

THE PRESENT STATE OF THE DESCRIPTION OF DANISH UTTERANCE PROSODY*

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I will comment first on *Danish, utterance and prosody*: Danish pronunciation varies markedly, depending on which geographical area, which age group, and which social stratum you choose to deal with. Differences due to age and social status may be most pronounced within Standard Danish. - If an utterance is anything that is spoken between two pauses, there are obviously many different kinds of utterances, from single words to long sentences. Sentences may be simple or complex and may be further classified by their status as, e.g., declarative or interrogative. Another choice, which cuts across the choice of utterance type, concerns context. You can choose to investigate free, natural speech or speech in some restricted situation or other: news reading on Radio or Television, a lecture, etc., or you can be compelled to make do with readings of schematized context free utterances. - Prosody is the generic term for several phenomena: primarily rhythm and intonation, but we can also classify such reductions and assimilations as occur in connected speech under *prosody*.

Let me now disclose what I have investigated:

intonation in (almost exclusively) non-compound periods (with extensive use of nonsense words) read - out of context - by 30 to 40 years old speakers of Standard Copenhagen Danish from the middle classes.

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Yet another restriction of the material lies in the fact that I have looked at neutral - non-emotional - speech only. Subjects were asked specifically not to give their reading any particular emotional colouring. - It is therefore a very limited part of all that which may come under the heading *Danish utterance prosody* that I have investigated. Add to this other sins of omission: you could expect from an exhaustive description of Danish utterance prosody that it will adopt a historical perspective - to the extent that this is possible - and you would also expect Danish to be compared to our most closely related neighbours - to the extent that that is possible (Swedish is the only Nordic language which is presently adequately described, really); finally, the description could be set off by more general theories of intonation.

The following phenomena have been studied:

- the relationship between stress and fundamental frequency
- intonation in various sentence types
- intonation in utterances with emphasis for contrast
- intonation in utterances of very different length
- the perception of sentence intonation
- the tonal manifestation of words with assimilated or elided schwa
- the relationship between stress and fundamental frequency in two Jutland areas (with Bent Jul Nielsen from the Institute of Danish Dialectology)

The methodology is classic in experimental phonetics:

- systematized material
- several subjects
- several recordings of each subject
- registration of fundamental frequency via pitch meters on mingograms
- segmenting, measuring and averaging - which lead to a
- descriptive model

The complex course of fundamental frequency (F_0) is assumed to be the outcome of a superposition of several components - an assumption which is supported by the results and which is also implicitly or explicitly present in some descriptions of other languages:

the sentence contributes an intonation contour			
- phrase group	-	-	phrase contour
- stress group	-	-	stress group pattern
- stød	-	-	stød movement
- segments	-	-	microprosodic modification

To cover more languages, you may have to add to this list a tone or word tone component, a sentence accent, and a terminal contour.

I will go into detail only with the stress group component in the following, because I have greater confidence in the generalizability of the stress group patterns, also to other speech materials and situations, than of any of the other phenomena investigated. - Hans Basbøll has defined a syntactic stress group as a group of words with one main stress, which is on the last word in the group (with certain exceptions - personal pronouns are unstressed, also in stress group final position). The same definition is implicit in Poul Andersen's description. You can say, very roughly, that the syntactic stress group ends with the stress. The prosodic stress group, on the contrary, begins with the stress: it consists of a stressed syllable plus all succeeding unstressed syllables (if there are any), irrespective of intervening word or other syntactic boundaries within the same intonation contour. - The two groupings, syntactic (indicated with slants) and prosodic (indicated with plusses) and the very different parsing of a sentence they lead to can be illustrated thus ('He lay down on the chaiselongue and lit a Caminante' - I have indicated stressed vowels with acute accents):

Han lågde sig / på chaiseløngen / og tændte / en Caminante.

Han + lågde sig på chaise+løngen og + tændte en Cami+nante.

