

## NOTES ON THE SWEDISH WORD TONES

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The present paper describes, firstly, the behaviour of the Swedish word accents in running speech, as far as their tonal movement is concerned, and, secondly, a test carried out with some two-syllabic word pairs, spoken and whispered by informants representing five Swedish dialects, and presented to a group of listeners for interpretation.

As is well-known, Swedish and Norwegian, and also some south-western Danish dialects possess two word tones or word accents, which can be shown to contrast in pairs of polysyllabic words. The opposition occurs only in stressed positions.

The pair most often used for illustration in Swedish is, of course, *'anden* (= the duck, representing Accent 1) and *''anden* (=the spirit, representing Accent 2). I would like to point out *en passant*, since there seems to be some doubt on this point, that there are actually quite a large number of similar pairs in Swedish; the reason why these two words are used over and over again is, probably, that this facilitates a comparison between different investigations.

Several theories have been advanced as to the nature of the word accents. The difference between Accents 1 and 2 has thus been said to be mainly one of tone, or of intensity, or of duration, or of some combination of these features. The tonal difference between the two accents in a dialect is usually quite distinct, more distinct than any other feature. However, findings show that the tonal pattern of one dialect may be almost the reverse of that of some other dialect. The theory has therefore been advanced that it is impossible to interpret correctly isolated samples of a dialect which is tonally different from one's own unless the listener has some previous knowledge of the dialect in question.

There are several other noticeable, though less constant differences between the accents. Thus, for instance, in many parts of Sweden the syllables following the stress usually, but by no means always, have a greater amount of tonal movement, intensity, and duration in words with Accent 2 than have corresponding syllables of Accent 1. In South Swedish this difference is much less evident and can often not be observed at all, particularly not in running speech. Where it occurs, it is mainly a difference in duration.

Thus, no common denominator seems to have been found for the Accent 2's of all Swedish dialects on the one hand and the Accent 1's on the other.

Fig. 1:1 shows the falling tone of the stressed syllable of Accent 1 in my own dialect (Skåne) and no. 2 shows the rising tone of Accent 2. Nos. 3 and 5 show the comparatively "neutral" tone of Accent 1 in two other dialects (from Central and North Sweden) and no. 4 the high-low of Accent 2 in Central Swedish (Stockholm). The repetition of the "hump" in the second syllable seen in no. 4 occurs rarely in the Skåne-dialect and is not necessary to the distinction in other Swedish dialects either, as exemplified by spectrogram no. 6 of fig. 1. The tonal pattern of Accent 1 of the Skåne-dialect is usually said to be quite similar to that of Accent 2 of Central Swedish. As can be seen from nos. 1 and 6 of fig. 1, the fall dominates no. 1 (= Accent 1 of the Skåne-dialect), while the high is more marked and has a longer duration in no. 6 (= Accent 2 of the Stockholm-dialect).

The final rise indicates politeness or amiability. The carrier sentence was: *ordet är - (the word is -)*. A final fall indicates a simple statement, with no appeal to the listener.

It seems that in South Swedish Accent-2 words emphatic pointing, attitudinal meanings, etc. are expressed as far as is possible without disturbance of the tonal characteristics of the accent, by modifications in the tonal movement of the stressed syllable (see fig. 2 nos 1 and 2): the next syllable completing the fall following the high of the stress. In other parts of Sweden this high-low contour is already completed within the stressed syllable and the following syllable takes over the expression of emphatic pointing and attitudinal meanings. In both cases there is thus an evident carrying-over from the stress to the following syllable and the unit character of the accent is clear.

In connection with a study of so-called sentence intonation in southern Swedish, where the material investigated was a text consisting of some 350 words spoken by ten informants, the tonal patterns of the two accents observed in isolated words and short utterances showed up just as clearly also in continuous speech. Various attitudes modified the tones but with some few exceptions, which will be discussed later on, the characteristic tonal configurations remained the same, as could be seen from spectrograms made of the entire corpus of material. This was true both for longer and shorter utterances, both for statements, questions, and exclamations, and for utterances spoken with more or less emphasis. The range of the rising tone of Accent 2 and the falling tone of Accent 1 could increase or decrease according to the intonation of the utterance as a whole; the rises and falls could also take place on a comparatively high or low frequency level. But the tonal opposition was still there.

