

## **Commutation test in action: Establishing the French consonantal phonematic system\***

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**ABSTRACT:** I demonstrate in this paper how, in my own view, the commutation test in functional phonology may best be performed with a view to identifying the phonological contents (in terms of relevant features) of the French consonantal phonematic units, i.e. both the phonemes and the archiphonemes. The concept of ‘opposition’ is borne in mind and applied throughout the commutation test. At the initial stage, a number of commutative series are set up which are associated with different phonetic contexts. During the whole course of the commutation test, recourse is had to the concepts of ‘orders’, ‘series’ and ‘(bundle of) correlation(s)’. The commutation test is conducted step by step until the phonological contents of all French consonant phonemes are identified and the consonant phoneme system will have emerged in its entirety. There follows the analytical operation whereby the instances of neutralization of certain consonant phoneme oppositions are found together with the identification of the phonological contents of the associated archiphonemes. At the end of the commutation test all the consonantal phonematic units of French will have been established.

**KEYWORDS:** commutation test, commutative series, opposition, phonematic unit, pre-phoneme, phoneme, minimal multiplet, near-minimal multiplet, order, series, correlation, bundle of correlations, mark of correlation, neutralization, archiphoneme, relevant feature, phonological content, contrast, fricative, spirant.

### **1. INTRODUCTORY REMARKS**

**1.1.** In functional phonology, the first task for the phonologist to accomplish is to elicit and identify the distinctive units of the second articulation of a given language under investigation. These distinctive units are, in a language like English, the phonemes and archiphonemes. In a language like Chinese which is known as a ‘tone language’, the distinctive units are not only the phonemes and the archiphonemes but, in addition, the tonemes and the architonemes as well which, though eluding the framework of the second articulation, qualify as distinctive units since their function is distinctive (oppositive) as much as that of the phonemes and the archiphonemes.

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**1.2.** The term ‘phonematic’ I employ is not to be understood in the sense of the term ‘phonemic’ which is widely used by many writers and which is associated strictly with the concept and term of ‘phoneme’. The term ‘phonematic’ is directly associated with ‘phonematics’ which is opposed to ‘prosody’ (Martinet 1964<sup>2</sup>: 5.1.) and refers to both the phoneme and the archiphoneme, which are the distinctive units of the second articulation.

**1.3.** The commutation test is based on the concept of ‘phonological opposition’ (Akamatsu 1992a: 60) and is conducted with the functionalist principle of ‘non-obligatory equivalence between physical reality and linguistic function’ (Martinet 1960<sup>1</sup>: III-3, Akamatsu 1992a: 62). It is also through the commutation test that the functionalist discovers and identifies instances of neutralization of phonological oppositions and instances of systematic absence of phonemes or tonemes in specific contexts (Akamatsu 1992a: 60).

**1.4.** In my view, the only theoretically justifiable analytical device whereby the phonologist carries out the above-mentioned task is the commutation test, at the end of which the phonologist will have elicited the distinctive units of a given language. Each distinctive unit is identified as a sum of phonologically relevant features (hereafter ‘relevant features’). As Martinet (1965: 66) says:

... l’identification du phonème résulte de l’énumération de ses caractéristiques pertinentes, celles qui assurent la distinction entre ce phonème et les autres phonèmes de la langue.

Some of the distinctive units may be definable in terms of single relevant features (e.g. /l/ “lateral” in English) while others are definable as mutually different sums of relevant features (e.g. /p/ “voiceless labial non-nasal plosive” and /g/ “voiced dorsal non-nasal” in English).

**1.5.** Relevant features in terms of which the distinctive units are defined are not to be confused with Jakobsonian or Chomskian distinctive features. Relevant features and distinctive features are conceptually different from each other, with resultant consequences (Akamatsu 1988: 81–84).

**1.6.** The material on which the commutation test is conducted is the phonic substance of a given language. The criterion whereby the phonic substance is examined in the course of the commutation test is the concept of ‘opposition’. This concept should never be confused with that of ‘contrast’ both conceptually and terminologically (for a helpful statement in this regard, see Veiga 2006: 61-62). The concept of ‘opposition’ is ultimately a Saussurean one with regard to which many a linguist refers to Saussure’s dictum (1916: 172) ‘... dans la langue il n’y a que des différences ... *sans termes positifs* [Saussure’s italics]’. The absolute importance of the concept of ‘opposition’ cannot be overemphasized in functional phonology. Any linguistic entity which fulfils a distinctive function is characterized by its inescapable

link to the concept of ‘opposition’. The minimal units of the second articulation, i.e. the phonemes and the archiphonemes, of a given language, are among such linguistic entities whose function is *par excellence* ‘distinctive’.

**1.7.** A good all-round account of the commutation test from a theoretical point of view is given by Martin (1997: 15-18) in a chapter entitled ‘Commutation et identification’. Builles (1998: 65-67, 102, 210-211) also makes helpful reading, particularly with advice on the operational principles of the commutation test. However, I know of no full-scale account of how the commutation test is performed *step by step* with a view to establishing the phonematic system of a given language. I have in the past briefly provided demonstrations of the commutation test in e.g. Akamatsu (1988: 104-105), Akamatsu (1992a: 65 ff), and Akamatsu (2000: 41 ff). In my present paper, I will demonstrate in detail, with regard to the French consonant phonemes and archiphonemes, how the commutation test is performed in the manner in which I personally believe it is to be performed.

**1.8.** The principles of the commutation test are succinctly set out with an exemplification from French by Martinet (1947: 41, repr. 1965: 63-64). I quote his words here.

... par la commutation nous arrivons à isoler des unités différenciatives dans des positions bien déterminées; en français, le rapprochement des mots *banc, pan, van, faon, dent, temps, zan, sang, gens, champ, gant, camp, lent, rang, ment* [no \*nan], permet de distinguer 15 unités distinctives que nous sommes tentés de noter au moyen des lettres *b, p, v, f*, etc.

Martinet (1947: 41-42, repr. 1965: 64) goes on:

Si nous rapprochons maintenant *bout, pou, vous, fou, doux, toux, zou, sou, joue, chou, goût, cou, loup, roue, mou* [no nous?], nous pouvons dégager de nouveau 15 unités que nous serons de nouveau tentés de noter au moyen de *b, p, v, f*, etc. En pratique, on n’hésitera pas à décréter l’identité du premier élément de *banc* et de celui de *bout* qu’on appellera le phonème /b/. Au nom de quel principe nous permettons-nous cette identification ?

## 2. SETTING UP COMMUTATIVE SERIES

**2.1.** What is presented in Martinet’s passages quoted above can be re-presented as follows by way of a table of 4 commutative series. I have augmented Martinet’s quoted passages by adding [n],<sup>1</sup> [ɲ], [ŋ] and [j] to the 15 consonantal segments he refers to. The 4 commutative series (CS) are CS 1, CS 2, CS 3 and CS 4. Of these, CS 1 and CS 2 correspond to the two series of words Martinet cites, viz. *ban, pan ... rang, ment*, and *bout, pou ... roue, mou*,

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<sup>1</sup> The reason why Martinet does not include [n] is presumably that a word \*nan (\*nans, \*nant) pronounced [nã] is unattested. I have included [n] in all 5 commutative series, as I believe that doing so is necessary for the commutation test.

respectively. My conveniently reversing the order of voiced and voiceless consonantal segments has no significant meaning.

## 2.2. Setting up 4 commutative series

	CS 1	CS 2	CS 3	CS 4
	[# – ã]	[# – u #]	[# – o #]	[# ka – #]
[p] <sub>n</sub>	<i>pan</i>	<i>pou</i>	<i>peau</i>	<i>cap</i>
[b] <sub>n</sub>	<i>banc</i>	<i>bout</i>	<i>beau</i>	<i>cab</i>
[f] <sub>n</sub>	<i>faon</i>	<i>fou</i>	<i>faux</i>	<i>caf(é)</i>
[v] <sub>n</sub>	<i>van</i>	<i>vous</i>	<i>veau</i>	<i>cave</i>
[t] <sub>n</sub>	<i>temps</i>	<i>toux</i>	<i>taux</i>	<i>cat(i)</i>
[d] <sub>n</sub>	<i>dent</i>	<i>doux</i>	<i>dos</i>	<i>cade</i>
[s] <sub>n</sub>	<i>sang</i>	<i>sou</i>	<i>sot</i>	<i>casse</i>
[z] <sub>n</sub>	<i>zan</i>	<i>zou</i>	<i>zoo</i>	<i>case</i>
[ʃ] <sub>n</sub>	<i>champ</i>	<i>chou</i>	<i>chaud</i>	<i>cache</i>
[ʒ] <sub>n</sub>	<i>gens</i>	<i>jou</i>	<i>jau(ger)</i>	<i>cage</i>
[k] <sub>n</sub>	<i>camp</i>	<i>cou</i>	<i>Caux</i>	<i>caque</i>
[g] <sub>n</sub>	<i>gant</i>	<i>goût</i>	<i>go(go)</i>	<i>cag(ot)</i>
[l] <sub>n</sub>	<i>lent</i>	<i>loup</i>	<i>lot</i>	<i>cal</i>
[r] <sub>n</sub>	<i>rang</i>	<i>roue</i>	<i>rôt</i>	<i>quart</i>
[m] <sub>n</sub>	<i>ment</i>	<i>mou</i>	<i>mot</i>	<i>came</i>
[n] <sub>n</sub>	<i>non</i>	<i>nous</i>	<i>nô</i>	<i>canne</i>
[ɲ] <sub>n</sub>	<i>gnan(gnan)</i>	<i>gna(f)</i>	<i>gnô(le)</i>	<i>cagne</i>
[ŋ] <sub>n</sub>	—	—	—	<i>ring</i>
[j] <sub>n</sub>	—	—	—	<i>caille</i>

Table 1

In a few cases, as seen above, vocalic segments different from those appearing in the phonetic contexts have had to be chosen. I have been obliged to choose *non* (instead of \**nan* which is unattested) and *gna(f)* (instead of \**gnou* which is unattested). I will return to these 2 words for discussion further below.

2.3. Particular attention is drawn to the consonantal segment that I indicate as [j] which can be seen at the bottom of the list of the 19 consonantal segments. [j] is a voiced palatal fricative, but the addition of the diacritic symbol ‘·’ (in [j·]) which means ‘more open’ placed on the right of ‘j’ signifies that the anterodorsum is considerably lowered from the position required for the articulation of [j]. The greater space between the pre-palatal area and the lowered anterodorsum has the effect of significantly reducing the frication of [j], resulting in the articulation of another consonantal segment [j·] which is a voiced palatal *spirant*. In other words, [j] changes to [j·]. I will make it a rule in this paper to employ the three different notations, [j], [j·] and [j], as the case may be, to indicate three different palatal consonantal segments. The last mentioned, [j], is a voiced palatal frictionless continuant, also known as a

voiced palatal semivowel or a voiced palatal approximant. Incidentally, the reason why I have chosen to employ the symbol ‘j·’ rather than ‘j̣’ which is typographically equally possible is that the propinquity of the low curling of ‘j̣’ and the lowly placed diacritic ‘·’ clash to create undesirable visible complexity.

**2.4.** As I write these lines, it has come to my notice that the phonetic symbol ‘j̣’, though not ‘j·’ which I prefer, was employed independently of me and at an earlier date by Martínez-Celdrán (2004) to designate what he refers to as ‘palatal approximant consonant’ as distinguished from what he refers to as ‘palatal approximant semi-consonant/semi-vowel’ which he indicates by ‘j’ (Martínez-Celdrán 2004: 205, 206).