The interesting thing about the prosodic stress group is not so much the fact that it begins with the stress (in contradistinction to the syntactic stress group), but that it cuts across syntactic boundaries. In other words: at some point in the speech production process the utterance is restructured - some (quite a number, in fact) syntactic boundaries are "deleted". The fundamental frequency pattern shown

(figure 1)

may accordingly depict the course of F_0 in any of the heavy passages in the three sentences ('Handball-playing is very tiresome. The bananas in the box are rotten. Allergy is an infamous disease.' - The large dot is the stressed syllable, the small dots are unstressed syllables.) The definition of the prosodic stress group as

a stressed syllable plus all succeeding unstressed syllables within the same intonation contour

is based on the observation that this unit is the carrier of a recurrent and rather constant F_0 pattern - namely, a low stressed syllable followed by a high-falling tail of unstressed syllables.

The prosodic stress group pattern is subject to variation, according to

position in the utterance
 the intonation contour it is superposed upon
 emphasis for contrast
 syllable reduction
 individual
 dialect

I shall return to this variation, but first let me show how stress groups combine into whole utterances

(figure 2)

('Mr. Andersen is taking a bus for Thisted.') Since the stress group pattern is - in a sense - constant, i.e. its variation (which mainly concerns the interval between the stressed and the first post-tonic syllable) is predictable, the sentence intonation contour may be defined narrowly as the course described by the stressed syllables alone, disregarding the unstressed syllables. This concept of sentence intonation contour is depicted by the broken lines in the figure

(figure 3)

This is not an illustration of any particular set of utterances. The broken lines which indicate sentence intonation contours have of course no physical reality. The intonation contour is most steeply falling in declarative, terminal utterances (3), least falling in questions that are neither syntactically nor lexically marked as such (1). Between these two extremes you find (2) other question types and non-terminal sentences, with a tendency towards a trade-off relationship between syntax and intonation: the more syntactic or lexical information the sentence contains about its non-declarative, non-terminal status, the more steeply falling, i.e. the more declarative terminal, is its intonation contour, and vice versa. This phenomenon is subject to a certain amount of individual variation, however.

Two points are worth noting about sentence intonation contours in Standard Danish: Firstly, in the type of speech

material and -situation I have studied, an intonation contour is never more rising than horizontal, i.e. rising intonation contours, properly speaking, do not occur. Secondly, sentence intonation is a global phenomenon, i.e. information about sentence status is distributed all over the sentence and is not a local feature, e.g. in the shape of a certain F_0 movement situated at the end. This analysis has been confirmed by some perceptual tests, i.e. listeners can indeed also utilize the information contained in earlier parts of the utterance in their identification of sentence intonation and -status.

The more or less rectilinear intonation contours in the figure (figure 3) are characteristic only of utterances which are not too long - I shall return to longer utterances later.

STRESS GROUP PATTERN VARIATION

Position and intonation contour dependent variation is apparent from the graph (figure 3): The rise to the first post-tonic syllable is greater early than late in the utterance, which gives the "topline" and "bottomline" of the F_0 course together a characteristic wedge shape, - a feature which is also found in other languages. You find the same shrinking of the F_0 patterns on less steeply falling contours, but it is not as extensive. In other words: the rise from stressed to post-tonic syllable is greater on less falling intonation contours, everything else being equal. - The shrinking of F_0 patterns may have physiological causes, - it may be a voluntary signal of termination, - or it may be a mixture of both - at any rate, it is predictable.

Emphasis for contrast will change the F_0 course in the utterance rather drastically

(figure 4)