Fig. 2 shows three spectrograms of the utterance: *''Packa ''pappas 'kappsäck*. There are three stresses: the first two on Accent-2 words and the third on a word with Accent 1. The first spectrogram represents an ordinary statement and the second the same words spoken with great surprise. The original rises and falls increase in range and duration but the general pattern is the same. The third spectrogram, however, is quite different. The words are spoken threateningly, with strong intensity

throughout. In the same way many other negative emotions produce a flattening or a slight fall of all the syllables of an utterance, thus also of Accent-2 words with their normally rising tone. Auditively the character of Accent 2 seems to disappear. The effect is rather similar to that of shouting or of monotonous speech, where it is known that no opposition between the accents occurs.

Another exception from the normal tonal accentual pattern occurred in some few instances of strong emphasis, particularly contrastive pointing. This could produce a rising tone also in Accent-1 words, most noticeable when the word occurred initially. In this case the auditory impression was still that of Accent 1, in spite of the rising tone. An attempt to explain this fact will be made in the following.

So far only polysyllabic words have been discussed. Monosyllables are usually said to have Accent 1. According to my spectrograms of running speech, monosyllables could be rising, falling, or "crescent-shaped" (i.e., rising-falling or falling-rising), depending on the intonation of the utterance as a whole. Monosyllables were thus not bound to one main tonal type as were the polysyllabics, even those with Accent 1 with the exception mentioned above. It seemed to me that they could not, without further investigation, be classed with Accent-1 words on the basis of their tonal shape alone.

Nevertheless, the monosyllables, whether rising or falling, gave an *auditive* impression similar to that of the stressed syllable of polysyllabic Accent-1 words, *not* of Accent 2. Some other factor than tonal pattern would thus seem to serve as a cue. Or such was my tentative conclusion.

A study of the spectra of the different types of words showed that somewhere in the latter part of the stressed syllable of Accent-2 words there occurred a fading, not of one or two formants only, but of the entire spectrum, which had no counterpart in monosyllables and Accent-1 words. In order to see whether this phenomenon was a special feature of southern Swedish (where the lack of agreement between the rising fundamental of Accent 2 and the simultaneously decreasing intensity is very marked), and also to investigate whether a person speaking one dialect cannot, after all, interpret correctly isolated words spoken in another dialect with different tonal patterns, a preliminary test was carried out with two pairs of words, *'anden* : *"anden* and *'buren* : *"buren* (= the cage : carried). The words were spoken by informants representing five very different dialects and were presented in random order to a group of 42 listeners (all freshmen) from various parts of Sweden. The words were presented in isolation but had been spoken as the final unit in the carrier sentence: "The word is -". Twenty whispered samples of the same dialects were added to the test.

The number of correct identifications of the *spoken* words varied from 99 and 98 per cent, respectively, for the two dialects best known to the listeners, i.e., the dialect of South Sweden, where the test was carried out, and of Central Sweden, representing the dialect usually heard over the wireless, the TV, etc., down to 86 per cent for a dialect of North Sweden, known by comparatively few listeners. As it happened the first dialect showed the largest tonal difference between the accents