**2.5.** A phonetic symbol alternative to ‘j’ could be ‘jz’ (where ‘j’ stands for palatality and ‘z’ stands for fricativeness) which was proposed by Woodhead (1957). I have in the past endorsed the symbol ‘jz’ before the IPA (in the IPA chart revised to 1989) introduced the symbol ‘j’. See in this connection Woodhead (1957: 6) and Akamatsu (1992b: 16). Yet another alternative phonetic symbol for ‘voiced dorso-palatal fricative’ is ‘j’ proposed by Catford (1988: 94).<sup>2</sup> However, I personally prefer ‘jz’ or ‘j’.

**2.6.** As Martinet (1960<sup>1</sup>: II-29) says, the symbol ‘j’ may often be used to refer to both a palatal fricative and a palatal spirant. This clearly means that the symbol ‘j’ is often used to refer to both [j] and [j·]. Martinet & Walter (1973: 36), when presenting the French consonants (i.e. French consonant phonemes), include the symbol ‘j’ and describe it as “semi-vowel” (the pair of double quotation marks are theirs). The symbol ‘j’ also occurs in ‘Conventions et symboles’ in Martinet & Walter (1973: 54) and is said to be ‘comme le y de *yole*, le i de *fier*’.

**2.7.** To the consonants presented by Martinet in his passages quoted above, I have added [n], [ɲ], [ŋ] and [j] which I believe it is necessary to include. I have supplied linguistic forms starting with [n] occurring in [ɲ – ã], [ɲ – u ɲ], [ɲ – o ɲ] and [ɲ ka – ɲ].

**2.8.** I have not listed [w] and [ɥ] in CS 1, CS 2 and CS 3. For the present purpose of explaining the principles of the commutation test with exemplifications from French, I will dispense with an account of the phonological identification of [w] and [ɥ] since the analytical procedures whereby to determine the phonological status of these segments are not comparable with those required for the other consonantal segments. I will only say here that [w] and [ɥ] in French are realizations of /u/ and /y/, respectively, which are vowel phonemes, as

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<sup>2</sup> In proposing this (new) symbol, Catford (*op. cit. loc. cit.*) says: ‘The symbol [j] for a voiced dorso-palatal fricative is not an official IPA symbol, but it is useful, in order to distinguish between the *fricative* [j] and the approximant or semivowel [j] ...’

in *oui* [wi], *couac* [kwak], *fois* [fwa] and in *huerta* [ʧerta], *luette* [lʊet], *rua* [rʊa] which occur when /u/ and /y/ occur in prevocalic position.

**2.9.** In CS 4 which is associated with [# ka – #], *caille* [kaj]<sup>3</sup> is shown to occur. [j] occurs in syllable-final position only, which means that it also occurs in e.g. [kajbɔti] *caillebotis*, [kajmã] *caillement*, [kajte] *cailleter*, etc. If more commutative series in addition to CS 1, CS 2, CS 3 and CS 4 were set up to work on, we would find out that [j] occurs syllable-finally after some other vocalic segments ([i a ə ε œ u]), hence /[j]<sub>n</sub>/. Witness [i] as in [fi] *fille*, [abijmã] *habillement*, etc., [a] as in [paj] *paille*, *bâillement* [bajmã], etc., [ε] as in [pej] *peille*, [parejmã] *pareillement*, etc., [œ] as in [œj] *oeil*, [fœjtɔ̃] *feuilleton*, etc, and [u] as in [ruj] *rouille*, [mujmã] *mouillement*, etc.

**2.10.** As for [ɲ]<sub>n</sub>, it will have been seen that [ɲ] occurs preceding [ã] (in CS 1), [a] (in CS 2), [o] (in CS 3), and [a] (in CS 4). However, if more than 4 commutative series are set up, more different vocalic segments will be found to be involved, so that [ɲ] will be found to precede [ɔ] ([ɲɔki] *gnocchi*), [ɔ̃] (*gnon*), [i] ([liɲ] *ligne*) and [ε] ([peɲ] *peigne*) as well.

**2.11.** All 4 commutative series (more could be added, if so wished) are associated with mutually different phonetic contexts. Thus, CS 1 is associated with [# – ã #], CS 2 with [# – u #], CS 3 with [# – o #], and CS 4 with [# ka – #]. Of these, CS 1 and CS 2 correspond to the two series of linguistic forms that Martinet presents in his passages quoted above, while CS 3 and CS 4 have been added by me. I have cited *non*, *nous*, *nô* and *canne* for [n], *gnan*(*gnan*), *gna*(*f*), *gnô*(*le*) and *cagne* for [ɲ], *ring* for [ɲ], and *caille* for [j].

**2.12.** In the indication of the phonetic contexts, the dashes show where the different consonantal segments (listed vertically in the leftmost column) occur. The symbol ‘#’ (double cross) shows the place where a pause occurs. Therefore, for instance [# bã #] and [# bu #] mean that [b] occurs in postpausal position before [ã] in the former and before [u] in the latter, and [ã] in the former and [u] in the latter are followed by pauses. Postpausal position corresponds to word-initial position, and prepausal position to word-final position. The occurrence of the different vocalic segments, [ã] and [u] which follow [b] constitutes two further different phonetic contexts in which different qualities of [b] occur, i.e. a non-labialized [b] (because it occurs before [ã]) and a labialized [b<sup>w</sup>] (because it occurs before [u]). This kind of variants of a consonantal segment applies to all the linguistic forms in CS 1, CS 2, CS 3 and CS 4.

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<sup>3</sup> This word is pronounced with either [a] or [ɑ], depending on individuals. See Martinet & Walter (1973: 170). The same applies to *caillebotis*, *caillement* and *cailleter* which I also cited.

**2.13.** All the linguistic forms of which each commutative series consists are what I call ‘multiplets’.<sup>4</sup> All the multipliers appearing in commutative series specifically refer to *their phonetic manifestations*, though for convenience sake they are customarily indicated in the orthographic forms.

**2.14.** The phonetic notations that are shown in the leftmost column, i.e. [p]<sub>n</sub>, [b]<sub>n</sub>, [f]<sub>n</sub>, [v]<sub>n</sub>, etc. should be understood to mean that [p]<sub>n</sub> is equivalent to the aggregate of [p]<sub>1</sub> in *pan* (CS 1), [p]<sub>2</sub> in *pou* (CS 2), [p]<sub>3</sub> in *peau* (CS 3) and [p]<sub>4</sub> in *cap* (CS 4); likewise [b]<sub>n</sub> is equivalent to the aggregate of [b]<sub>1</sub> in *ban* (CS 1), [b]<sub>2</sub> in *bout* (CS 2), [b]<sub>3</sub> in *beau* (CS 3) and [b]<sub>4</sub> in *cab* (CS 4), and so on. All of [p]<sub>1</sub>, [p]<sub>2</sub>, [p]<sub>3</sub> and [p]<sub>4</sub> share certain phonetic features in all the different phonetic contexts they occur in. On the other hand, [p]<sub>1</sub>, [p]<sub>2</sub>, [p]<sub>3</sub> and [p]<sub>4</sub> all differ from each other in their phonetic quality which is imposed by the different contexts in which they occur. Likewise [b]<sub>1</sub>, [b]<sub>2</sub>, [b]<sub>3</sub> and [b]<sub>4</sub>, and so on. The first mentioned phonetic features which remain unaffected by the different phonetic contexts in which they occur are phonologically relevant. The second mentioned varying phonetic differences are *contextually determined and are therefore phonologically irrelevant*. The downsized subscripted ‘n’ as in [p]<sub>n</sub> signifies ‘undetermined variable number (from 1 upwards)’. I happen to have set up 4 commutative series, but more commutative series could have been set up, in which case ‘n’ would likewise apply. [j] occurs in only one phonetic context, i.e. syllable-finally. In CS 4, [j] is preceded by [a] in *caille* [kaj]. As already said, [j] can be preceded by other different vocalic segments than [a] as well, i.e. [i a ε œ u], so that [j]’s occurring before different vocalic segments can be shortly represented by [j]<sub>n</sub> since the phonetic quality of [j] varies according to each of the different vocalic segments preceding [j]. On the other hand, [ŋ] which also occurs only syllable-finally is always preceded by [i] (cf. *camping, doping, parking*, etc.) in contemporary French, not by any other vocalic segments.<sup>5</sup>

### 3. MULTIPLETS (MINIMAL MULTIPLETS, NEAR-MINIMAL MULTIPLETS)

**3.1.** The multipliers in commutative series may be ‘minimal multipliers’ or ‘near-minimal multipliers’. Minimal multipliers are a set of those linguistic forms whose phonetic manifestations are minimally, i.e. through just one difference (e.g. *pou* vs. *peau*, i.e. [u] vs. [o]), distinguished from each other, whereas near-minimal multipliers are those linguistic forms whose

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<sup>4</sup> The term ‘multiplier’ is my derivative use of the pre-existing term ‘multiplier’ in physics. I have been employing this term in this way as in ‘minimal multiplier’ in Akamatsu (1992a: 52 *et passim*) and both ‘minimal multiplier’ and ‘near-minimal multiplier’ in Akamatsu (2000: 42 *et passim*). I have alternatively employed the term ‘item’ as in ‘minimal item’, ‘near-minimal item’, ‘quasi-minimal item’ (Akamatsu 1992a: 75). To the best of my knowledge, there does not seem to exist other terms proposed and employed by other writers alternative to ‘multiplier’.

<sup>5</sup> [ŋ] has been imported from English in words ending with *-ing*, not otherwise. It seems very rare to find any case in which [ŋ] was imported in English words in which [ŋ] is preceded by another vowel than [i] (hence, [i] in French). But see *infra* § 10. 9.

phonetic manifestations are differentiated from each other through more than minimal differences, i.e. through two or more differences (e.g. *ban* vs. *fou*, i.e. both [b]<sub>1</sub> vs. [f]<sub>2</sub> and [ã] vs. [u].) For example, *ban* and *pan* in CS 1 are differentiated from each other only through the differences between *b* and *p*, while the rest of each of these multiplets, i.e. [ã], is identical. Therefore *ban* and *pan* in CS 1 are minimal multiplets. On the other hand, *caque* and *bague* in CS 4 are differentiated from each other through not only the difference between [k]<sub>4</sub> *c* and [b]<sub>4</sub> *b* (for the initial consonantal segments) but also the difference between [k]<sub>4</sub> *qu* and [g]<sub>4</sub> *g* (for the final consonantal segments). They are near-minimal multiplets.

**3.2.** The clear cases of minimal multiplets are as follows: *pan, ban, faon, van, temps, dent, sang, zan, chens, gens, camp, gant, lent, rang, ment* in CS 1; *pou, bout, fou, vous, toux, doux, sou, zou, chou, joue, cou, goût, loup, roue, mou, nous* in CS 2; *peau, beau, faux, veau, sot, zoo, chaud, Caux, go, lot, rôti, mot, nô* in CS 3; and *cap, cab, cave, cade, casse, case, cache, cage, caque, cal, quart, came, canne, cagne, caille* in CS 4.

**3.3.** This leaves us with the following linguistic forms whose status as either near-minimal multiplets or minimal multiplets need be examined and justified. They are: *non* and *gnan(gnan)* in CS 1; *gna(f)* in CS 2; *jau(ger), go(go)* and *gnô(le)* in CS 3; and *caf(é), cat(i)* and *cag(ot)* in CS 4. These near-minimal multiplets are included, in addition to the minimal multiplets, in the commutative series for the purpose of establishing the French consonant phonemes. Valid reasons to justify the inclusion of near-minimal multiplets must be put forward for each case. These reasons are largely of phonetic order, so that it is required of the analyst that he should have a good knowledge of general phonetics, articulatory phonetics in particular.