If you compare this graph to the neutral edition of the same sentence (figure 2) you will note that the three stress group patterns in the neutral case reduce to one, i.e. the rise-fall characteristic of the stress group pattern is reduced or completely eliminated in the stress groups that surround the one which contains the stressed syllable of the emphasized word, and we are left with one low+high-falling pattern. The clumsy formulation is due to the fact that word and other boundaries are still immaterial for the course of F_0 . The prominence comes on with the stressed syllable of the emphasized word, and any pre-tonic syllables will again tie up prosodically with the preceding (reduced) stress group. Emphasis may be accompanied by a raising of the stressed syllable in question, but this raising does not in itself appear to be perceptually decisive, and it seems that the tonal reduction of surrounding stress group patterns - which is equivalent

to a reduction from main to secondary stress - is the salient feature of emphasis for contrast in Standard Danish, - something which has also been pointed out by Steffen Heger. Therefore, the phenomenon which has been termed *focus*, *Satzakzent*, *primary accent*, *nucleus*, etc. cannot be said to be equivalent to emphasis for contrast in Danish, because *focus* etc. in languages that have such a phenomenon is not accompanied by a similar reduction of surrounding stresses. Danish lacks obligatory sentence accent - and languages that have such a sentence accent of course have emphasis for contrast as well.

On previous occasions I have said that when a first post-tonic schwa is dropped or assimilated to a sonorant neighbouring consonant, it seems that this syllable may also be tonally assimilated (at least partially) to the preceding stressed syllable, to the effect that the Fo maximum in the stress group is reached only in the second post-tonic syllable.

(figure 5)

However, this phenomenon - partial tonal assimilation of a post-tonic syllable with elided or assimilated schwa - is far from being a general one. I am in the process of analysing a rather comprehensive material, recorded by four subjects; - so far I have performed a quantitative two-way description of the stress group patterns, i.e. I have ascertained whether the stress group peak is situated in the first or the second post-tonic syllable after the stressed one. It turns out that across all subjects and all words (with assimilated as well as unassimilated schwa) the stress group Fo maximum lies in the first post-tonic syllable in about 75% of the material. Subjects differ among themselves, however, - with one of them the peak almost invariably lies in the first post-tonic, and with another this is so in a large majority of the words. The remaining two subjects have more instances of late Fo peaks, and it does indeed appear, that the tendency with them is greater towards late Fo maxima in words with assimilated schwa than in words with a vocoid in the first post-tonic syllable. But to say that syllables with assimilated schwa generally behave differently from other unstressed syllables is hardly justified. - A closer qualitative description may still, however, reveal interesting differences.

The conditions in schwa syllables are the only tonal phenomena which have previously been subjected to acoustic (and auditory) analyses. Jørgen Rischel determined how syllable number is distinguished in words of the type *hårde-hårdere* 'hard (pl.)-harder' [¹hɔ:ʌ-¹hɔ:ʌʌ] and *faldne-faldende* 'fallen (pl.)-falling' [¹falnə-¹fal|nə]. He found that, apart from some not quite stable durational differences in the consonants, the peak in the rising-falling tonal pattern is much earlier, relative to the end of the word, in tri- than in dissyllabic words. It is tempting to reformulate this

and say that the peak is situated in the first post-tonic syllable; if there is only one post-tonic, the peak will lie very near the end of the word; if there are several post-tonics the peak must be succeeded by a fall. In other words, in Rischel's material a first post-tonic schwa syllable, where schwa is assimilated, did not seem to assimilate tonally to the preceding stressed syllable, at least not to the extent that the F_0 peak is "delayed" until the second post-tonic syllable.

The fall through the post-tonics may vary somewhat from one speaker to another

(figure 6)

some have rather steeply falling post-tonics (left) to the effect that the intonation contour will often be transgressed by unstressed syllables (figure 3), but others have only slight falls (right), to the effect that the "bottomline", i. e. a connection of local F_0 minima, will be identical to the intonation contour.