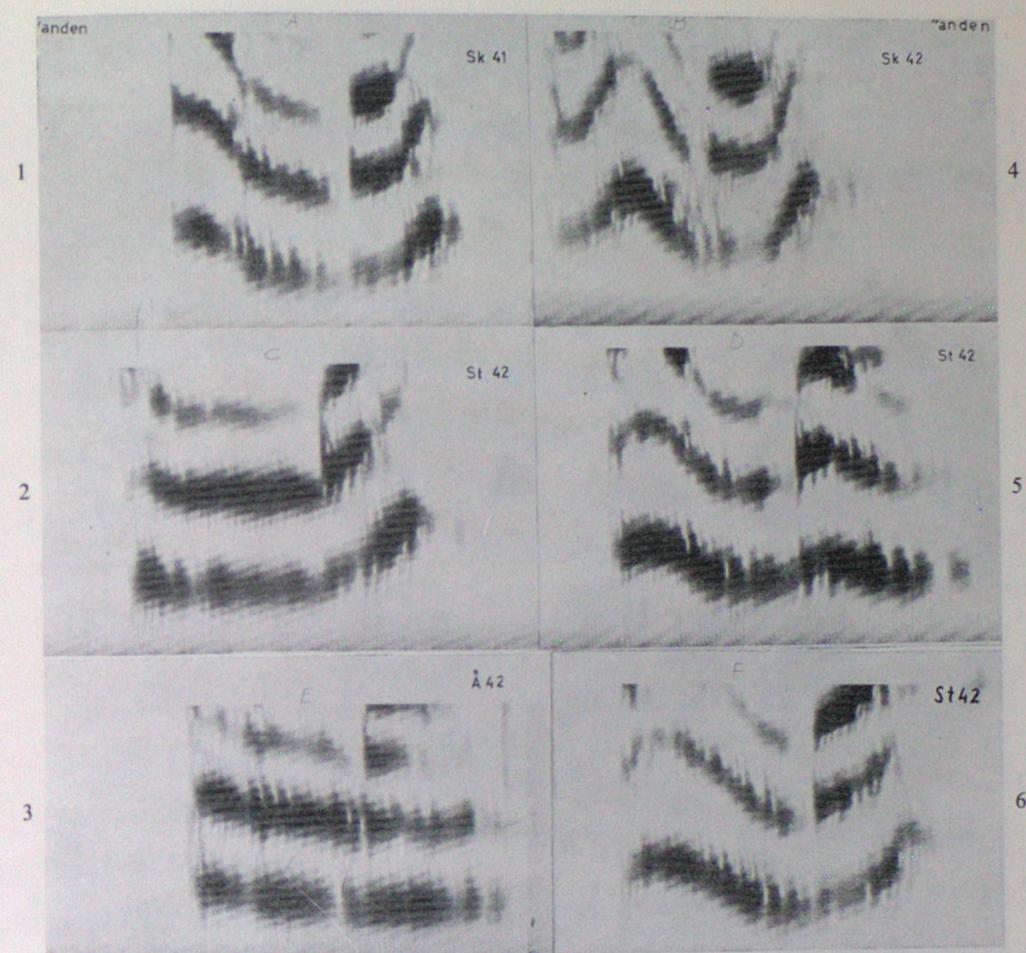


Fig. 1. Narrow-band spectrograms (45 cps. at 200 cps. per inch) of the words *'anden* (to the left) and *"anden* (to the right).

