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# INFORMATION BY TONES AND SINGLE VOWELS

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As the results of these researches were published in relatively unknown periodicals, partly even in Dutch, it may be of some interest to summarise these here in a circle of professional phoneticians, the more so as they seem to fit into the general programme.

The material consisted of two collections of combinations of three tones, in which duration and intensity had been kept constant as much as possible. The first collection consisted of 49 sequences, giving rise to associations and afterwards leading to a judgment concerning the emotional and linguistic information.

The second collection implied 2535 sets of three tones, all lying between *c*, *c'* and *c''*. Here only a judgment was demanded concerning the acceptability of the tune for three geographic names, as a statement, a question or a call. If in this case emotion was judged to be a condition for a certain possibility, this was simply noted.

Besides we had at our disposal the records of three vowels, *a*, *o*, *e*, performed by 3 male and 7 female students, judged by 50 students as to the affect they meant to transfer: cheerfulness, disgust, kindness, enthusiasm, grimness and sadness.

It was striking that concerning the emotional information of the 49 complexes of three tones a high degree of concordance existed, whereas concerning the linguistic information the opinions differed.

It appeared that the first interval had a preponderant rôle in the expression of emotion.

The linguistic category: statement, question, call, seemed to be determined especially by the second interval.

As to the judgments concerning the three geographical names fitting to a tune of three tones, the results were regular to a high degree. Generally spoken the positive results were found in one single quadrant. For the first word (Apeldoorn) this was the one of two negative intervals, for the second word (Ootmarsum) a first positive interval was combined with a second negative one, while for the third word (Oostmahorn) a field was found covering two quadrants partly, in which a rising second interval was combined with a first one that was either falling or rising. This ambiguity found its cause in a relatively strong secondary accent on the first syllable.

A special behaviour showed the territories in which one of the intervals was zero, this favouring the impression of a call.

Mr Van Gelder tried to formulate the importance of the range of the intervals and that of absolute tone value.

The second interval presented 169 possibilities, eventually leading to the interpretation of one, two or three names, as a statement, a question or a call.

Tracing a diagonal, we find at the right the falling and at the left the rising intervals. In this latter half statements are almost absent, whereas the right one shows a mixture of questions and statements. C or cis as an ultimate tone frequently results in a statement, but it is striking that especially here also many questions occur.