#### 4. JUSTIFYING THE INCLUSION OF THE INDIVIDUAL NEAR-MINIMAL MULTIPLETS

**4.1.** *non* [nõ]. The presumed minimal multiplet would be \**nan* [nã], which is unattested, a case of accidental gap in current French lexis.<sup>6</sup> There would be no articulatory problem for native speakers of French to pronounce [nã] \**nan* instead of [nõ] *non* if French came to have this word. The occurrence of [õ] after [n] does not necessitate the occurrence of another consonantal segment than [n]. The occurrence of [ã] or [õ] and that of [n] are independent of each other, so that other consonantal segments can also occur before [ã] or [õ] (cf. *pont, pan, bon, banc, fond, faon*, etc.). Therefore, *non* can be accepted as a near-minimal multiplet.

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<sup>6</sup> It is most probably for this reason that Martinet (1965: 65) cites no word which is to be pronounced [nã].



4.2. *gnan(gnan)*. It is the reduplicated form *gnangnan* that normally occurs while *gnan* on its own does not. It is the occurrence of [ɲ] before [ã] in initial position that we are interested in. The very fact that this reduplicated form occurs shows that [ɲã] is perfectly pronounceable for native French speakers even though [ɲã] *gnan* on its own does not occur. There is no reason why *gnan(gnan)* is not accepted,<sup>7</sup> though not as a minimal multiplet, and why *gnan* should not be regarded as a minimal multiplet. The fact that [ɲ] does occur in initial position justifies the inclusion of *gnan* as a minimal multiplet in the phonetic context [# – ã #].

4.3. *gna(f)*. The presumed minimal multiplet would be a word \**gna* pronounced [ɲa] which is unattested. The occurrence of [f] after [ɲa] is not thought to necessarily cause that of some other consonant than [ɲa]. Therefore, *gna(f)* can be accepted as a near-minimal multiplet.

4.4. *jau(ger)*. The presumed minimal multiplet would be [ʒo] \**jau* which forms part of *jau(ger)*. \**jau* would be pronounced [ʒo] which fits in with the phonetic context [# – o], so that [ʒ] occurs in initial position. The additional part *ger* of *jauger* is not thought to necessarily determine the occurrence of [o] instead of another vowel after (the first) [ʒ] since *juger* [ʒyʒe] with [y] also exists. Therefore \**jau* can be accepted as a *de facto* minimal multiplet., and *jauger* as a near-minimal multiplet.

4.5. *go(go)*.<sup>8</sup> This linguistic form is syllabified *go-go*. The first *go* fits in with the phonetic context [# – o], so that [g] occurs in initial position. As in the case of *gnan(gnan)*, *go* can be accepted as a minimal multiplet, and *gogo* as a near-minimal multiplet. Alternatively, one might prefer to accept *go* [go], the name of a Japanese game of Chinese origin.<sup>9</sup> If so, *go* will unproblematically be a minimal multiplet.

4.6. *gnô(le)*. The presumed minimal multiplet would obviously be a linguistic form \**gnô* pronounced [ɲo], which is not attested on its own but exists as part of *gnôle*, which seems to be the only French word having [o] preceded by word-initial [ɲ]. [ɔ] (*gnocchi*) cannot be accepted since the vowel following [ɲ] is [ɔ], not [o]. The occurrence or non-occurrence of

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<sup>7</sup> The word *gnangnan* may be compared with e.g. *beriberi* in English. There is no potential pause between the two *gnan*'s or the two *beri*'s, as *gnangnan* and *beriberi* are employed as simple words (simplexes). In this sense, they are different from e.g. *kuniguni* (< *kuni* + *kuni*) 'countries' in Japanese, as a potential pause intervenes between the constituents of the reduplicated form. The simplex word *kuni* can occur on its own, unlike *gnan* or *beri*.

<sup>8</sup> The first *go* of *gogo* was taken from *gober*.

<sup>9</sup> The word *go* is entered in *Le Petit Robert* (1979) in this sense. The date of first occurrence of this word is given as 1969. This word is not entered in *Martinet & Walter* (1973).

[l] (*le*) in *gnô(le)* is not thought to necessarily affect the occurrence of either [ŋ] or [o]. We can accept *gnôle* as a near-minimal multiplet or \**gnô* [ŋo] as a *de facto* minimal multiplet.

4.7. *caf(é)*. The presumed minimal multiplet would be [kaf] \**caffé*, which is unattested. The occurrence of [e] in [kafé] *caffé* is not thought to necessarily change [f] which occurs before [e] to another consonantal segment. In fact, French speakers have no difficulty pronouncing the segmental sequence [kaf] without [e] in word-final position, as in *bathyscaphe* [-kaf]. Therefore, *caf(é)* is accepted as a near-minimal multiplet.

4.8. *cat(i)*. The presumed minimal multiplet would be [kat] \**catte*, which is unattested, so that *cat(i)* can only be accepted as a near-minimal multiplet. Removing *i* [i] from *cat(i)* does not cause the consonantal segment before [i] to be another consonantal segment than [t]. The resultant form after [i] is removed will be [kat]. The segmental sequence [kat] actually occurs in prepausal position, i.e. in word-final position. Here are just two examples: *Hécate* [ekat] and *magnificat* [mapifikat]. French speakers have no difficulty pronouncing [kat] in prepausal position as demonstrated in such words. Besides, there is a French word which is often pronounced [kat] in prepausal position, viz. *quatre*. This word is widely – and normally – pronounced [kat] by many French speakers in e.g. *j'en ai quatre* [kat]; *faire les quatre* [kat] *cents coups*; *un, deux, trois, quatre* [kat] (when counting). A few examples of compounds in which *quatre* is widely pronounced [kat] in addition to [katr] are e.g. *quatre-huit* [katɥit], *quatre-quarts* [katkar], *quatre-saisons* [katsezō], etc. For such reason, I am tempted to consider citing *quatre* [kat] as a minimal multiplet in [# ka – #] in CS 4.

4.9. *cag(ot)*. The presumed minimal multiplet would be [kag] \**cag(ue)*, \**kag(ue)*, \**quag(ue)*, which is unattested. The occurrence of [o] in [kago] is not thought to necessarily prevent [g] from occurring before [o] in favour of some other consonantal segment. Unlike in the case of *caf(é)* and *cat(i)*, I have not found an example of [kag] on its own occurring in prepausal positions, i.e. in word-final position. Consequently, *cag(ot)* can only be accepted as a near-minimal multiplet.

4.10. *ring*. A minimal multiplet which would be pronounced [kaŋ] (possibly spelt \**cang* or \**kang*) does not seem to be attested in French. In the absence of such a multiplet, we would cite any suitable near-minimal multiplet (mainly of English origin) like *ring* beginning with a consonantal segment (but not [k]) which has been borrowed by, and is common in, present-day French. The vocalic segment that follows the word-initial consonantal segment, e.g. [r] of *ring*, can be (preferably) [a] or some French vocalic segments. It so happens that *king-charles* (pronounced [kiŋʃarl]) is attested; it is found in Martinet & Walter (1973: 513). The hyphen in the spelling of this linguistic form suggests the presence of a potential pause. We could in that case include *king* as a near-minimal multiplet. However, this would be impossible as the linguistic form *king* does not seem to occur otherwise than in *king-charles* in

French.<sup>10</sup> We could cite any suitable near-minimal multiplet (mainly of English origin) like *ring* beginning with a consonantal segment (other than [k]). What is crucially necessary is that the near-minimal multiplet chosen should end with [ŋ] in final position.

## 5. PROPORTIONALITY IN PHONETIC DIFFERENTIAL RELATIONSHIP AMONG THE DIFFERENT (NEAR-)MINIMAL MULTIPLETS ACROSS THE DIFFERENT COMMUTATIVE SERIES

**5.1.** All the mutually different consonantal segments in CS 1 to CS 4 are differentiated from each other in a parallel manner. That is, [p]<sub>1</sub>, [b]<sub>1</sub>, [f]<sub>1</sub>, [v]<sub>1</sub>, etc. in CS 1, [p]<sub>2</sub>, [b]<sub>2</sub>, [f]<sub>2</sub>, [v]<sub>2</sub>, etc. in CS 2, [p]<sub>3</sub>, [b]<sub>3</sub>, [f]<sub>3</sub>, [v]<sub>3</sub>, etc. in CS 3 and [p]<sub>4</sub>, [b]<sub>4</sub>, [f]<sub>4</sub>, [v]<sub>4</sub>, etc. in CS 4 are phonetically differentiated from each other in a mutually comparable manner in the different commutative series, that is, in the manner which Martinet characterizes as ‘proportionnalité des rapports’ (Martinet 1960<sup>1</sup>: III-13). [p]<sub>1</sub> (in *pan*) through [ŋ]<sub>1</sub> (in *gnan*) in CS 1, [p]<sub>1</sub> (in *pou*) through [ŋ]<sub>2</sub> (in *gna(f)*) in CS 2, [p]<sub>3</sub> (in *peau*) through [ŋ]<sub>3</sub> (in *gnô(le)*) in CS 3, and [p]<sub>4</sub> (in *cap*) through [ŋ]<sub>4</sub> (in *caille*) in CS 4 ([ŋ] and [j] are involved only in CS 4) are phonetically distinguished from each other in the same way except for those phonetic qualities imposed by the different phonetic contexts [# – â], [# – u #], [# – o #] and [# ka – #], respectively. Thus there is proportionality in their phonetic differential relationship across the 4 commutative series.

**5.2.** We have obtained *so far* the maximum number, i.e. 17, of consonantal segments available in CS 1, CS 2, CS 3 and CS 4, excepting [ŋ] and [j] which occur in CS 4 only and are not counted in here. The phonetic difference among these 17 consonantal segments constitute what I would call ‘multiple differentiation’, i.e. a differentiation between three or more phonetic segments, as distinct from what I would call ‘simple differentiation’, i.e. a differentiation between only two phonetic segments.<sup>11</sup> In other words, for example in CS 1, [p]<sub>1</sub> vs. [b]<sub>1</sub> vs. [f]<sub>1</sub> vs. [v]<sub>1</sub> vs. [t]<sub>1</sub> vs. [d]<sub>1</sub> vs. [s]<sub>1</sub> vs. [z]<sub>1</sub> vs. [ʃ]<sub>1</sub> vs. [ʒ]<sub>1</sub> vs. [k]<sub>1</sub> vs. [g]<sub>1</sub> vs. [l]<sub>1</sub> vs. [r]<sub>1</sub> vs. [m]<sub>1</sub> vs. [n]<sub>1</sub> vs. [ŋ]<sub>1</sub> constitute a multiple differentiation. Likewise [p]<sub>2</sub> vs. [b]<sub>2</sub> vs. [f]<sub>2</sub> vs. [v]<sub>2</sub>, etc. in CS 2, [p]<sub>3</sub> vs. [b]<sub>3</sub> vs. [f]<sub>3</sub> vs. [v]<sub>3</sub>, etc. in CS 3, and [p]<sub>4</sub> vs. [b]<sub>4</sub> vs. [f]<sub>4</sub> vs. [v]<sub>4</sub> ... [ŋ]<sub>4</sub> vs. [j]<sub>4</sub> in CS 4. But we can alternatively and succinctly reckon with [p]<sub>n</sub> vs. [b]<sub>n</sub> vs. [f]<sub>n</sub> vs. [v]<sub>n</sub> vs. [t]<sub>n</sub> vs. [d]<sub>n</sub> vs. [s]<sub>n</sub> vs. [z]<sub>n</sub> vs. [ʃ]<sub>n</sub> vs. [ʒ]<sub>n</sub> vs. [k]<sub>n</sub> vs. [g]<sub>n</sub> vs. [l]<sub>n</sub> vs. [r]<sub>n</sub> vs. [m]<sub>n</sub> vs. [n]<sub>n</sub> vs. [ŋ]<sub>n</sub> vs. [j]<sub>n</sub> in CS 4, or the same except [ŋ]<sub>n</sub> vs. [j]<sub>n</sub> in CS 1, CS 2 and CS 3. It will have been noticed that I talk about *phonetic* segments being *differentiated*, not opposed to, from each other. On the other hand, I will talk about *phonological* entities (i.e. archiphonemes as well as phonemes) being *opposed* to each other. In the same vein I talk about ‘phonetic difference’ (e.g. [p] vs. [b]; also /p]<sub>n</sub>/ vs. /b]<sub>n</sub>/) but ‘phonological opposition’ (e.g. /p/

<sup>10</sup> This reservation would of course be unnecessary if and when *king* were imported into French with an independent status. In ‘Liste des mots en *-ing*’ in Walter (1983: 16-17), we find *king-charles* (dated 1845) but *king* is not found. In the same list, *ring* (dated 1850) is found.