In a pilot study I did with Bent Jul Nielsen from the Institute of Danish Dialectology of the relation between stress and F_0 in two Jutland areas, Thy and Århus, it turns out that here, too, one can reasonably define a prosodic stress group as a succession of a stressed and all following unstressed syllables within the same intonation contour - but the stress group patterns look somewhat different from Standard Copenhagen

(figure 7)

If you consider the stress determined tonal pattern to be a hat or a triangle or, better, a wave, the difference between these stress group patterns can be accounted for in terms of a difference in the timing of the syllables with respect to the peak and troughs of this wave. In Standard Copenhagen the stressed syllable hits the trough and the rise to the first post-tonic at the peak is fairly steep. Succeeding post-tonics float on a (more or less) falling flank. In Århus, the stressed syllable hits the last part of the rise to the peak, and the unstressed syllables lie on the falling flank. The difference between Århus and Thy is a difference in the steepness of the falling flank - in Thy it is so steep that the first post-tonic will already lie in the next trough. - If this description - in terms of differences in timing with respect to basically the same pattern - holds for other dialects as well, it will be an interesting parallel to the way the two word tones are realised in different Swedish dialects - which is basically a question of how a sequence of low and high syllables are timed relative to the beginning of the word or the stressed syllable in the word. - Another advantage of this description of stress group patterns is that vowel F_0 movements need not be separately accounted for. A particular

vowel movement is just a consequence of the position of the vowel on the Fo pattern - segments "float" on the Fo pattern - as hinted in the figure by the heavy strokes (stressed syllables).

INTONATION CONTOURS IN LONG UTTERANCES

One might imagine that upper and lower limits for sentence intonation contours are constant, regardless of the length of the utterance, so intonation contours in long and short utterances will differ only in the steepness of their slopes, which will be inversely proportional to the length of the utterances they span

(figure 8)

This is, however, an over simplification. In utterances containing four to five, or more, stress groups the intonation contour is decomposed into smaller phrase contours

(figure 9)

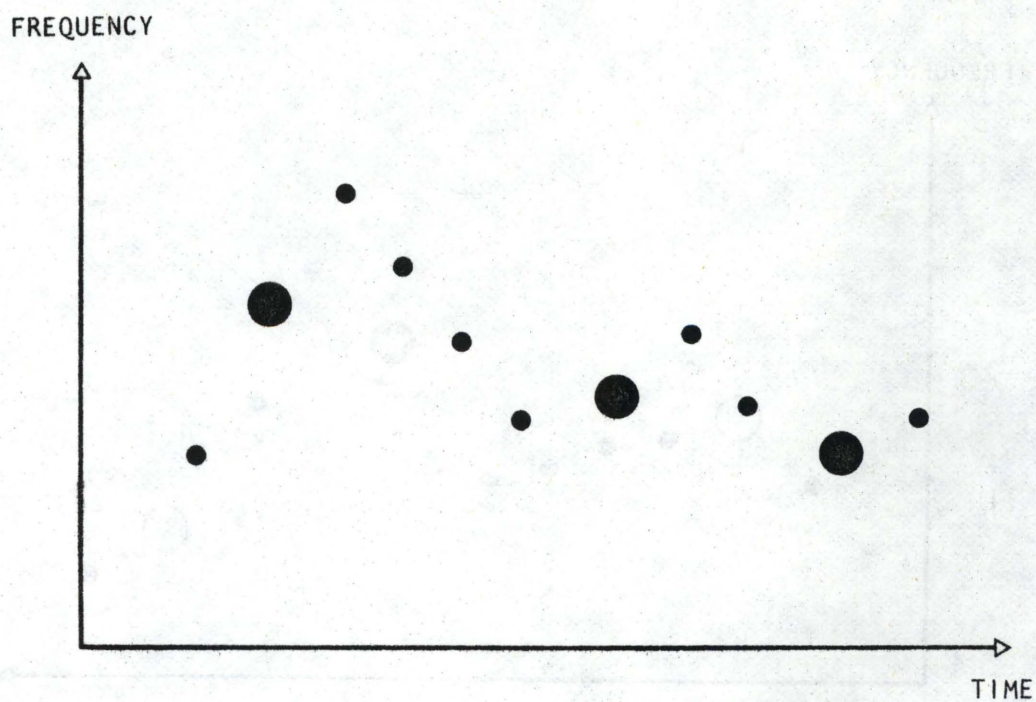
(as indicated by the broken lines in the figure), but an overall fall is preserved. - The question of the location of phrase boundaries relative to the syntax of the utterance is complicated. Generally, one can say that the phrase boundaries will be located near syntactic boundaries, but far from all and every syntactic boundary is thus marked, and the prosodic stress group will still cut right across any syntactic boundary within the simple sentence. Furthermore, surface syntactic structure alone cannot predict the location of phrase boundaries: the semantic content of the phrases must be taken into account. This last point is one which (together with several others) calls for much more comprehensive investigations, however.