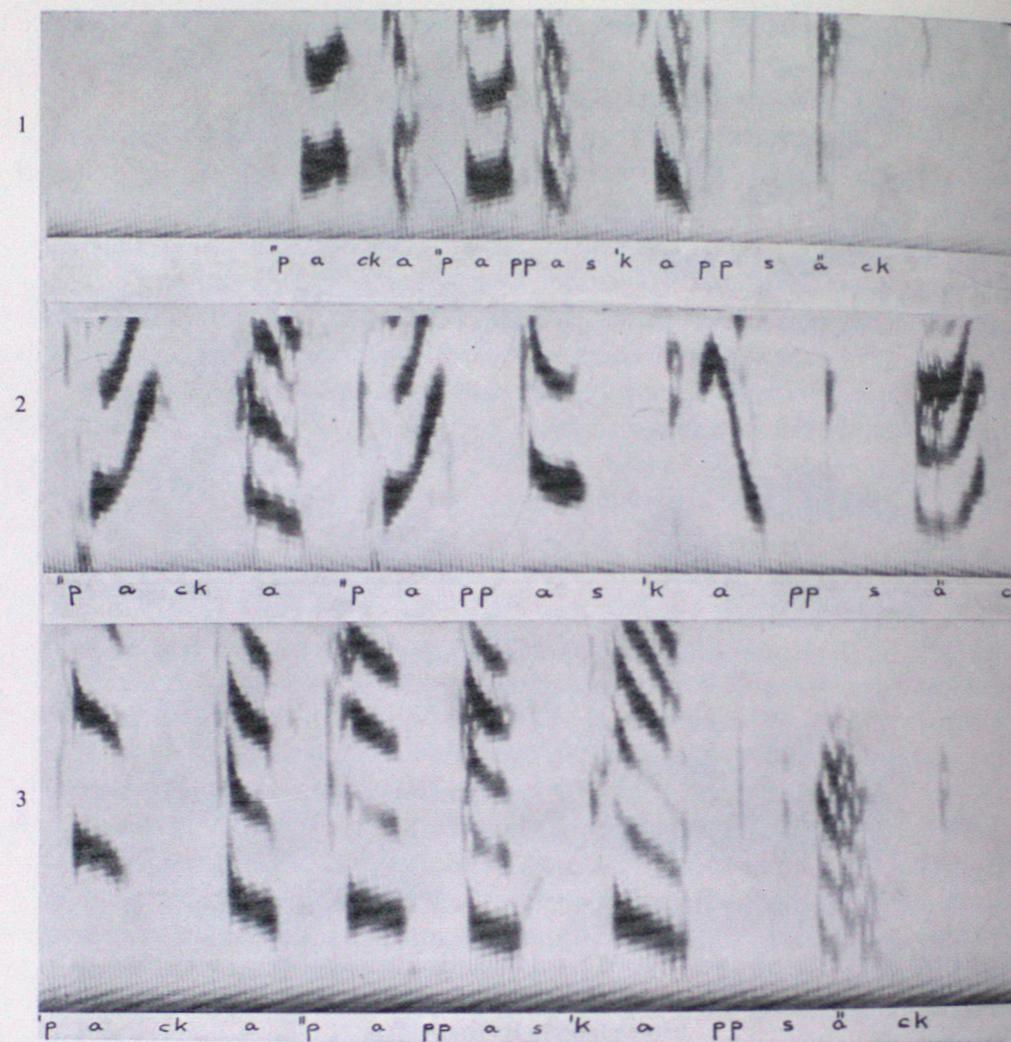


Fig. 2. Narrow-band spectrograms (200 cps. per inch) of the utterance *Packa pappas kappsäck*.