<sup>11</sup> What I call ‘simple differentiation’ would correspond to the differentiation found in what is widely known as ‘minimal pair’.

vs. /b/). The word ‘vs.’ is flexibly employed in this paper to stand for either ‘differentiated from’ or ‘opposed to’ as the case may be. These terminological distinctions are mine, not necessarily every writer’s.

/[p]<sub>n</sub>/ and /[b]<sub>n</sub>/ shown just above are what I designate as pre-phonemes, which I will explain immediately below (§§ 6.1 and 6.2).

These consonantal segments presented in CS1 to CS4, e.g. [b]’s in *ban* in CS 1, *bout* in CS 2, *beau* in CS 3 and *cab* in CS 4, are to be interpreted at a later stage of the commutation test as realizations (or combinatory variants, to be precise) of a given consonant phoneme, e.g. /b/, in this case.

## 6. PRE-PHONEME

**6.1.** In the mid-1970s, the term ‘pré-phonème’ was proposed by some functionalists (along with a few other terms such as ‘hypo-phonème’ and ‘phonèmoïde’) by which to refer to the phonetic segments which are subsequently to be identified as realizations (more precisely, combinatory variants) of phonemes.<sup>12</sup> The term ‘pré-phonème’ I am referring to here has nothing to do with the same term used in historical linguistics (see Fox 1995: 150). The term ‘pré-phonème’ – which I will employ as ‘pre-phoneme’ in English – has not caught on. In retrospect, I feel that the idea underlying the term ‘pré-phonème’ may not be dismissed out of hand as this term and the entity designated by it are conveniently useful while performing the commutation test. For instance, by /[p]<sub>n</sub>/ is meant the aggregate of [p]<sub>1</sub> (*pan*), [p]<sub>2</sub> (*pou*), [p]<sub>3</sub> (*peau*) and [p]<sub>4</sub> (*cap*) in the 4 commutative series (see Table 1 in § 2.2). [p]<sub>1</sub>, [p]<sub>2</sub>, [p]<sub>3</sub> and [p]<sub>4</sub> are the combinatory variants of the phoneme which is yet to be established later as /p/. It is important to point out that /[p]<sub>n</sub>/ itself and in its totality is not to be identified as /p/. Any phonetic features in /[p]<sub>n</sub>/ that are those imposed by the contexts in which /[p]<sub>n</sub>/ occurs must be left out of account as linguistically irrelevant. What remains of /[p]<sub>n</sub>/, when its differential relation to /[b]<sub>n</sub>/, /[f]<sub>n</sub>/, /[t]<sub>n</sub>/, /[s]<sub>n</sub>/, /[ʃ]<sub>n</sub>/, /[k]<sub>n</sub>/ and /[m]<sub>n</sub>/ has been investigated, will be phonologically evaluated in terms of a sum of relevant features, i.e. the phonological content, of what we shall eventually establish as the phoneme /p/, but this phoneme cannot be established until the whole of its relevant features that define it have been (gradually, i.e. step by step) identified.

**6.2.** In an attempt to elicit the relevant features of the French consonant phonemes step by step,, I will have recourse to the entity ‘pre-phoneme’. I will operate with /[p]<sub>n</sub>/, /[b]<sub>n</sub>/, /[t]<sub>n</sub>/, /[d]<sub>n</sub>/, etc. each of which is a pre-phoneme. These notations differ from [p]<sub>n</sub>, [b]<sub>n</sub>, [t]<sub>n</sub>, [d]<sub>n</sub>, etc. in that they are enclosed by pairs of diagonal slashes.

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<sup>12</sup> See in this connection *Actes du deuxième colloque de linguistique fonctionnelle* (1975: 9-10).

**7. DISCUSSING /[p]<sub>n</sub>/, /[b]<sub>n</sub>/, /[f]<sub>n</sub>/, /[v]<sub>n</sub>/, /[t]<sub>n</sub>/, /[d]<sub>n</sub>/, /[s]<sub>n</sub>/, /[z]<sub>n</sub>/, /ʃ<sub>n</sub>/, /ʒ<sub>n</sub>/,  
/[k]<sub>n</sub>/ AND /[g]<sub>n</sub>/**

**7.1.** We are now ready to identify the different sums of relevant features which characterize the different French consonant phonemes. In other words, we endeavour to identify the ‘phonological content’ (G. ‘Phonemgehalt’<sup>13</sup>) of each of these phonemes. I will quote here what Trubetzkoy says about ‘Phonemgehalt’, citing in English from Trubetzkoy (1969: 66).

By phonemic content [phonological content] we understand all phonologically distinctive properties of a phoneme, that is, those properties which are common to all variants of a phoneme and which distinguish it from all other phonemes of the same language, especially from those that are most closely related.

And Martinet (1956: 40) has this to say:

Un **phonème** peut être considéré comme un ensemble de traits pertinents qui se réalisent simultanément [Martinet’s boldface].

By the phrase ‘... qui se réalisent simultanément’ Martinet shows that the relevant features of a phoneme do not occur successively as do monemes which do. Thus such a concept as ‘third articulation’ is rejected. For example, the relevant features “voiceless bilabial non-nasal” of the phoneme /p/ in French occur simultaneously, not sequentially.

**7.2.** In order to find out by what phonetic features the pre-phonemes are differentiated from each other in each commutative series, I would suggest that we first seek those pre-phonemes that are likely to form ‘series’, ‘orders’ and hence ‘correlation.’<sup>14</sup> Why ‘series’, ‘order’ and hence ‘correlations’? This is in my view the best and quickest way to discover the relevant features of the individual consonant phonemes (or for that matter, vowel phonemes, too) of a language under investigation. As is well known, languages tend to achieve economy by combining a relatively small number of articulatory habits into series, orders and therefore correlations, rather than resorting to a large number of separate articulatory habits for the individual phonemes of the language.

I am aware that my recourse in this paper to the concepts and terms ‘series’, ‘order’ and ‘correlation’ pertaining to phonetic segments is unorthodox as these concepts and terms are generally employed in connection with phonological entities.

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<sup>13</sup> ‘Phonemgehalt’ is the term Trubetzkoy (1939: 50) employs. The corresponding terms in French and English are ‘contenu phonologique’ in Trubetzkoy (1949: 68) and ‘phonemic content’ in Trubetzkoy (1969: 66). As an English term for ‘Phonemgehalt’, I employ ‘phonological content’ in agreement with ‘contenu phonologique’. In my view, ‘phonological content’ has a broader use whereby to apply to the phoneme, the archiphoneme (in phonematics) and the toneme and the architoneme (in prosody) as well.

<sup>14</sup> For ‘series’, ‘order’ and ‘correlation’, see Martinet (1960<sup>1</sup>: III -15) and Martinet (1964<sup>2</sup>: 3.8. - 3.10.).

7.3. We will first look at all the pre-phonemes listed in the leftmost column in Table 1 of the 4 commutative series presented in § 2.2. We will look for those pre-phonemes that are likely to form orders, series, or correlation(s). We shall first find certain pairs of pre-phonemes such that the members of each pair are differentiated from the other by being either ‘voiceless’ or ‘voiced’. Six such pairs of pre-phonemes we find are: /p<sub>n</sub>/ and /b<sub>n</sub>/; /f<sub>n</sub>/ and /v<sub>n</sub>/; /t<sub>n</sub>/ and /d<sub>n</sub>/; /s<sub>n</sub>/ and /z<sub>n</sub>/; /ʃ<sub>n</sub>/ and /ʒ<sub>n</sub>/; and finally /k<sub>n</sub>/ and /g<sub>n</sub>/.

These six pairs of pre-phonemes form a correlation – in this case the correlation of ‘voice’ – which consists of two ‘series’, i.e. the ‘voiceless’ series consisting of /p<sub>n</sub>/, /f<sub>n</sub>/, /t<sub>n</sub>/, /s<sub>n</sub>/, /ʃ<sub>n</sub>/ and /k<sub>n</sub>/ while the ‘voiced’ series consist of /b<sub>n</sub>/, /v<sub>n</sub>/, /d<sub>n</sub>/, /z<sub>n</sub>/, /ʒ<sub>n</sub>/ and /g<sub>n</sub>. These two ‘series’ together constitute the ‘voice’ correlation. This is shown below in Fig. 1.

‘voiceless’	/p <sub>n</sub> /	/f <sub>n</sub> /	/t <sub>n</sub> /	/s <sub>n</sub> /	/ʃ <sub>n</sub> /	/k <sub>n</sub> /
‘voiced’	/b <sub>n</sub> /	/v <sub>n</sub> /	/d <sub>n</sub> /	/z <sub>n</sub> /	/ʒ <sub>n</sub> /	/g <sub>n</sub> /

Fig. 1

7.4. What I indicated as ‘voice’ in Fig. 1 is customarily referred to as the ‘mark of correlation’ which, let it be noted, is a *phonetic feature*, not a phonological feature.<sup>15</sup> /p<sub>n</sub>/ vs. /f<sub>n</sub>/ vs. /t<sub>n</sub>/ vs. /s<sub>n</sub>/ vs. /ʃ<sub>n</sub>/ vs. /k<sub>n</sub>/ forms a series characterized by the absence of ‘voice’ and constitutes the ‘voiceless’ series while /b<sub>n</sub>/ vs. /v<sub>n</sub>/ vs. /d<sub>n</sub>/ vs. /z<sub>n</sub>/ vs. /ʒ<sub>n</sub>/ vs. /g<sub>n</sub>/ forms a series characterized by the presence of ‘voice’ and constitutes the ‘voiced’ series. The absence of ‘voice’ is phonologically evaluated as the relevant feature “voiceless” and the presence of ‘voice’ as the relevant feature “voiced”, and “voiceless” and “voiced” are opposed to each other. It is important to understand that the absence of ‘voice’ does not signify nil or the absence of a relevant feature.<sup>16</sup> As will have just been seen, I will consistently use a pair of *single* quotation marks to indicate a *phonetic* entity (e.g. ‘voice’) and a pair of *double* quotation marks (e.g. “voiceless”, “voiced”) to indicate a *phonological* entity. Only this latter is of course a *relevant feature* (short for ‘phonologically relevant feature’).

7.5. /p<sub>n</sub>/ and /b<sub>n</sub>/ are *differentiated* from, not opposed to, each other and that /p<sub>n</sub>/ vs. /b<sub>n</sub>/ constitutes a simple differentiation while /p<sub>n</sub>/, /f<sub>n</sub>/, /t<sub>n</sub>/, /s<sub>n</sub>/, /ʃ<sub>n</sub>/ and /k<sub>n</sub>/ are

<sup>15</sup> On this point, I disagree with most linguists and agree with Tcheu (1969: 240-244) who says that ‘La marque fournit, par sa présence et son absence deux traits pertinents, mais elle-même n’est qu’un caractère phonique particulier’ (*op cit.* 241). A mark of correlation is a phonetic feature. I consequently do not consider a mark of correlation as a (phonologically) relevant feature (*cf.* Martinet 1960<sup>1</sup>: III-15).