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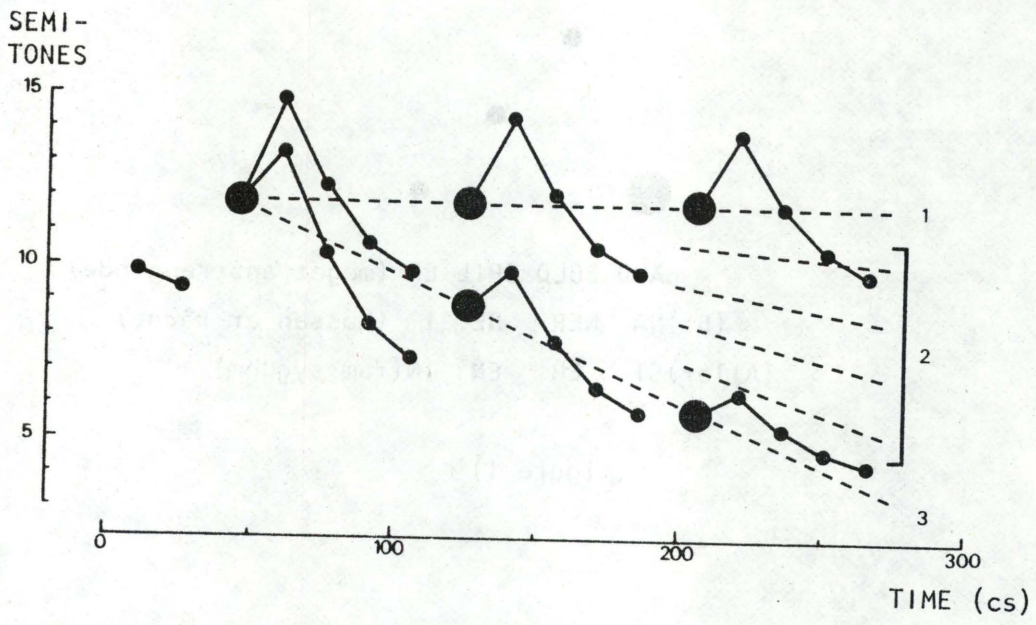
HÅND BOLD SPIL ER (meget anstrengende)
 (Ba)NA NER NE I (kassen er rådne)
 (Aller)GI ER EN IN(fam sygdom)

(figure 1)