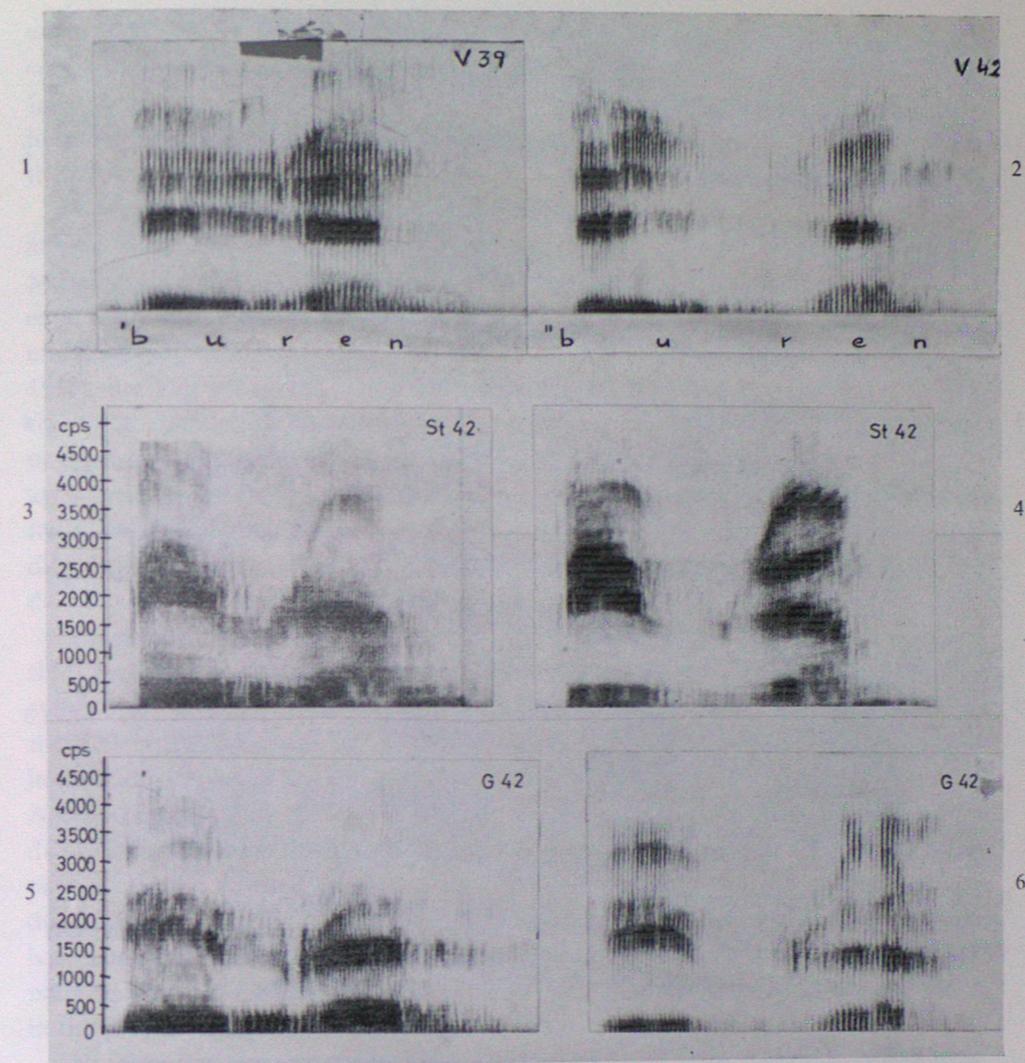


Fig. 3. Broad-band spectrograms of the words *'buren* (to the left) and *"buren* (to the right). The figures show the number of correct identifications by 42 listeners. Three different dialects are represented: V = Varmland, St = Stockholm, G = Gothenburg.

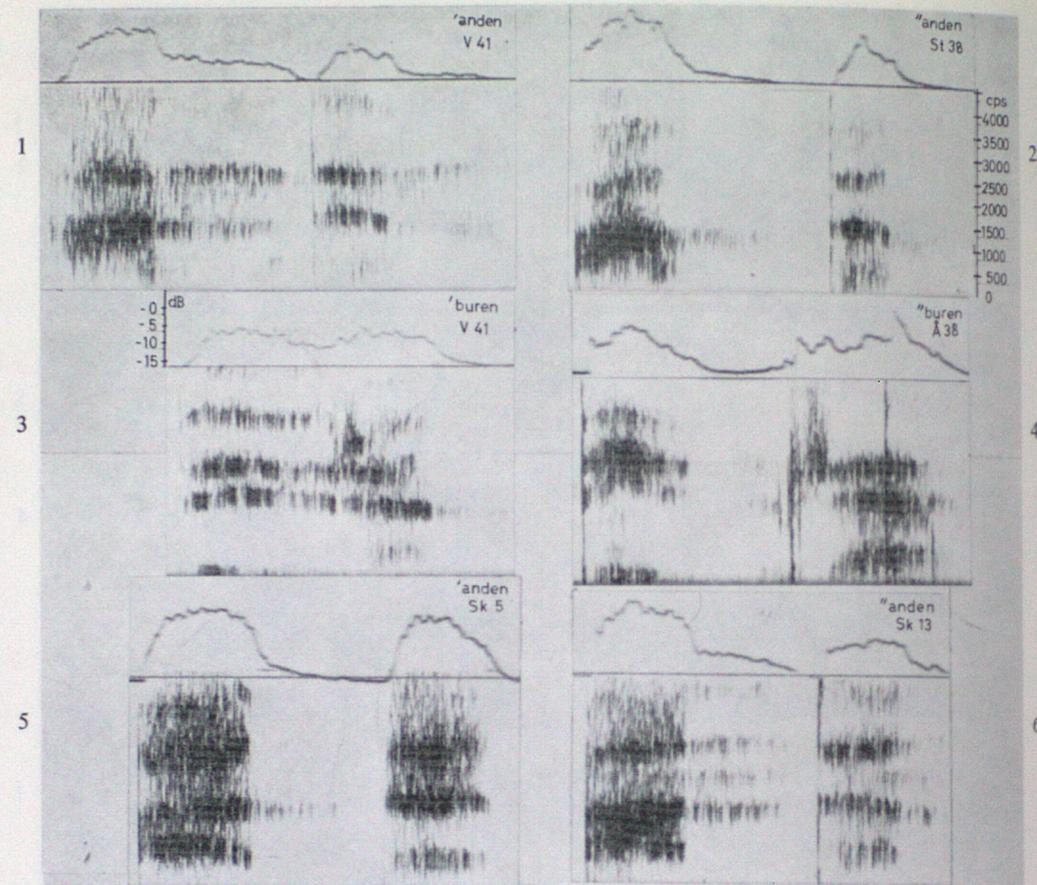


Fig. 4. Broad-band spectrograms and amplitude display curve of whispered speech. Accent 1 to the left, Accent 2 to the right. The figures show the number of correct identifications by 42 listeners. Note listeners' reactions to whispers Nos. 5 and 6. Four dialects are represented: V = Varmland, St = Stockholm, Å = Ångermanland, and Sk = Skåne.

while the northern dialect had the smallest tonal difference. The five listeners, who spoke the northern dialect themselves, showed the best listening results throughout. Individually, the smallest percentage of correct identification was found in such listeners from southern Sweden, who reported little experience of other dialects than their own.