<sup>16</sup> Martinet (1964<sup>2</sup>: 104-105 fn. 10) perspicaciously writes as follows: ‘Ce qu’on appelle absence de marque doit être ici compté comme une caractéristique positive puisque correspondant à un type articuloire distinct: pour réaliser l’absence de voix, par exemple, il faut prendre garde à ne pas laisser le contexte imposer des vibrations glottales; l’absence de voix correspond à une organisation bien définie de la glotte.’ Another example one can cite is the absence of ‘nasality’ (also a mark) versus its presence which corresponds to two relevant features “non-nasal” and “nasal” (as exemplified in /p/ vs. /m/, as in /pæd/ *pad* vs. /mæd/ *mad*, and also /b/ vs. /m/, as in /bæd/ *bad* vs. /mæd/ *mad*, in English).

*differentiated* from, not opposed to, each other, and /p<sub>n</sub>/ vs. /f<sub>n</sub>/ vs. /t<sub>n</sub>/ vs. /s<sub>n</sub>/ vs. /ʃ<sub>n</sub>/ vs. /k<sub>n</sub>/ constitutes a multiple differentiation. The same can be said, *mutatis mutandis*, of /b<sub>n</sub>/, /v<sub>n</sub>/, /d<sub>n</sub>/, /z<sub>n</sub>/, /ʒ<sub>n</sub>/ and /g<sub>n</sub>/, and /b<sub>n</sub>/ vs. /v<sub>n</sub>/ vs. /d<sub>n</sub>/ vs. /z<sub>n</sub>/ vs. /ʒ<sub>n</sub>/ vs. /g<sub>n</sub>/ constitutes a multiple differentiation. I wish to make a clear distinction between a phonetic entity (e.g. /p<sub>n</sub>/) and a phonological entity (e.g. /p/). A pre-phoneme (e.g. /p<sub>n</sub>/) has an intermediate and janus-like status, looking to both phonetics and phonology. As already said, I use the concept and term ‘opposition’ in connection with distinctive units like phonemes (hence phonological opposition) but ‘differentiation’ in connection with sounds (hence phonetic difference).

**7.6.** As was shown in Fig. 1 (§ 7.3), the relationship between the ‘voiceless’ series and ‘voiced’ series leads us to establish two relevant features, “voiceless” and “voiced”, which can be attributed to the 12 phonological units, i.e. the 12 consonant phonemes which we may notate, respectively, as /p f t s ʃ k/ (the “voiceless” series) and /b v d z ʒ g/ (the “voiced” series).

**7.7.** Each of the pre-phonemes seen above is such that it consists of (i) those phonetic features which are found to play a distinctive role and are therefore phonologically identified as a relevant feature and (ii) those other phonetic features whose occurrence are imposed by the contexts in which they appear and are consequently phonologically irrelevant. For example, /b<sub>n</sub>/ consists, on the one hand, of those phonetic features that are phonologically identified as the relevant feature “voiced” while the rest of the phonetic features of /b<sub>n</sub>/ whose occurrence is governed by the context and are phonologically irrelevant and therefore are left out of account.

**7.8.** A relevant feature does not consist of just one distinctive phonic feature. For instance, the relevant feature “voiced” does not consist of just a single distinctive phonic feature ‘voice’, i.e. glottal vibration. Martinet (1957: 83 = 1965: 138) writes that ‘... un trait pertinent est un ensemble de caractéristiques phoniques distinctives qui ne se trouvent dissociées nulle part dans le système ...’. I have expressed this shortly as ‘a complex of multiple indissociable distinctive phonic features’ in some past writings (Akamatsu 1988: 100 *et passim*; Akamatsu 1992a: 39 *et passim*).<sup>17</sup> I have also referred to a relevant feature as ‘a functionally single entity, a phonologically global entity’ (Akamatsu *op. cit. loc. cit.*). My expression merely echoes Martinet (1965: 67) phrase ‘... un trait phonétiquement complexe, mais phonologiquement unique ...’. An excellent explanation of this characteristic of the relevant feature, taking the relevant features “voiced” and “bilabial” as examples, is provided by Martinet (1957: 83 = 1965: 138).

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<sup>17</sup> What is meant by ‘qui ne se trouvent dissociées nulle part dans le système’ or ‘indissociable’ may be misapprehended by many. This is no place for me to explain it. See, if interested, Akamatsu (1988: 100-102).

7.9. Fig. 2 below shows that /[p]<sub>n</sub>/ and /[b]<sub>n</sub>/, /[f]<sub>n</sub>/ and /[v]<sub>n</sub>/, /[t]<sub>n</sub>/ and /[d]<sub>n</sub>/, /[s]<sub>n</sub>/ and /[z]<sub>n</sub>/, /[ʃ]<sub>n</sub>/ and /[ʒ]<sub>n</sub>/, and /[k]<sub>n</sub>/ and /[g]<sub>n</sub>/, are 6 pairs of pre-phonemes which are differentiated from each other through 6 different phonetic characteristics, viz. ‘bilabial’, ‘labiodental’, ‘apical’,<sup>18</sup> ‘hiss’, ‘hush’<sup>19</sup> and ‘dorsal’.<sup>20</sup>

		‘bilabial’	‘labiodental’ <sup>21</sup>	‘apical’	‘hiss’	‘hush’	‘dorsal’
‘voice’	‘voiced’	/[p] <sub>n</sub> /	/[f] <sub>n</sub> /	/[t] <sub>n</sub> /	/[s] <sub>n</sub> /	/[ʃ] <sub>n</sub> /	/[k] <sub>n</sub> /
	‘voiced’	/[b] <sub>n</sub> /	/[v] <sub>n</sub> /	/[d] <sub>n</sub> /	/[z] <sub>n</sub> /	/[ʒ] <sub>n</sub> /	/[g] <sub>n</sub> /

Fig. 2

7.10. As can be seen in Fig 2., /[p]<sub>n</sub>/ and /[b]<sub>n</sub>/ forms the ‘bilabial’ order, /[f]<sub>n</sub>/ and /[v]<sub>n</sub>/ the ‘labiodental’ order, /[t]<sub>n</sub>/ and /[d]<sub>n</sub>/ the ‘apical’ order, /[s]<sub>n</sub>/ and /[z]<sub>n</sub>/ the ‘hiss’ order, /[ʃ]<sub>n</sub>/ and /[ʒ]<sub>n</sub>/ the ‘hush’ order, and /[k]<sub>n</sub>/ and /[g]<sub>n</sub>/ the ‘dorsal’ order. The designations for the ‘orders’ need not necessarily stand for articulatory features (‘bilabial’, ‘labiodental’, ‘apical’, ‘dorsal’) as they may stand for auditory/acoustic features (‘hiss’, ‘hush’).

7.11. /[p]<sub>n</sub>/ and /[b]<sub>n</sub>/ which are in the same ‘order’, i.e. the ‘bilabial’ order, are differentiated from each other through ‘voiceless’ (of /[p]<sub>n</sub>/) and ‘voiced’ (of /[b]<sub>n</sub>/). For example, /[p]<sub>n</sub>/ and /[b]<sub>n</sub>/ are *direct neighbours* of each other in the system. This is a case of simple differentiation, i.e. a two-way differentiation. So are, likewise, /[f]<sub>n</sub>/ and /[v]<sub>n</sub>/ of the ‘labiodental’ order; /[t]<sub>n</sub>/ and /[d]<sub>n</sub>/ of the ‘apical’ order, /[s]<sub>n</sub>/ and /[z]<sub>n</sub>/ of the ‘hiss’ order, /[ʃ]<sub>n</sub>/ and /[ʒ]<sub>n</sub>/ of the ‘hush’ order, and /[k]<sub>n</sub>/ and /[g]<sub>n</sub>/ of the ‘dorsal’ order.

<sup>18</sup> The French [t d n] (also [l]) are generally characterized as ‘dental’ (MacCarthy 1975: 86, 93, 95). However, they can be either ‘dental’ or (occasionally) ‘alveolar’ (Walter 1977: 31; Coveney 2001: 26, 29, 31, 36, 67; Dart 1991, 1998; Ladefoged & Maddieson (1996: 191-192). This is why I prefer to characterize [t d n] (also [l]) in French not as ‘dental’ but as ‘apical’ which include both ‘dental’ and ‘alveolar’ articulations, as is also done by Martinet (1960<sup>1</sup>: III-13, III-14), Martinet & Walter (1973: 36) and Walter (1976: 32). Interestingly, Chigarevskaïa (1966: 104) is alone, to my knowledge, in writing that [t d n] in French are of alveolar articulation, without mentioning dental articulation at all in this connection.

<sup>19</sup> The terms ‘hiss’ and ‘hush’ which I customarily employ for the French consonants (for that matter, also English, among others) consonants are my English translations of ‘sifflant’ and ‘chuintant’ found in e.g. Martinet (1960<sup>1</sup>: II-28, III-13), Martinet & Walter (1973: 36) and Walter (1977: 31, 32). Chigarevskaïa (1966: 105) also employs ‘sifflantes’ and ‘chuintantes’ in connection with [s z] and [ʃ ʒ], respectively.

<sup>20</sup> The term ‘dorsal’ is used in Martinet & Walter (1973: 36) and Walter (1977: 32-33). The term ‘velar’ is used in Walter (1976: 32), and the term ‘dorso-velar’ is used in Martinet (1960<sup>1</sup>: III-13, III-14). I employ the designation “dorsal” rather than “dorso-velar” which Martinet (1960<sup>1</sup>: III-13, III-14) employs as one of the relevant features of /k g ŋ/ of French; see in this connection Walter (1977: 32-33) who employs the designation “dorsal” in preference to “dorso-vélaire” and explains her use of this term.

<sup>21</sup> Martinet (1956: 39) writes: ‘... les labiodentales du français sont toujours des fricatives, tandis que les fricatives ne sont pas nécessairement des labiodentales (par exemple /s z š ž/), c’est le caractère labiodental qui est retenu comme réellement caractéristique et seul pertinent.’



The phonetic feature presented above as ‘voiceless’ (of /p]<sub>n</sub>/, /f]<sub>n</sub>/, /t]<sub>n</sub>/, /s]<sub>n</sub>/, /ʃ]<sub>n</sub>/, /k]<sub>n</sub>/) can be phonologically evaluated as the relevant feature “voiceless”, while ‘voiced’ (of /b]<sub>n</sub>/, /v]<sub>n</sub>/, /d]<sub>n</sub>/, /z]<sub>n</sub>/, /ʒ]<sub>n</sub>/, /g]<sub>n</sub>/) can be phonologically evaluated as the relevant feature “voiced”. The two relevant features are opposed to each other. The relevant feature “voiceless” is tentatively attributed to the 6 phonological units, i.e. 6 consonant phonemes, viz. ?/p f t s ʃ k/, while the relevant feature “voiced” is tentatively attributed to the other 6 consonant phonemes, viz. ?/b v d z ʒ g/. Why I place interrogative marks in indicating ?/p f t s ʃ k/ and ?/b v d z ʒ g/ will be explained in a few words in § 7.14.