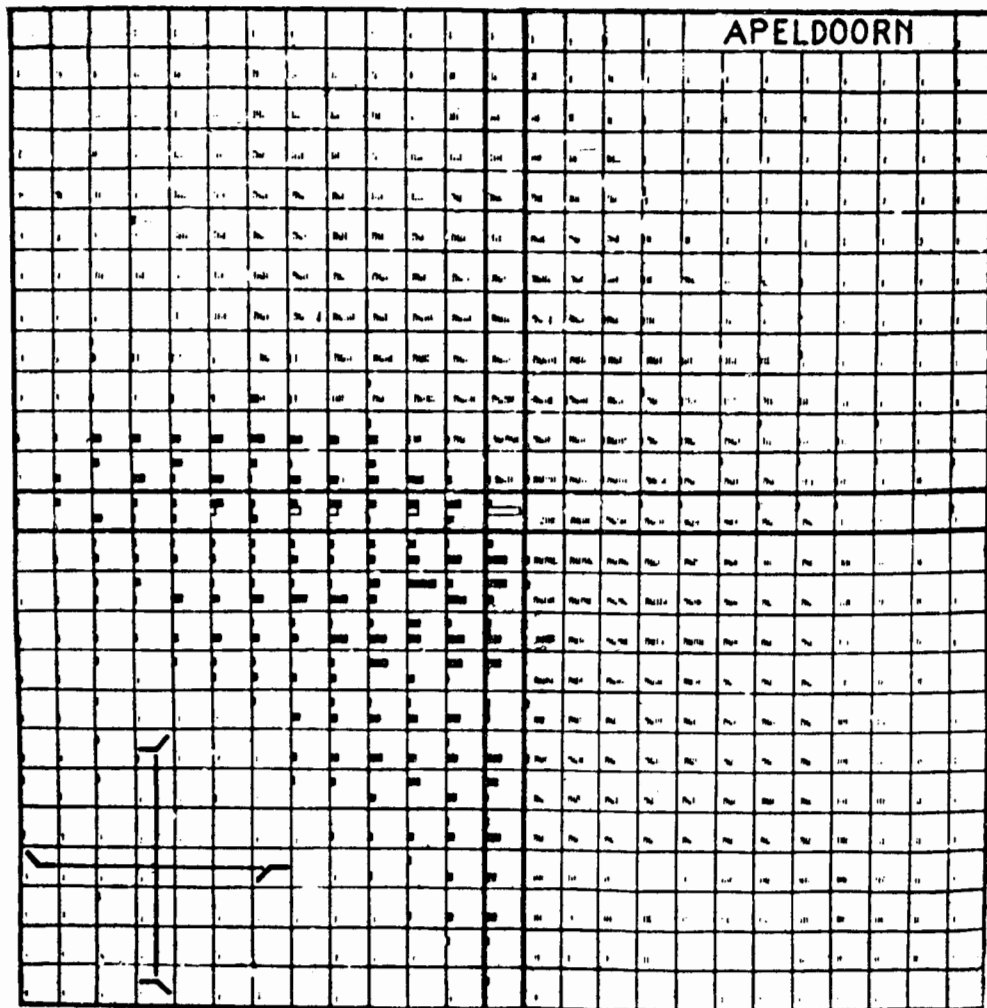


Fig. 1.

Questions show maximal values in rising intervals encompassing two halftones. Falling intervals encompassing about six halftones work also as questions.

A call was especially recognized if the ultimate tone was lying between c<sup>1</sup> and g.

Fis as the first tone of the first interval gave a remarkably high number of statements for all three words, demonstrating an exceptional linguistic role of the first interval.

Of 127 tunes on c giving a signal, this concerned 70 times a statement, 53 times a question and 4 times a call.

In the research with the vowels the human vocal sounds gave rise to an extremely prompt mimical reaction, followed by free associations which often were highly emotional and accompanied by gestures.