It seems to me probable that the tonal difference is the chief indicator of the word accent within one and the same dialect, as has been convincingly shown by Bertil Malmberg in several investigations (among others in "Sydsvensk ordaccent, en experimental-fonetisk undersökning", *Lunds universitets årsskrift*, 1953, pp. 3-85, and *Observations on the Swedish Word Accent*, report from Haskins Laboratories, 1955), but that other cues are present and become important, even distinctive, when the tonal distinction is less evident or unfamiliar. It seems probable, too, that unexperienced listeners who are used to a strong tonal difference in their own dialect, as is the case in South Swedish, find it particularly difficult to shift cues (whether from one set of tonal patterns to another, or to other cues than tonal ones). Less difficulty was experienced by the listeners from North Sweden who spoke the dialect with the smallest tonal difference between the accents.

The spectrographic evidence seemed to confirm my previous tentative conclusion that the decrease in spectral intensity somewhere in the second part of the stressed syllable of Accent-2 words may serve as an important cue since it occurred in all the dialects, independent of their tonal characteristics. See fig. 3. The unfinished impression produced by the stressed syllable of Accent 2 as compared to that of Accent 1 and monosyllables reported by investigators of different dialects, may be due at least in part to this fading. I found too an evident similarity between the tonal patterns of the stressed syllable of the Accent-2 words of the five dialects, viz., a distinct *high*, while the tonal patterns of Accent 1 were much vaguer and seemed to have no stable tonal characteristics, except in southern Swedish. The quite reversed patterns between dialects reported in earlier investigations were thus not confirmed in the present study.

The *whispered* samples resulted in an average of 71 per cent correct identifications. The responses were thus not mere guesses. Best results (85 per cent) were obtained for words whispered in the northern dialect which showed least agreement for the spoken words (i.e., 86 per cent). Spectrograms of the whispered material indicated that the Accent-2 words with a comparatively high percentage of correct identifications showed the same fading in spectral intensity somewhere in the latter part of the stressed syllable as had been noted in spoken words with Accent 2 and also a clear-cut division or valley between the intensity peaks of the two syllables of the word. Accent-1 words, on the other hand, with a comparatively high percentage of correct identifications, were whispered with more or less sustained intensity throughout (see spectrograms 1 to 4 in fig. 4). These results are only what would be expected if intensity features are used as cues when tonal ones are absent. The results depended therefore to some extent on the whisperer's ability to make this substitution.

The "worst" whisperers came from South Sweden. Spectrograms showed that the subjects ambitiously tried to replace the rising tone of the spoken Accent 2 by a gradually increasing intensity (which was interpreted by the majority of listeners as Accent 1), while the falling tone of Accent 1 was replaced by a strong initial effort followed by a decrease in intensity to zero. This was interpreted by the majority of listeners as Accent 2, as was to be expected (see spectrograms 5 and 6 in fig. 4).

There are, as was pointed out before, other features too, which help to distinguish between the word accents, such as the greater time interval of the two syllables in Accent-2 words reported by Gunnar M. Fant (in *Acta Oto-Laryngologica*, Suppl. 116 (1954), pp. 83-93) and differences in duration. I have confined myself to those features which I believe to be most important for the distinction of the two word accents in Swedish, viz., (1) the tonal difference and (2) the difference in spectral intensity.

The results obtained so far on these two points corroborate the definition suggested by Einar Haugen of Accent 1 as unmarked (merkmållos, without any relevant feature), and, in contrast, of Accent 2 as marked or merkmålhaft. ("Tone and Intonation in East Norwegian", *Acta Philologica Scandinavica*, Vol. 22 (1952), pp. 41-64).

Nevertheless we shall probably not have a really clear-cut picture of the phonetic nature of the word tones until the whole range of Scandinavian material has been consistently analysed.

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