

# Phonetic Reality of Linguistic Structures: the Case of (Secondary) Stress in French

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## 1. Introduction

A great deal of the investigation of stress phenomena in French has been carried out by scholars who belong to what might be called the French school of prosody and intonation (cf. Ladd, 1982: 161), whose approach is characterized by an emphasis on instrumental phonetics, a tendency to translate instrumental results into fairly 'concrete' or 'surface-y' phonological analyses, and an interest in the prosodic correlates of grammatical organization' (Ladd, *ibid.*). These scholars work under the assumption that there exist one or more phonetic correlates of the phonological category of *stress*, and that these correlates can and must be identified before we can further our understanding of stress-related linguistic phenomena. In this paper, I wish to argue that (i) it is by no means either necessary or obvious that stress may be correlated with phonetic parameters, and phonetic data up to now tend to show that the correlation, if it exists at all, is at the very least not a straightforward one, and (ii) the necessity of positing a *phonological* category of stress can be demonstrated without references to the phonetic parameters this category is usually correlated with. Stress phenomena are one of the surface manifestations of the *underlying* prosodic ('metrical') structure of the language. We claim that the underlying prosodic structure of French (monomorphemic) words is characterized by an *alternating rhythm* of the type S W S (W). Most of the data adduced in this short paper concern secondary stress in French, but the same argument could be equally well upheld for primary stress in French, and possibly in most other languages too.

## 2. Perception of stress

The 'phonetician's assumption' that there must be phonetic correlates to a phonological category such as stress is very probably based on the (implicit) idea that something cannot be perceived which is not, in some form or another, physically present in the signal. Yet psychological literature abounds of examples where this is not the case. Just as there are many well-known instances of so-called 'optical illusions', there also exist cases where the acoustical signal and the perceived categories do not correspond. To take an example which concerns us more directly, it has been established

that the human being may perceive (and normally does perceive) rhythmic groups in stimuli which are, in fact, not grouped together in any fashion at the physical level:

Si nous écoutons tomber dans le silence des gouttes d'eau provenant d'un robinet mal fermé, nous les percevons groupées par deux ou par trois, plus rarement par quatre, même si la cadence de leur chute est parfaitement régulière. On parle alors de rythmisation *subjective* parce qu'aucun facteur lié à la suite objective des stimulations ne détermine le groupement (Fraisie 1974: 74).

Thus, there are in fact no *a priori* reasons to assume a correlation between phonetic parameters and any given phonological category. The existence itself of such a correlation is an empirical question, and the absence of any correlation at all cannot be rejected without prior examination.

## 3. Absence of secondary stress

In reality, phonetic investigations as they have been carried out since the beginning of the century, if one examines them without bias, tend to indicate that a correlation between the phonological category of stress and phonetic parameters such as intensity, pitch or duration is either absent, or else much less simple and straightforward than has been assumed. Initially, the major correlate of stress in French was thought to be intensity (Grammont, 1914: 105); since Delattre (1938), it is often taken to be vowel duration; for some, the major parameter is pitch (cf. Wunderli, 1978: 71-74, 99-100); recently, Crompton (1980) has adduced evidence that stress is not correlated to duration, but that 'it seems that contrary to the views expressed by certain other investigators (...), intensity is a significant correlate of accent in French' (Crompton, 1980: 230-1). Thus, we are back at the beginning... Clearly, there exists no *stable* phonetic correlate of stress; typically, the investigator's conclusions vary depending on the data he or she obtained, i.e., ultimately, on the test and on the subjects tested. There may be regional or individual variation as to the major parameter; or else, as we argued above, it may be the case that stress is not correlated to any phonetic parameter at all (this view is also expressed by Crompton, 1980: 211).

Rigault (1970) has set up a phonetic experiment by means of which he wishes to show that there exists no secondary stress in French. In this experiment, three subjects were asked to read a number of French trisyllabic and quadrisyllabic words; in these words, Rigault searched for a possible correlation between pitch, intensity and duration and the systematic occurrence of secondary stress (as defined by those phonetic parameters) on any but the final syllable. It comes as no surprise that the three parameters themselves exhibit a different behavior:

Pour les trisyllabes, on constate que les schémas des trois facteurs de la proéminence se répartissent de façon différente: les schémas de hauteur et d'intensité sont en majorité décroissants ou croissants-décroissants (...). Pour les quadrisyllabes, la situation est moins nette. Remarquons que dans l'ensemble la hauteur et l'intensité suivent des schémas inverses de celui de la durée (Rigault 1970: 286-7).