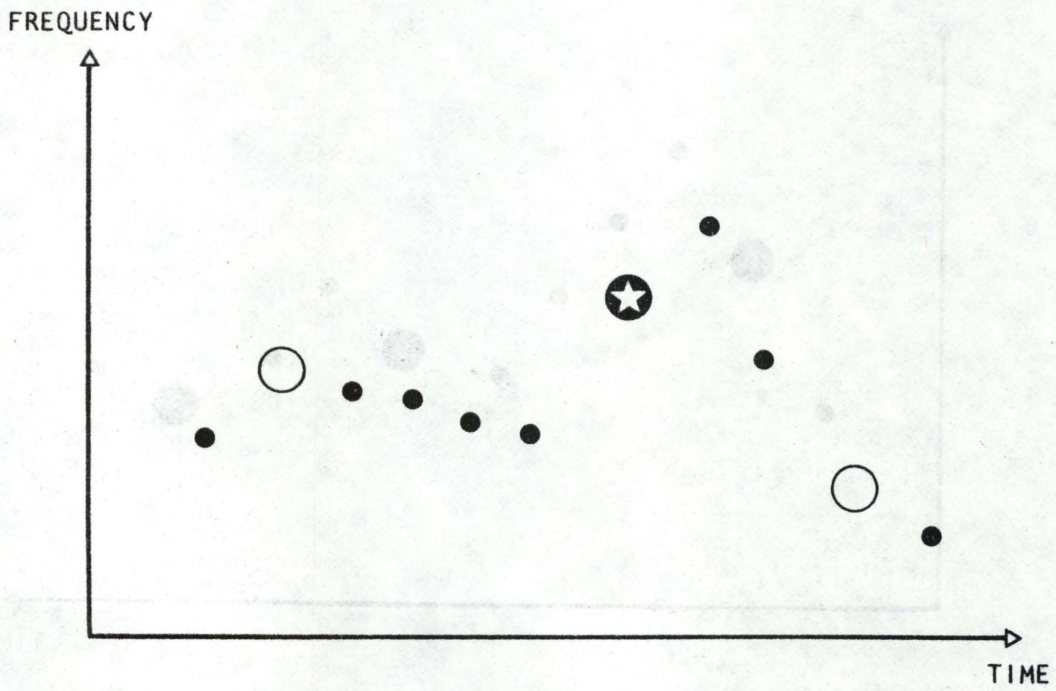


Herr Andersen skal med bussen til Thisted

(figure 2)



(figure 3)



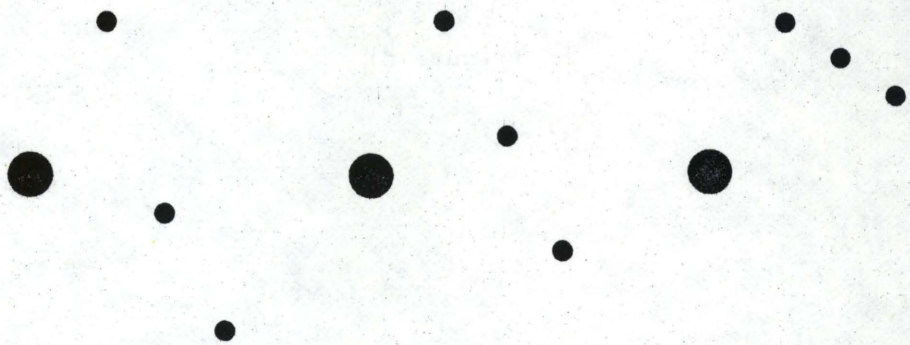
Herr Andersen skal med BÜSSEN til Thisted

(figure 4)