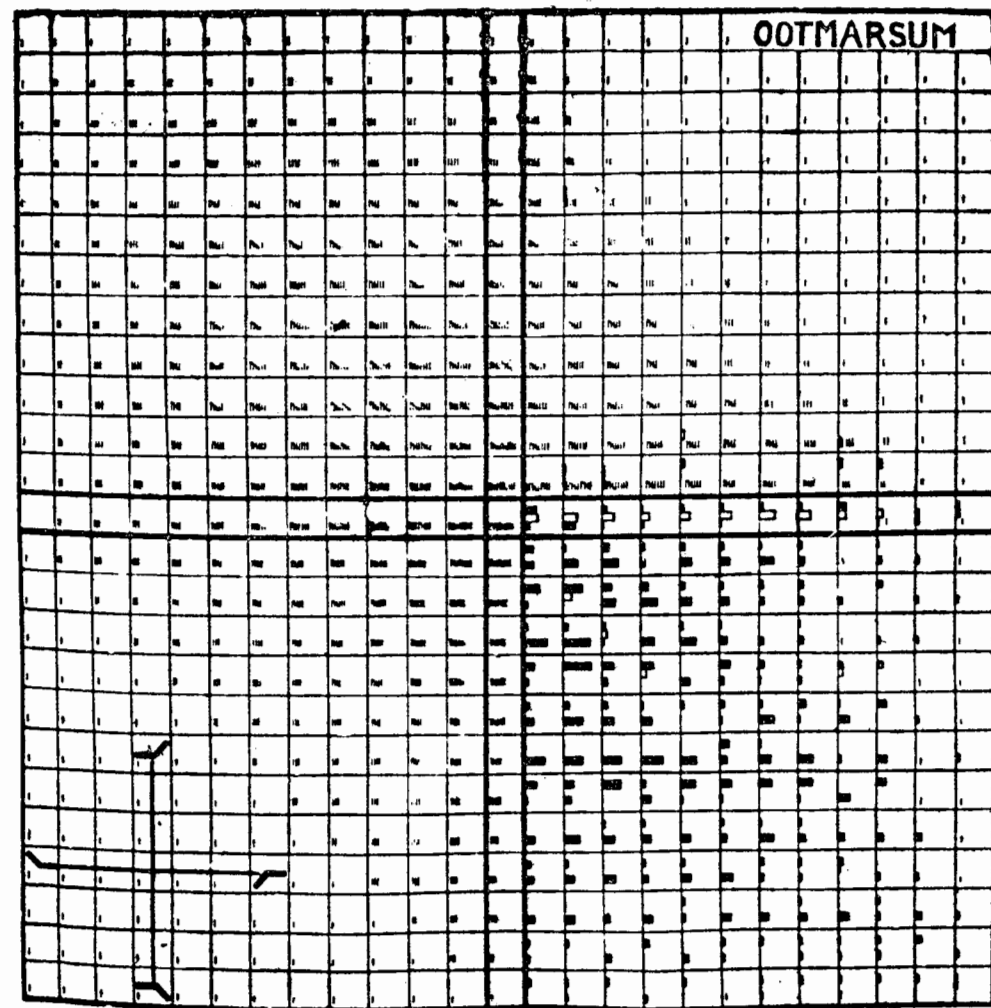


Fig. 2.

Mr De Nooyer brought all 7500 judgments into three categories: +, ±, —, though they had various forms, going from an indication of the affect by a substantive, an adjective or an adverb, to associations indicating situations, persons or animals.

The number of positive judgments for *a* was considerably larger than that for *o* and *e*. Especially cheerfulness, kindness and enthusiasm were recognized best in *a*, sadness being recognized very well in all three vowels.

As to the objective intonation curve, pitch was generally higher in the positive affects than in the negative ones, kindness and grimness forming a transition. The three negative affects were characterized by a long fall, the positive ones by a rise,

