The Effect of Accentuation on Comprehension: An Experiment

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1. Introduction

Psycholinguistic investigations (Cutler, 1976; Cutler and Foss, 1977) have proposed that accents direct the listener's attention to the words carrying the accents. This would make sense if, as linguistic investigations have proposed, accents mark words which convey important information in a given context, and deaccentuation (that is, not accenting a word that may be accented for syntactic reasons) marks information that is recoverable from the context, (Halliday, 1967; Chafe, 1974). Accentuation and deaccentuation might signal to the listener how to distribute processing efforts in an efficient way; for instance, deaccentuation might tell him not to spend much effort on doing a precise analysis of the speech signal, since the interpretation is already available on the basis of the preceding context (Nooteboom and Terken, 1982; Terken, in preparation).

If the distinction between presence and absence of accent is a functional one, we should be able to measure the extent to which the presence or absence of accents affects the listener's comprehension of the incoming information. More specifically, we may ask what the effect of appropriate application of accentuation rules is, that is, whether the listener's comprehension is seriously disrupted if a word which should be accented is not accented or vice versa. For the clearly structured material used in the present experiment we will use the following straightforward rule: if an expression has been mentioned in the preceding utterance in the same syntactic function, it need not be accented. Deviation from this rule defines 'inappropriate' accentuation.

2. Method

To investigate these questions we have chosen a verification task: a listener is watching a screen displaying a simple configuration of alphabetic characters. Subsequently, he hears a description of some aspect of the configuration, and he is asked to decide as quickly as possible whether the description is right or wrong. Decision time is taken as an index of comprehension time.

To give an example: we present the letter configuration shown in figure 1. After a warning signal the *p* moves to the top of the *k*. Subsequently, we present the description 'the p moves to the top of the k'. The listener should
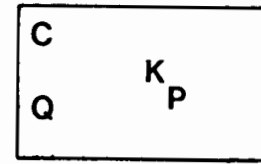

Figure 1. Example of initial configuration of alphabetic characters.

decide whether the description is right or wrong. Next the *p* moves to the left of the *q*. We present the description 'the p moves to the left of the q'. In the second description, the 'p' should be deaccented because it has been mentioned in the preceding utterance. If it were accented, it would be labelled 'inappropriately accented'. On the other hand, the 'q' has not been mentioned in the preceding utterance and should therefore be accented. If it had not been accented, it would be labelled 'inappropriately deaccented'. The successive descriptions are interrelated, so that we can define the appropriateness of accentuation with reference to the preceding context.

By manipulating the presence or absence of an accent on a specific word, and by measuring the decision time from the word onwards, we get an indication of the effect of accentuation and appropriateness of accentuation on comprehension time.

The presence or absence of accents and 'appropriateness' is manipulated independently for subject nouns and predicate nouns. For each condition, ten sentences are presented to eleven subjects, and comprehension times measured.

3. Results and Discussion

For subject nouns we find the following data (we do not consider the data for 'true' subject targets, since if the subject is described correctly, the listener has to wait for the remainder of the sentence before he can make a decision, while we are interested in the immediate effects of accentuation. So the data presented are only for 'false' subject targets. Means are in ms. Arrows between means in the matrices indicate that the means differ significantly in a sign test on comparisons of individual measurements. Each mean is based on at most 110 measurements).

	−Accent	+Accent
Appropriate	606	584
Inappropriate	624	613

We see that the presence of an accent leads to faster decisions, and that both for plus and minus accent the appropriate application of the rule leads to faster decisions than the inappropriate rule application.

For predicate nouns we have two sets of data: for true descriptions and for false descriptions. Let us first consider the data for false descriptions.

	−Accent	+Accent
Appropriate	435 ⟶ 389
Inappropriate	453 ⟶ 427

Again, we see that the presence of an accent leads to faster decisions than the absence of an accent, and that appropriate rule application leads to faster decisions than the inappropriate application of the rule. The data for 'true' predicate targets are the following.

	−Accent	+Accent
	p = .06
Appropriate	266	294
Inappropriate	407	323

Again, we see that inappropriate rule application leads to longer decision times. However, for true descriptions the presence of an accent leads to faster decisions only when the rule is applied incorrectly. When the rule is applied correctly the absence of an accent leads to faster decisions.

4. Conclusion

We see that appropriate application of the rule in all cases leads to faster decisions, and that the presence of an accent leads to faster decisions except when the description is true and the word may be appropriately deaccented, that is, when there is no conflict between the description and the word described, and there is also no conflict between the lexical information and the accentual information. Thus, the present results suggest that the 'appropriateness' of deaccentuation should not only be defined with respect to the preceding linguistic context, but also with respect to the domain of reference: we have found that accentuation speeds up decision time when there is a conflict between the information conveyed and the actual state of affairs. This would make sense if accentuation signals to the listener that he cannot easily supply the intended interpretation by himself, so he should give proper attention to the analysis of the speech signal, and if deaccentuation conversely signals that the listener has the intended interpretation already available on the basis of the preceding context, so that he need not spend too much effort on analysing the speech signal. This new definition of 'appropriateness' is being tested in current experiments.

5. Applications

In the design of rule systems for automatic accent assignment the present results suggest the following. Words which may be accented for syntactic reasons (e.g. nouns) should be marked by an accent, except in cases where there is no doubt concerning two matters:
1. deaccentuation is appropriate with respect to the preceding context;
2. what is said is a true description of the state of affairs.

This strategy will probably lead to the presence of an accent in a number of cases where speakers would apply deaccentuation. We have no evidence yet about the possible cumulation of negative effects of such a conservative strategy in coherent discourse.

Acknowledgements

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