**7.12.** On the other hand, /p]<sub>n</sub>/, /f]<sub>n</sub>/, /t]<sub>n</sub>/, /s]<sub>n</sub>/, /ʃ]<sub>n</sub>/ and /k]<sub>n</sub>/ which are in the same ‘series’, i.e. the ‘voiceless’ series, are differentiated from each other through ‘bilabial’ (of /p]<sub>n</sub>/) vs. ‘labiodental’ (of /f]<sub>n</sub>/) vs. ‘apical’ (of /t]<sub>n</sub>/) vs. ‘hiss’ (of /s]<sub>n</sub>/) vs. ‘hush’ (of /ʃ]<sub>n</sub>/) vs. ‘dorsal’ (of /k]<sub>n</sub>/). This is a case of multiple differentiation. They are *direct neighbours* to each other in the ‘voiceless’ series. Likewise, /b]<sub>n</sub>/, /v]<sub>n</sub>/, /d]<sub>n</sub>/, /z]<sub>n</sub>/, /ʒ]<sub>n</sub>/ and /g]<sub>n</sub>/ in the ‘voiced’ series are *direct neighbours* to each other.

**7.13.** Regarding the 6 phonetic features mentioned above, ‘bilabial’ can be attributed to /p]<sub>n</sub>/ and /b]<sub>n</sub>/, ‘labiodental’ to /f]<sub>n</sub>/ and /v]<sub>n</sub>/, ‘apical’ to /t]<sub>n</sub>/ and /d]<sub>n</sub>/, ‘hiss’ to /s]<sub>n</sub>/ and /z]<sub>n</sub>/, ‘hush’ to /ʃ]<sub>n</sub>/ and /ʒ]<sub>n</sub>/ and ‘dorsal’ to /k]<sub>n</sub>/ and /g]<sub>n</sub>/.

These 6 phonetic features can be phonologically evaluated, respectively, as 6 relevant features, viz. “bilabial”, “labiodental”, “apical”, “hiss”, “hush”, and “dorsal” and can, respectively, be attributed tentatively to the 6 pairs of 12 phonological units, i.e. the 12 consonant phonemes, thus “bilabial” to ?/p b/, “labiodental” to /f v/, “apical” to ?/t d/, “hiss” to /s z/, “hush” to /ʃ ʒ/, and “dorsal” to ?/k g/.

**7.14.** We can, up to now, tentatively conceive of ?/p/ as “voiceless bilabial”, ?/b/ “voiced bilabial”, /f/ “voiceless labiodental”, /v/ “voiced labiodental”, ?/t/ “voiceless apical”, ?/d/ “voiced apical”, /s/ “voiceless hiss”, /z/ “voiced hiss”, /ʃ/ “voiceless hush”, /ʒ/ “voiced hush”, ?/k/ “voiceless dorsal” and ?/g/ “voiced dorsal”. The interrogative marks signify that the above identification of the 6 consonant phonemes is not yet complete nor has it yet been confirmed at this stage; this is why I said ‘tentatively’. We need to complete the identification of these 6 consonant phonemes in full as we progress in our analysis. On the other hand, the 6 other consonant phonemes, viz. /f/, /v/, /s/, /z/, /ʃ/ and /ʒ/, which do not bear the interrogative marks, can in fact be considered as being completely identified in terms of relevant features even at this early stage of our analysis, as will be reconfirmed later when we look at the ‘nasality’ series (§§ 8.1, 8.3). Fig. 2 can now be replaced by Fig. 3 below. Note that ‘voice’ is written with a pair of single quotation marks as it is a mark of ‘correlation’, a phonetic feature and not a relevant feature.

		“bilabial”	“labiodental”	“apical”	“hiss”	“hush”	“dorsal”
‘voice’	“voiced”	?/p/	/f/	?/t/	/s/	/ʃ/	?/k/
	“voiced”	?/b/	/v/	?/d/	/z/	/ʒ/	?/g/

Fig. 3

**7.15.** What I said about  $?/p/$ ,  $?/b/$ ,  $?/t/$ ,  $?/d/$ ,  $?/k/$  and  $?/g/$  suggests that the task of identifying all the consonant phonemes can in principle only be achieved progressively, stage by stage. This is because the relevant features of the consonant phonemes may or may not be identified in their entirety at the early stages of our analysis.

**7.16.** Customarily, *order*, *series* and *correlation* are such that the linguistic entities that constitute them are distinctive units like phonemes in the case of non-tone languages like French, English and German. It will have been noticed, however, that I unorthodoxly consider, as has been shown above and will be shown in the following pages, that *order*, *series* and *correlation* may be constituted by *pre-phonemes* as well as phonemes. This is inevitable in the course of the commutation test performed step by step, so that, at each successive stage of the analysis, an increasing number of phonemes are fully characterized in terms of relevant features. Once all the phonemes that constitute *orders*, *series* or *correlations* have been characterized in terms of relevant features, we are in the presence of orders, series and correlations constituted by the *phonemes*, no longer the *pre-phonemes*.

## 8. DISCUSSING $/[m]_n/$ , $/[n]_n/$ , $/[p]_n/$ AND $/[ŋ]_n/$

**8.1.** Having confirmed that the ‘voice’ correlation exists (which consists of the ‘voiceless’ series and the ‘voiced’ series) in the French consonantal system, we look further to see if any more series exists.

We see that there is indeed another series, i.e. the ‘nasal’ series, consisting of  $/[m]_n/$ ,  $/[n]_n/$  and  $/[ŋ]_n/$ . Of these,  $/[m]_n/$  and  $/[n]_n/$  are found in all of CS 1, CS 2, CS 3 and CS 4 while  $/[ŋ]_n/$  is found in CS 4 only. These 3 pre-phonemes are differentiated from each other through  $/[m]_n/$ , being ‘bilabial’,  $/[n]_n/$ , ‘apical’, and  $/[ŋ]_n/$  ‘dorsal’. The ‘nasal’ series and the ‘non-nasal’ series form the ‘nasality’ correlation. The ‘non-nasal’ series consists of  $/[p]_n/$ ,  $/[b]_n/$ ,  $/[t]_n/$ ,  $/[d]_n/$ ,  $/[k]_n/$  and  $/[g]_n/$ , but not  $/[f]_n/$ ,  $/[v]_n/$ ,  $/[s]_n/$ ,  $/[z]_n/$ ,  $/[ʃ]_n/$  and  $/[ʒ]_n/$  as well. Thus the ‘non-nasal’ series only partially interacts with the ‘voice’ and ‘voiceless’ series.

**8.2.** At this stage of my analysis, a ‘non-nasal’ pre-phoneme that would be differentiated from  $/[p]_n/$  (which occurs in CS1 to CS 4) remains unknown. We cannot characterize  $/[p]_n/$  as ‘nasal’ in the way  $/[m]_n/$ ,  $/[n]_n/$  and  $/[ŋ]_n/$  are because whereas these three pre-phonemes can be characterized as ‘nasal’ since they are differentiated, respectively, from  $/[p]_n/$  and  $/[b]_n/$ ,

/[t]<sub>n</sub>/ and /[d]<sub>n</sub>/, and /[k]<sub>n</sub>/ and /[g]<sub>n</sub>/, this is not the case with /[ɲ]<sub>n</sub>/, at least so far at this stage of the analysis. We have not seen a pre-phoneme which can be characterized as ‘non-nasal’ and from which /[ɲ]<sub>n</sub>/ can be differentiated as ‘nasal’. We do not find in French either [c] ‘voiceless palatal plosive’ or [ɟ] ‘voiced palatal plosive’ from which [ɲ] could be said to be differentiated in a manner in which [m], [n] and [ŋ] are differentiated from [p b], [t d], and [k g], respectively. All we can do so far is to retain ‘palatal’ of /[ɲ]<sub>n</sub>/ as potentially evaluable as the relevant feature “palatal” once we have found the above-mentioned pre-phoneme characterizable as ‘non-nasal’ and consequently a phoneme characterizable as “non-nasal” and also once we have phonologically evaluated /[m]<sub>n</sub>/, /[n]<sub>n</sub>/ and /[ŋ]<sub>n</sub>/ as /m/, /n/ and /ŋ/ whose total phonological contents in terms of relevant features are confirmed (see 9.).

Until then /[ɲ]<sub>n</sub>/ cannot be declared to be part of the ‘nasal’ series along with /[m]<sub>n</sub>/, /[n]<sub>n</sub>/ and /[ŋ]<sub>n</sub>/.

**8.3.** We have seen that /[f]<sub>n</sub>/, /[s]<sub>n</sub>/ and /[ʃ]<sub>n</sub>/ (they are all part of the ‘voiceless’ series) and /[v]<sub>n</sub>/, /[z]<sub>n</sub>/ and /[ʒ]<sub>n</sub>/ (these are all part of the ‘voiced’ series) are extraneous to the ‘nasality’ correlation as they have no ‘nasal’ counterpart pre-phonemes. The ‘voice’ correlation and the ‘nasality’ correlation are linked to each other in French. This type of two correlations is known as a *bundle of correlations*.<sup>22</sup> In the ‘nasality’ correlation, only three ‘orders’, i.e. ‘bilabial’, ‘apical’, and ‘dorsal’ have so far been seen to exist. It is true that /[ɲ]<sub>n</sub>/ is ‘palatal’ (/ [m]<sub>n</sub>/ being ‘bilabial’, /[n]<sub>n</sub>/ ‘apical’, and /[ŋ]<sub>n</sub>/ ‘dorsal’) but we cannot establish the ‘palatal’ order in the way we can establish the ‘bilabial’, ‘apical’ and ‘dorsal’ orders, since /[ɲ]<sub>n</sub>/ stands alone without a potential pre-phoneme which can be characterized as ‘non-nasal’ (indicated by the interrogative marks) in Fig. 4 below.

				‘bilabial’	‘apical’	‘palatal’	‘dorsal’
		‘voiceless’		/[p] <sub>n</sub> /	/[t] <sub>n</sub> /	?	/[k] <sub>n</sub> /
	‘non-nasal’	‘voice’					
		‘voiced’		/[b] <sub>n</sub> /	/[d] <sub>n</sub> /	?	/[g] <sub>n</sub> /
	‘nasality’						
	‘nasal’			/[m] <sub>n</sub> /	/[n] <sub>n</sub> /	/[ɲ] <sub>n</sub> /	/[ŋ] <sub>n</sub> /

Fig. 4<sup>23</sup>

**8.4.** It may be remembered that /[f]<sub>n</sub>/, /[v]<sub>n</sub>/, /[s]<sub>n</sub>/, /[z]<sub>n</sub>/, /[ʃ]<sub>n</sub>/ and /[ʒ]<sub>n</sub>/ have been phonologically evaluated so that /f/ is defined as “voiceless labiodental”, /v/ as “voiced labiodental”, /s/ as “voiceless hiss”, /z/ as “voiced hiss”, /ʃ/ as “voiceless hush”, and /ʒ/ as “voiced hush”. /[f]<sub>n</sub>/, /[v]<sub>n</sub>/, /[s]<sub>n</sub>/, /[z]<sub>n</sub>/, /[ʃ]<sub>n</sub>/ and /[ʒ]<sub>n</sub>/ are not part of the ‘nasality’ correlation, and

<sup>22</sup> See Trubetzkoy (1939: 78), Trubetzkoy (1949: 90) or Trubetzkoy (1969: 86). Trubetzkoy (1969: 86) reads as follows: ‘In cases where a phoneme participates in several correlations of the same related class, all phonemes taking part in the same correlative pairs unite to form a multimember *correlation bundle*.’ See also Martinet (1960<sup>1</sup>: III-15) and Martinet (1964<sup>2</sup>: 72, 101).