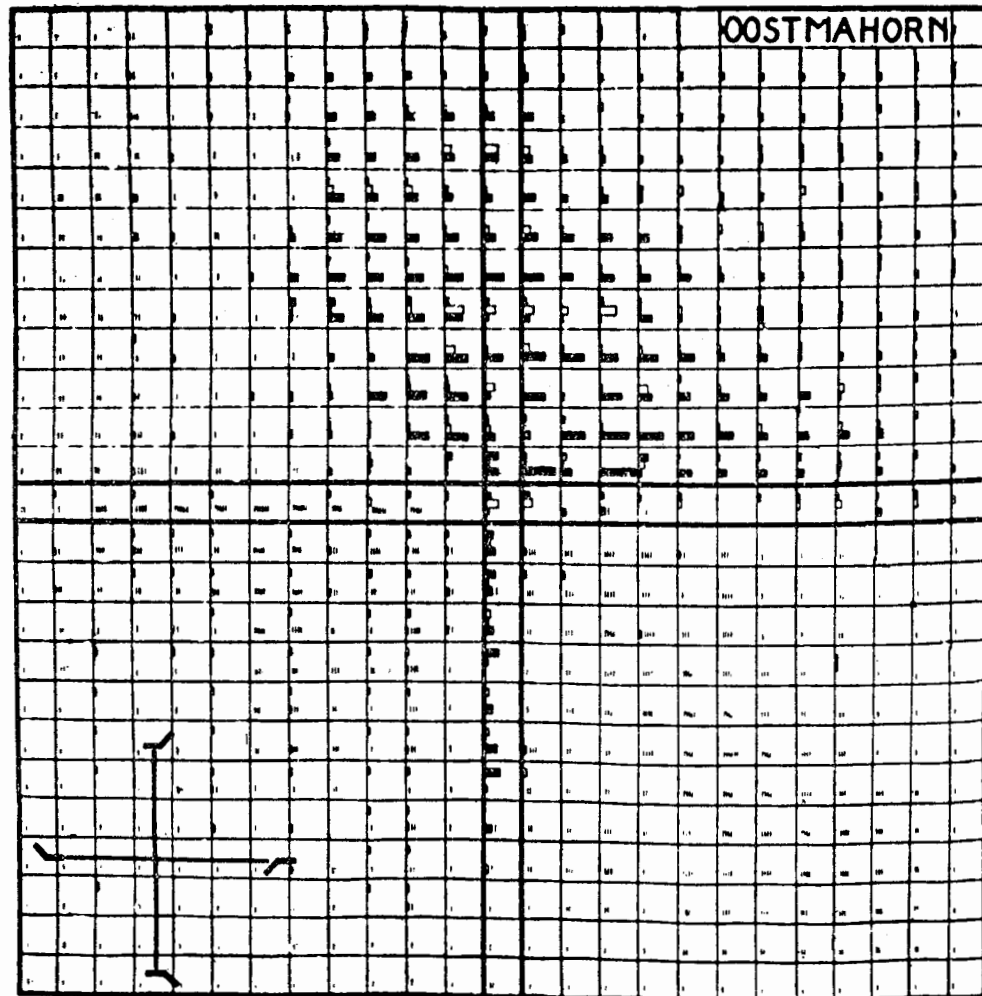


Fig. 3.

