i.e. maximal and minimal information on the basis of which the subjects have to make their decisions.

In the first type of experiments, the combination of the situation description and the dialog is presented with the exception of one detail - the presumed opinion on Ivanova as bad or good. It is this 'opinion' or 'attitude' which is to be extracted on the basis of the intonation of A. or, in a separate experiment, of B. A similar task is the reconstruction of Ivanova's pre-dialog behaviour of Ivanova.

The second type of experiment utilizing isolated utterances (turns) presents the subject with the task of determining the similarity of intonational contours of the repeated answers, the type of question between them (weak or strong), and the degree of emotional expression.

In the third type of experiments the subject has to take part in the dialog himself, uttering responses to the computer in turn. The subject is given the possibility of hearing the dialog and of repeating it as often as necessary until he finds it adequate, making use only of the information conveyed by the intonation which he is reacting to. Chart 3 shows

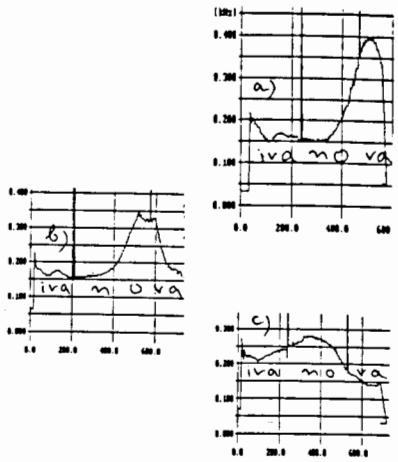

Chart 3. a) - c) Three reactions of a subject to neutral, positive and negative utterances in the dialogue with the computer.

three different questions of type A2 as reactions to B1 utterances of neutral, positive and negative versions. Although the subject has no explicit information about the nature of these turns beforehand, he reacts in a way comparable to the versions with explicit information.

4. The Interpretation

In determining the speaker's attitude subjects show in some cases a high degree of similarity, while in other cases their interpretation remains disparate. The overall picture is the following:

- Neutral attitude is recovered with greater accuracy in the context of positive behaviour; it seems difficult for the speaker to remain neutral in the context of negative behaviour.
- In the case that behaviour and attitude have different values, subjects have difficulty recovering the original intentions.

The intonation seems to convey not the isolated speaker-generated values, but rather the conformity of expectations or their disparity as perceived by the respondent.
- The combination of a negative attitude and negative behaviour usually results in positive answers! This can be an expression of satisfaction resulting from the perception that the judgements correspond.

These results show that there is no set of modal features that can be interpreted in isolation. The modal cues in the intonational contours must therefore be interpreted in combination with various other types of information.

Additional evidence in favour of this kind of model can be found in the results of experiments of Type 2:

Comparing the repeated answers B.1. and B.2., (made comparable by cutting off the initial "da" of the latter) subjects reveal the highest degree of dissimilarity in dialog 2.2., where speaker B. tries to influence speaker A., knowing that the latter's attitude towards Ivanova is contrary to his own. The intervening question A.1. seems to be a signal to speaker B. that his attempt to influence A. was not successful and has to be repeated with a modified intonation. The judgement "not similar" is slightly diminished in the case of 2.3. and 2.1., where the partner's attitude is neutral and negative, respectively. The intervening question A.1. is classified as intense ("a high degree of interrogativity"), in the case of 2.2., a less intense degree, in the case of 2.3. and 2.1. corresponding to a decreasing need for resistance.

The exact mechanisms of modal expression and interpretation must remain open until the results of quantitative, statistical analysis are availible. Preliminary interpretation shows that
- the reaction of the subjects to the situations and dialogs is not random;
- the interpretation is the result of a process of inference, taking into account different types of information;
- even in the case of the absence of exact information an interpretation still seems possible; in this case a "default" standard situation seems to be assumed.

References:

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