<sup>23</sup> The two interrogative marks in Fig. 4 mean that, at this stage of our analysis, we cannot yet determine what is the non-nasal consonantal segment which corresponds to /[ɲ]<sub>n</sub>/.

besides they are unlikely to form a bundle of correlations with the rest of the pre-phonemes yet to be analyzed, viz. /[ɲ]<sub>n</sub>/, /[ŋ]<sub>n</sub>/, /[j]<sub>n</sub>/, /[l]<sub>n</sub>/ and /[r]<sub>n</sub>/. For the moment we leave these pre-phonemes unanalyzed till later.

### 9. DISCUSSING /[m]<sub>n</sub>/, /[n]<sub>n</sub>/ AND /[ŋ]<sub>n</sub>/

**9.1.** When we confront /[m]<sub>n</sub>/, /[n]<sub>n</sub>/ and /[ŋ]<sub>n</sub>/ with /[p]<sub>n</sub>/ and /[b]<sub>n</sub>/, [t]<sub>n</sub>/ and /[d]<sub>n</sub>/, and /[k]<sub>n</sub>/ and /[g]<sub>n</sub>/, respectively, we see that /[m]<sub>n</sub>/, /[n]<sub>n</sub>/ and /[ŋ]<sub>n</sub>/ will be phonologically evaluated as /m/ “bilabial nasal”, /n/ “apical nasal”, and /ŋ/ “dorsal nasal”. We see at the same time that all of ?/p/ “voiceless bilabial”, ?/b/ “voiced bilabial”, ?/t/ “voiceless apical”, ?/d/ “voiced apical”, ?/k/ “voiceless dorsal” and ?/g/ “voiced dorsal” need to additionally have the relevant feature “nasal” attributed to them. Consequently, /[p]<sub>n</sub>/, /[b]<sub>n</sub>/, /[t]<sub>n</sub>/, /[d]<sub>n</sub>/, /[k]<sub>n</sub>/ and /[g]<sub>n</sub>/ can now be phonologically evaluated as /p/ “voiceless bilabial non-nasal”, /b/ “voiced bilabial non-nasal”, /t/ “voiceless apical non-nasal”, /d/ “voiced apical non-nasal”, /k/ “voiceless dorsal non-nasal” and /g/ “voiced dorsal non-nasal”. We can now remove the interrogative marks from ?/p/, ?/t/, ?/k/, ?/b/, ?/d/ and ?/g/, and consider that /p/, /t/, /k/, /b/, /d/ and /g/ are completely defined in terms of relevant features.

In opposing /p b/ to /m/, /t d/ to /n/, and /k g/ to /ŋ/, neither “voiceless” nor “voiced” is attributed to /m/, /n/ or /ŋ/ since there is no ‘voice’ correlation in English for the three consonant phonemes definable with “nasal”.

**9.2.** As for /[ɲ]<sub>n</sub>/, this pre-phoneme can, so far, only be regarded as ‘palatal’ as differentiated from /[m]<sub>n</sub>/, /[n]<sub>n</sub>/ and /[ŋ]<sub>n</sub>/. The phonetic property ‘nasal’ in /[ɲ]<sub>n</sub>/ remains as such, and cannot yet be phonologically evaluated as “nasal” because a counterpart pre-phoneme ‘palatal non-nasal’ has yet to be found, so /[ɲ]<sub>n</sub>/ cannot yet be phonologically evaluated.

**9.3.** At this stage of our analysis, we have been able to establish the following 15 consonant phonemes defined in terms of their respective relevant features, as shown in Fig. 5 below. For easier readability I have removed in Fig. 5 ‘voice’ which is the mark of the ‘voice’ correlation and also ‘nasality’ which is the mark of the ‘nasality’ correlation. Neither ‘palatal’ nor /[ɲ]<sub>n</sub>/ has yet been phonologically evaluated. This is why neither “palatal” nor /ɲ/ figure in Fig. 5.

	“bilabial”	“labiodental”	“apical”	“hiss”	“hush”	“dorsal”
“non-nasal”	“voiceless” /p/	/f/	/t/	/s/	/ʃ/	/k/
	“voiced” /b/	/v/	/d/	/z/	/ʒ/	/g/
“nasal”	/m/			/n/		/ŋ/

Fig. 5

9.4. At this stage of my analysis, I can say that (i) /p f t s ʃ k/ are characterized as “voiceless” and /b v d z ʒ g/ as “voiced”, that (ii) /p b/, /f v/, /t d/, /s z/, /ʃ ʒ/ and /k g/ are characterized, respectively, as “bilabial”, “labiodental”, “apical”, “hiss”, “hush” and “dorsal”, respectively, and (iii) finally that /p b t d k g/ (but not /f v s z ʃ ʒ/) are characterized as “non-nasal”. I can also say that /m n ŋ/ are characterized as “nasal”. In other words, all these consonant phonemes are completely defined because the totality of their relevant features have been identified.

## 10. DISCUSSING /ŋ/ “DORSAL NASAL”

10.1. Of /m n ŋ/ which have all been defined above, much has been written about /ŋ/ “dorsal nasal” in French in the literature for a long time. In what follows, I will discuss /ŋ/ at some length for a number of reasons concerning its status in the French consonant phoneme system. As is well known, the introduction of /ŋ/ into the French consonant phoneme system happened when a good number of English words ending with the suffix *-ing* started being imported into French.<sup>24</sup> There is little articulatory difficulty for the French to pronounce [ŋ] as dorsal articulation (which is required for [k] or [g]) and nasal articulation (which is required for [m] and [n]) can be easily combined to produce [ŋ].<sup>25</sup> Most French speakers nowadays pronounce [ŋ] with sufficient ease.<sup>26</sup> The creation of the new phoneme /ŋ/ in the French consonant phoneme system can be regarded as an instance of filling a ‘case vide’ (‘gap’, ‘hole in the pattern’). In this process ‘nasality’ and ‘dorsality’ which pre-existed (in /m n/ and /k g/, respectively) were combined and served the French to pronounce English loanwords ending with *-ing* with [ŋ] as in English.<sup>27</sup> Indeed English loanwords like *camping*<sup>28</sup> and *parking*,<sup>29</sup> are nowadays pronounced [kãpiŋ] and [parkiŋ] by the majority of French speakers, but they are also differently pronounced with [ɲ] by a minority, for instance [kãpiɲ, kãpiɲɲ, kãpiŋg] and [parkiɲg, parkiɲ].<sup>30</sup> The consonant phoneme system shown above in Fig. 5 (§ 9.3) assumes the occurrence of /ŋ/ in the speech of the predominant majority of French speakers. /ŋ/ can be said to be well integrated in the consonant phoneme system of French with most speakers.

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<sup>24</sup> Lists of such words with the dates of their importation can be seen in Walter (1983: esp. 16-18).

<sup>25</sup> See Walter (1977: 34-35), Walter (1983: 28), Walter (2005: 313) and Hagège (1987: 67).

<sup>26</sup> However, Passy (1925<sup>10</sup>: § 188) says that ‘La nasale vélaire (ŋ) ... [est] un des sons les plus difficiles pour les Français.’

<sup>27</sup> See Walter (2005: 313). As Walter (1983: 25) shows, /ŋ/ in French is not always realized by [ŋ] only. It can be realized variously by [ŋ ŋg ŋ<sup>g</sup>] as indicated by Walter (1983: 25).

<sup>28</sup> Notice that *camping* is, so to speak, a Frenchified (or pseudo-) English loanword, since *camping* as a noun is not an English word. The English expression corresponding to the French word *camping* may be *campsite* (in BrE) or *campground* (in AmE).

<sup>29</sup> The English expression for this word is *car park* (in BrE) or *parking lot* (in AmE).

<sup>30</sup> See Martinet & Walter (1973: 174) for *camping*, and Martinet & Walter (1973: 640) for *parking*. Of the various pronunciations indicated for *camping* by Martinet & Walter (1973), [-ŋg] seems to me somewhat surprising. Would it not rather be [-ŋg]? For example, *pressing*, *footing*, *shopping* and *standing* – to cite only a few more – have [-ŋ, -ɲ, -ŋg] but no [-ŋg], and *doping* has [-ŋ, -ɲ, ɲɲ, -ŋg] but again no [-ŋg].

**10.2.** Most writers recognize /ŋ/ as one of the phonemes of French. However, we find Passy (1925<sup>10</sup>: § 188) writing as follows:

La nasale vélaire (ŋ) n'existe en Français qu'accidentellement, dans quelques assimilations: *une longue main* (ynlɔ̃mɛ̃) ... C'est le *ng* de l'Anglais *thing*, de l'Allemand *ding*, un des sons les plus difficiles pour les Français.

**10.3.** Another very negative view about the presence of [ŋ] in contemporary French is found in Chigarevskaïa (1966: 103) who writes as follows:

... on ne peut pas prendre en considération le son [ŋ], même sur le plan phonétique, malgré les emprunts à l'anglais tels que *camping, meeting, footing, shopping*. Ces emprunts sont peu nombreux et, exception faite des mots cités, fort peu répandus. La prononciation [ŋ] n'est qu'une imitation voulue de l'articulation anglaise.

I wonder how much careful observation of contemporary French pronunciation Chigarevskaïa's assertion is based on. It is obvious anyway that she is largely in denial about the presence of [ŋ] in French.

**10.4.** Malmberg (1972<sup>2</sup>: 106 Rem. 5) appears to reject /ŋ/ when he writes: 'Le français n'a pas de phonème /ŋ/'. But his objection seems tempered when he also says (*op. cit. loc. cit.*): '... il semble qu'un nombre croissant de Français prononcent une nasale vélaire /ŋ/ ...', and '... il est peut-être légitime de considérer [ŋ] comme un phonème dans le système français.' (*op. cit.* 106 fn 1) and thus almost casts aside his objection.

**10.5.** Désirat & Hordé (1988: 120-121) go further when they write categorically as follows:

... certains affirment que notre langue aurait acquis au XX<sup>e</sup> siècle ce nouveau phonème. Les faits démentent cette assertion ... l'occlusive /ŋ/ n'est pas un nouveau phonème du français mais représente /g/ dans un contexte nasal : elle apparaît ailleurs qu'à la finale des emprunts, ainsi dans «une longue marche», réalisé [ynlɔ̃ŋ(g)marʃ].

**10.6.** The occurrence of [ŋ] in French I have been mentioning is in absolute syllable-final context (*-ing* in loanwords from English). [ŋ] as in [lɔ̃ŋmɛ̃] (instead of [lɔ̃gmɛ̃]) cited by Passy (1925<sup>10</sup>: § 188)<sup>31</sup> or as in [ynlɔ̃ŋ(g)marʃ] (instead of [ynlɔ̃gmarʃ]) cited by Désirat & Hordé (1988: 121) occurs occasionally when /g/ is flanked by phonemes both of which are realized by nasal segments, i.e. in 'un contexte nasal'. [ŋ] in these cases *is* a realization of /g/, not that of /ŋ/. Désirat & Hordé (1988: 121-122) are right to say that [ŋ] in question 'represents' /g/, though they are wrong to deny French having acquired a new consonant phoneme /ŋ/ much

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<sup>31</sup> An example given by Passy (1925<sup>10</sup>: § 188) and cited by Walter (1977: 34). See also Passy (1925<sup>10</sup>: § 238).

earlier than the 20th century. Martinet (1977: 82) too says: ‘En français traditionnel, ce son [i.e. [ŋ]] s’entend comme réalisation du phonème /g/ dans les prononciations relâchées de *langues nègres* ou *longue natte*.’ A similar phenomenon concerns [ŋ] in *campement* when pronounced [kãŋmã] instead of [kãpmã]. In this case, [ŋ] is a realization of /p/, not that of /m/.<sup>32</sup> The phenomenon illustrated above in connection with the substitution of [g] by [ŋ] or of [p] by [ŋ] demonstrates a measure of economy (law of least effort) on the part of the speaker on condition that the successful transmission of the linguistic message is not compromised (Martinet 1960<sup>1</sup>: VI-5). In the case of [ynlõŋ(g)mẽ], [ynlõŋ(g)marʃ] and [kãŋmã] cited above, the velic opening necessary for [ð] and [m], or for [ã] and [m], is sustained instead of the velic closure necessary for [g] or [p] being achieved. This represents a measure of economy on the part of the speaker. Likewise, *mutatis mutandis*, a similar phenomenon happens in [mẽtnã] > [mẽŋnã] *maintenant* or [sẽkmẽ] > [sẽŋmẽ] *cinq mains*.