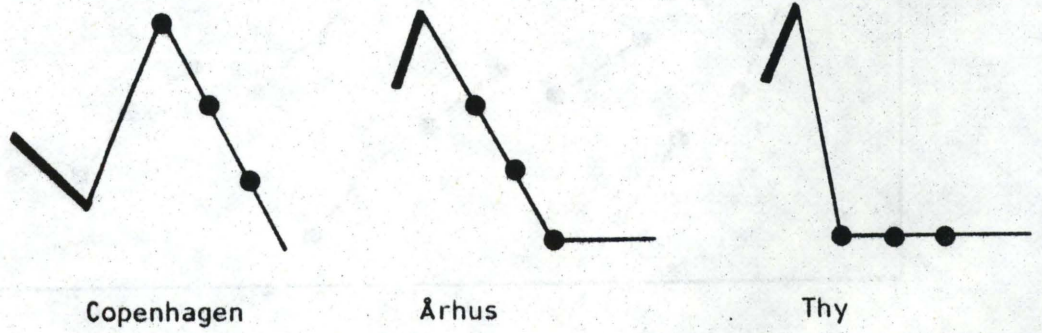


stávelserne versus (hy)stérikkerne

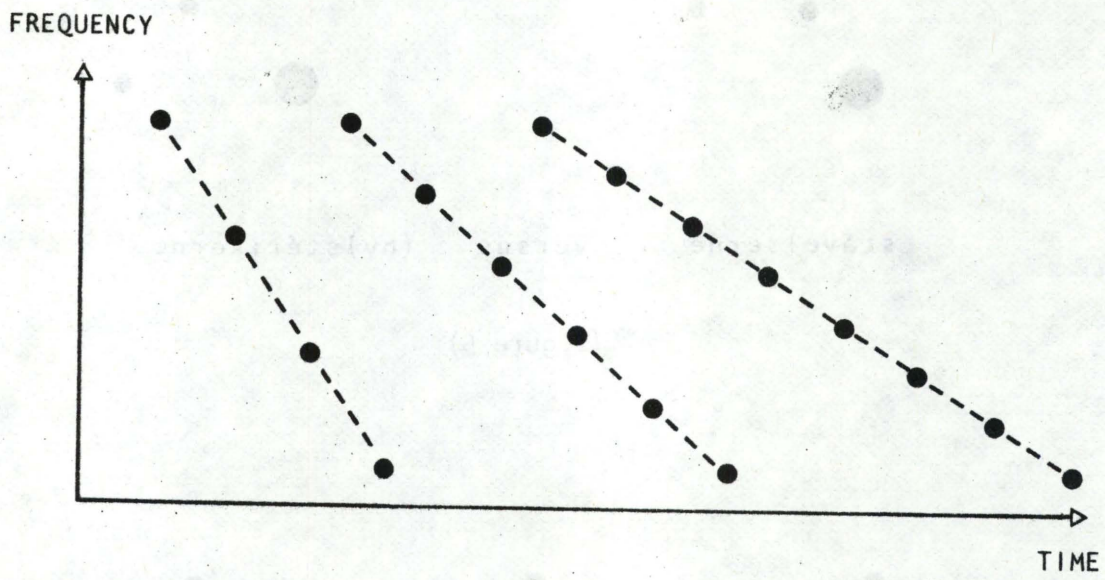
(figure 5)



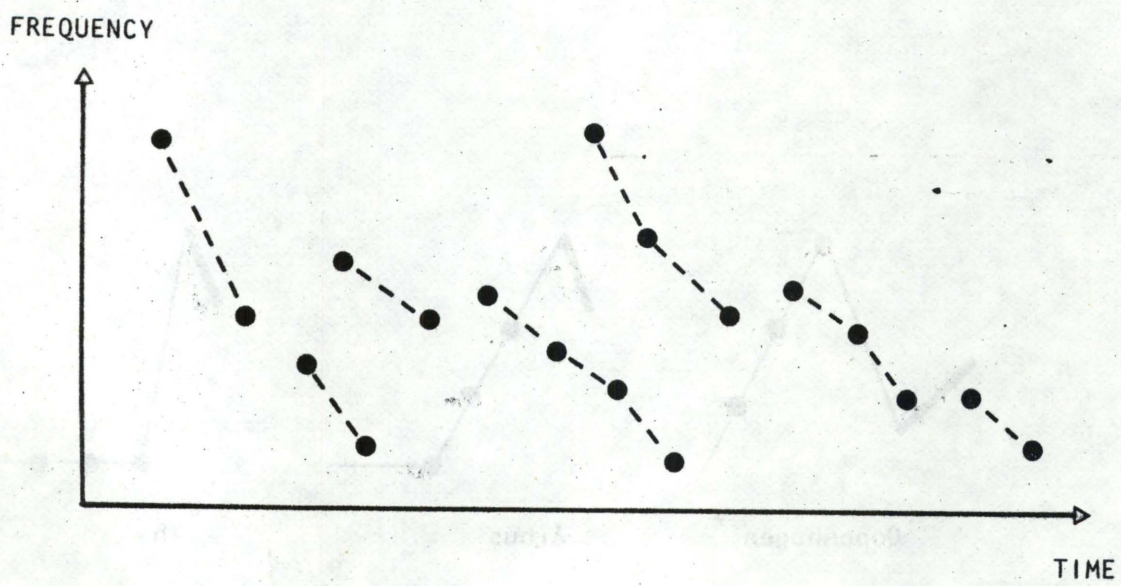
(figure 6)



(figure 7)



(figure 8)



(figure 9)