VOORLAATSTE TOON

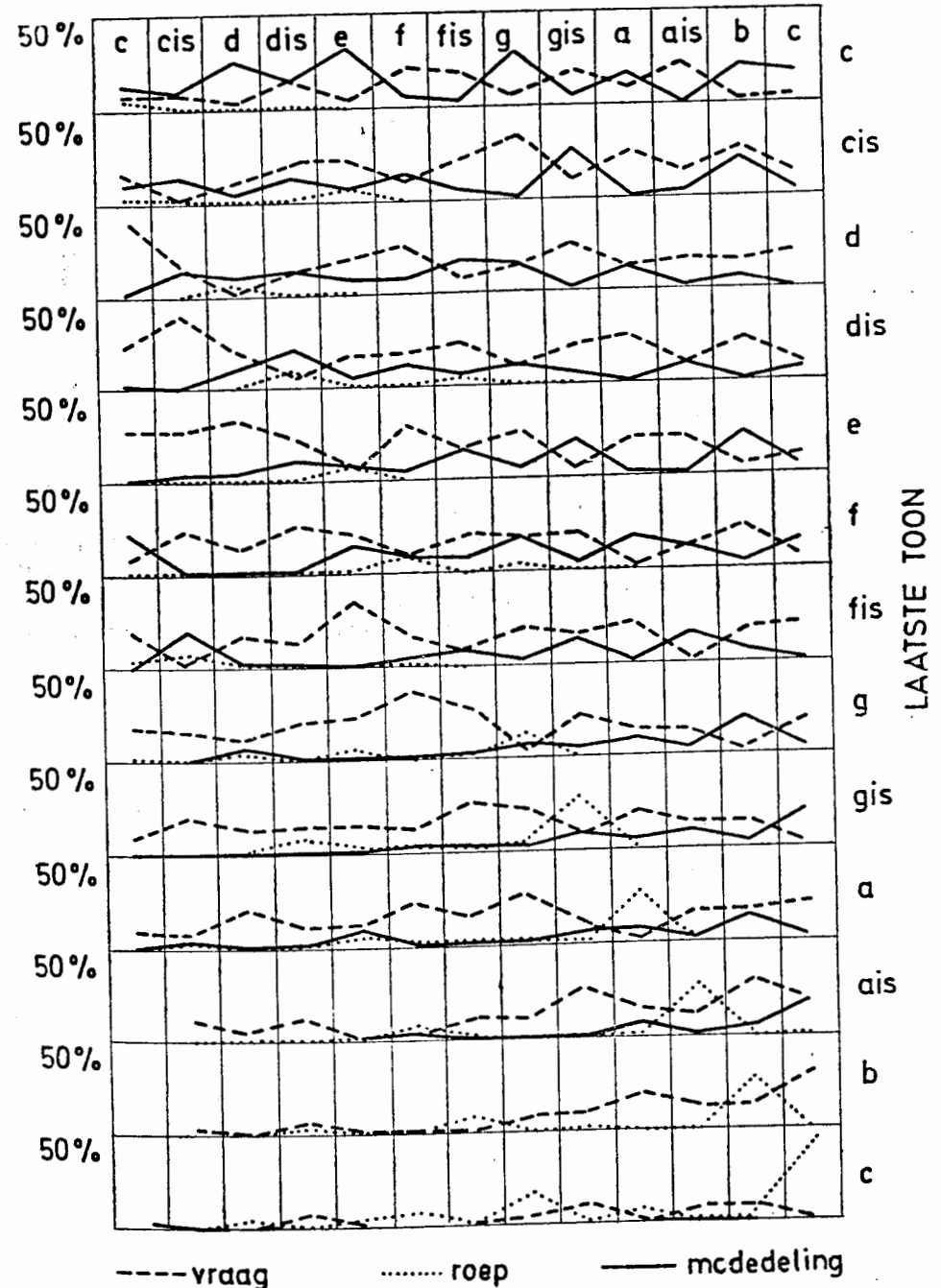


Fig. 4.

a summit and a fall. Kindness showed a final rise, demonstrating that the final part is not quite blocked for emotional information.

It will be possible by dividing the vowels into sections of about 0.5 second, to detect which part is most active.

As it is known that the subcortical region is reacting more slowly than the cortex, a longer latency and a longer excitation in the former may lead to a perfect combination of the emotional and the linguistic information.

In this connection it may be remarked that time-compression as applied by Fairbanks and his school might be dangerous by suppressing emotional information at will.

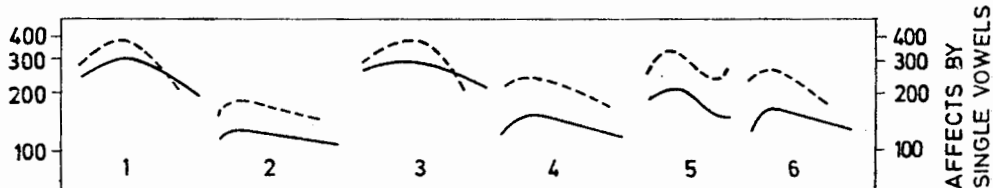


Fig. 5.

Average shape of various melody patterns in men ——— and women - - - - - The duration agrees with the average duration. The pitch of beginning, maximum and end agrees with the average values.

1. Cheerfulness; 2. Sadness; 3. Enthusiasm; 4. Disgust; 5. Kindness; 6. Grimness.

## DISCUSSION

### *Black:*

I am of course thrilled to hear the report of Professor Kaiser's pioneering work. I see in the stimulus response procedure of this work a way to seek particular "universals" in speech, ones of suprasegmental phonemes.

### *Fry:*

We have been delighted to have the opportunity to hear Dr. Kaiser reviewing for us a greater deal of her experimental material. Her paper has suggested the idea that her results might be linked with recent experiments which have shown the dominance of one ear or the other in the reception of speech and music. It would be of very great interest if the same methods could be used in examining the distinction between affective and grammatical intonation.

### *MacCarthy:*

Question about the technique used for producing the evidence on which the last of the speaker's slides was based.

### *Kaiser:*

As Professor MacCarthy supposed, the last slide gave averages of the pitch records of vowels by which the subjects had tried to imitate six affects on request.

The subjects followed different ways to reach the result: some performing the affect by gestures and mimic, other limiting themselves to vocal expression.