Although the author concedes that we do not know the relative weight of each of the phonetic parameters, he does not consider the possibility, however clearly it seems to us to be indicated by the data, that there is a total absence of correlation between secondary stress and the phonetic parameters that are examined. Rather, Rigault's conclusion, hardly surprisingly on the basis of his assumptions, will be that there exists no secondary stress in French. In fact, the experiment is irrelevant to the question of the existence of a *phonological* category of secondary stress in that language.

#### 4. Phonology of stress

The relevance of the phonological category of secondary (as well as primary) stress in French can be demonstrated without reference to phonetic parameters (except in the trivial sense that, for instance, vowel deletion is of course also reflected in the phonetic output). The prosodic model we adopt is inspired by Schane's (1979a, 1979b) proposals for English (which are themselves a rather strongly modified version of Liberman and Prince's (1977) metrical theory). Within the word, only syllables are assigned a binary relative prominence marker (S or W). According to Schane, the basic rhythm

pattern of English words is *dactylic*: SWW (Canada, America); our hypothesis is that the underlying rhythm of French words is iambic, or *alternating*, of the type WSWS(W) (in general the final syllable is W if it contains schwa, S otherwise). Thus the penultimate syllable of French words (lexemes) is relatively less prominent (W) than the antepenultimate (S): this captures the more traditional idea of antepenultimate secondary stress (which most French phonologists reject anyway). If we accept this prosodic structure of French words, various phonological phenomena can be explained in a simple and general way. Some of these phenomena have not been observed as such before, because there was no theoretical framework which made their observation feasible.

Firstly, we can explain why schwa is deleted more easily in penultimate position, whereas it tends to be maintained or restructured towards [e] or [ɛ] in antepenultimate position. Thus, the initial schwa is deletable in *seconde* (where it is W), and tends to become [e] in *secundo* (where it is S); it is deletable in *demi-saison*, but not in *demi-heure*. In words such as *derechef*,

*briqueterie, buffleterie*, the schwa which is in W position is deletable; the one in S position is not, and tends to become [ɛ]. Many more data from standard French can be adduced (most data are from Martinet and Walter 1973).

Secondly, it appears that the phenomenon of high-vowel syncope in Quebec French occurs preferentially in W position: in the corpus we examined (from Hammond, 1980), there were 45 cases of syncope of [i], [y] or [u] in penultimate or ante-antepenultimate (i.e. W) position, against 12 in antepenultimate (S) position: *versification, inscription, capucine, rajoute*, etc.

Thirdly, positing an alternating rhythm (and hence secondary stress) on French words allows us to explain some observations made in the realm of French verse. It is known that in French verse, some of the metrical positions (such as the 6th and the 12th in the *alexandrin*) have to be filled with a (prosodically) stressed syllable. Whereas this syllable had to bear primary stress (hence, in French, had to be word-final) in the classical and postclassical period (17-18th century), this constraint has been weakened in the course of the 19th century. In particular, the French poet Paul Verlaine (1844-1896) gradually starts writing lines where the 6th metrical syllable is not word-final. Given that all of Verlaine's violations of the classical metrical constraints on the French alexandrin are clearly becoming more numerous and more extreme over the years, it is interesting to observe that lines where the 6th metrical position is filled with a syllable that is prosodically S in our model (mostly antepenultimates) appear much earlier in his works than lines where this is not the case (i.e., where the 6th metrical position is filled by a W syllable such as a penultimate). The first type of line also remains much more frequent than the second type. Clearly, it is felt the first type of line is less unmetrical; this observation receives a straightforward explanation in our model of French prosodic structure, where antepenultimate syllables carry secondary stress because they are underlyingly S in virtue of the alternating rhythmic pattern of French words.

#### 5. Conclusion

In summary, there appears to be a wide array of facts which tend to establish the necessity of positing secondary stress in French. Some phonologists may dispute these facts, or try to explain them differently. Either way, however, the question of the existence of phonetic parameters of secondary stress is at best an interesting side-problem, at worst completely irrelevant to the issue phonologists are discussing. It is neither necessary nor advisable to assume phonetic reality for all linguistic structures.

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