**10.7.** If one takes into account differences like [m] (*dîme*) vs. [n] (*dyn*) vs. [ɲ] (*digne*) vs. [ŋ] (*ding*)<sup>33</sup> one would not deny the existence of /ŋ/. If [ŋ] in *ding* which is an interjection/onomatopoeia is accepted, it may be said that /ŋ/ already existed in the French consonant phoneme system, independent of its subsequent acquisition caused by the importation of English words ending in *-ing*. However, if recourse to interjections is objected to, one could still cite e.g. *dring* instead of *ding*. The occurrence of [r] after [d] in *dring* (which is a near-minimal item) is not thought to necessarily change [ŋ] of [iŋ] to some other consonantal segment. It is to be noted that *ding* is not entered in Martinet & Walter (1973).

**10.8.** Be that as it may, we will all agree with Martinet (1977: 82) who definitively says as follows:

Il ne fait ... aucun doute que les prononciations [iŋ] s’entendent chez les unilingues français, ce qui nous autorise à déclarer qu’un phonème /ŋ/ existe dans certains usages de la langue et ceux-là même qui ont le plus de chance de s’étendre.

Martinet’s mention of ‘unilingues’ (monolinguals) is important. This is enough to discredit Chigarevskaja’s remark ‘La prononciation [ŋ] n’est qu’une imitation voulue de l’articulation anglaise.’

**10.9.** [ŋ] in French is generally believed to occur only after [i]. In contemporary French, /ŋ/ always occurs in word-final position preceded by /i/ [i] in English loanwords ending with the suffix *-ing*. For this reason there is a strong sequential link between /i/ and /ŋ/. However, if and when /ŋ/ is ‘released from this yoke’ and /ŋ/ occurs preceded by (an)other vowel(s),

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<sup>32</sup> See Martinet (1969a: 128-129) and Avram (1975: 12).

<sup>33</sup> The dates of first entry into English are, according to *Le Petit Robert*, as follows: *dîme* (12 c), *dyme* (1881), *digne* (1050), *ding* (16 c). *Le Petit Robert* indicates *dring* (20 c) but Walter (1983: 16 fn. 13) puts (1900) and says that this information is obtained from Dubois (1975).

/ŋ/ can be said to be the more integrated in the French consonant phoneme system.<sup>34</sup> For example, *bang* (first occurrence 1953) which is a noun as well as an interjection/onomatopoeia occurs pronounced [bãŋ].<sup>35</sup> There are cases in which it may be said that /ŋ/ occurs before some other vowel phonemes than /i/ in French. Malmberg (1972<sup>2</sup>: 106) cites *Mao Tsé-Toung* and *Hong-Kong* (as spelled by him) to which he attaches his own notations -/tuŋ/ and /ʔɔŋ-kɔŋ/, respectively, suggesting that [ŋ] is susceptible of occurring after vocalic segments other than [i] in French.<sup>36</sup>

Apart from /[l]<sub>n</sub>/ and /[r]<sub>n</sub>/, there still remain /[j]<sub>n</sub>/ and /[ɲ]<sub>n</sub>/ for us to consider in conjunction with each other. /[j]<sub>n</sub>/ is a ‘voiced palatal fricative’ found in CS 4 only. /[j]<sub>n</sub>/ is not matched in French by what might be /[ç]<sub>n</sub>/, a ‘voiceless palatal fricative’ which would be the counterpart of /[j]<sub>n</sub>/ . This means that /[j]<sub>n</sub>/ does not take part in the ‘voice’ correlation.

## 11. ANALYZING /[ɲ]<sub>n</sub>/ AND /[j]<sub>n</sub>/

**11.1.** It may be wondered why I proceed to analyze /[ɲ]<sub>n</sub>/ and /[j]<sub>n</sub>/ rather than just /[ɲ]<sub>n</sub>/. There are two specific reasons for my taking this course of action.

Firstly, ?/ɲ/ in terms of which /[ɲ]<sub>n</sub>/ (‘voiced palatal nasal’) may be phonologically evaluated cannot be characterized as either “palatal” or “nasal” straight away since we have not encountered up to now a phoneme in terms of which one of the pre-phonemes is phonologically evaluated and is characterized as “palatal” and “non-nasal”. If such a pre-phoneme exists in French, this pre-phoneme and /[ɲ]<sub>n</sub>/ can be considered to form the ‘palatal’ order and hence phonologically the “palatal” order. The concept of ‘order’ requires that there should be two or more member pre-phonemes or phonemes to form an order. The meaning of the question mark I have put for /ɲ/, thus ?/ɲ/, is that this supposed consonant phoneme, ?/ɲ/, is yet to be found and defined.

Secondly, we have already analyzed the following 14 pre-phonemes, viz. /[p]<sub>n</sub>/, /[b]<sub>n</sub>/, /[f]<sub>n</sub>/, /[v]<sub>n</sub>/, /[t]<sub>n</sub>/, /[d]<sub>n</sub>/, /[s]<sub>n</sub>/, /[z]<sub>n</sub>/, /[ʃ]<sub>n</sub>/, /[ʒ]<sub>n</sub>/, /[k]<sub>n</sub>/, /[g]<sub>n</sub>/, /[m]<sub>n</sub>/ and /[n]<sub>n</sub>/, but there are still, apart from /[ɲ]<sub>n</sub>/ which we will analyze in what follows, three pre-phonemes to be analyzed, /[j]<sub>n</sub>/, /[l]<sub>n</sub>/ and /[r]<sub>n</sub>/. Neither /[l]<sub>n</sub>/ nor /[r]<sub>n</sub>/ is characterized as ‘palatal’. However,

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<sup>34</sup> Hagège (1987: 67): ‘... il n’est même pas évident pour le moment que la nasale vélaire soit assurée d’un brillant avenir en français, puisqu’elle n’apparaît pas ailleurs que dans ce suffixe *-ing*.’ Unlike Hagège, I am inclined to hold a sanguine view about the future as well as the present occurrence and stability of [ŋ] in French even if [ŋ] continue to occur after [i] only.

<sup>35</sup> See *Le Petite Robert* (1979: 159). Martinet & Walter (1973) does not include this word, which is a noun as well as an interjection/onomatopoeia.

<sup>36</sup> Most probably echoing what Malmberg (1972<sup>2</sup>: 106) says, Rothe (1978<sup>2</sup>: 75) mentions cases of Chinese proper names, if not by citing examples, in the pronunciation of which [ŋ] occurs preceded by other vocalic segments than [i]. I can provide here a few relevant examples of Chinese surnames: *Wáng*, *Dìng* and *Sòng* (written in Hanyu Pinyin Romanization).



/[j]<sub>n</sub>/ is characterized as ‘palatal’, and ‘fricative’ which can be equated to ‘non-nasal’<sup>37</sup> and, for this reason, stands as the appropriate, in fact the only obvious, pre-phoneme to be analyzed *in conjunction with* /[ɲ]<sub>n</sub>/, hence the inclusion of /[j]<sub>n</sub>/ in the title of this section. The phrase I emphasized, ‘in conjunction with’, is crucially important.

Thus, it would be wrong at this stage of our analysis to envisage attributing the relevant features “palatal” and “nasal” to (?)/ɲ/ just because /[ɲ]<sub>n</sub>/ is phonetically ‘palatal’ and ‘nasal’ (apart from it being also ‘voiced’ which is phonologically irrelevant).

**11.2.** We will first concentrate on investigating /[j]<sub>n</sub>/, or simply, [j] which is a ‘voiced palatal fricative’.<sup>38</sup> The fricativity of [j] is generally mentioned by various writers. Here is, at some length, what several writers say about what I have just presented as [j]. The diversity in the degrees of frication mentioned by the writers lead them to offer some conflicting descriptions, even with one and the same writer.

Armstrong & Jones (1955: § 345) write:

What, then, is the sound (transcribed phonetically with the symbol j) which closes a syllable, final or non-final : *la fille* la fi:j, *le travail* lə trava:j, *le soleil* lə sɔlɛ:j, *la bataille* la bata:j, *feuilleton* fœjtɔ̃, *tressaillement* tresajmɑ̃ ? In such positions j may be pronounced in the following ways: (1) as a weak fricative consonant ...; (2) as a very short vowel ... trava:i, tresajmɑ̃; (3) as a semi-vowel, a faint ə being added : lə trava:j<sup>2</sup>.

Nicholson (1927: 68) says that the friction should be faint. Paul Passy (1925<sup>10</sup>: § 210) writes: ‘La *fricative palatale* (j) ... in *paille* (pa:j) and *médaille* (meda:j).’ MacCarthy (1975: § 294) who categorizes [j] in French as ‘voiced palatal fricative’ cites *fille* and *paille*, but also *yeux*, *brillant*, etc. and emphasizes that the friction is weak and often imperceptible. Malmberg (1972<sup>2</sup>: 122) says: ‘Grâce aux vibrations laryngales, le bruit de friction est faible, souvent à peine perceptible.’ and also (1972<sup>2</sup> *loc. cit.*) ‘Il ne faut ... pas fermer trop l’articulation en français et produire un bruit de friction trop marqué.’

It seems to me that the general consensus among these (and other) writers is that we have a palatal consonant in the articulation of which there is only very slight friction, which may be [j·] (‘a voiced palatal spirant’).

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<sup>37</sup> /[j]<sub>n</sub>/ is ‘fricative’ which can be equated with ‘non-nasal’ in this context. What is ‘non-nasal’ is not necessarily ‘fricative’, but what is ‘fricative’ is ‘non-nasal’. Ladefoged & Maddieson (1996: 103) say categorically: ‘There are no fricative nasals’.

<sup>38</sup> Historically, [j] derives from the erstwhile [ɕ] (palatal lateral). Malmberg (1974: 156) writes: ‘Le français l’a [i.e. [ɕ]] connu jusqu’au siècle passé dans des mots comme *fille*, *piller* où le son a été remplacé par [j].’ Posner (1997: 249) writes: ‘The change of [ɕ] to [j] is easily explained in terms of phonetic simplification (loss of the lateral feature) and is paralleled all over the place (cf. especially Spanish).’ The phonetic symbol Malmberg employs is ‘λ’ (which is not an IPA symbol, not ‘ɕ’ which is).

**11.3.** A fair number of writers employ the symbol ‘j’ and cite examples like *yak* (prevocalic initial position) and *meilleur* (intervocalic position) but also examples like *travail* and *fille* (syllable-final position) and refer to [j] as a semivowel.<sup>39</sup> Such a view puzzles me. It is strange to consider a phoneme that is characterized as “semivowel” (a relevant feature?) is realized by a fricative ([j]). It seems to me that a phoneme that is realized by a fricative is a consonant phoneme, not a semivowel, or still less, a vowel phoneme. Besides, a semivowel generally occurs prevocally or intervocalically, not postvocally.<sup>40</sup>

**11.4.** I wish to put forward one particular reason, though not one of phonological order, to support the view that /j/ is a consonant phoneme. It is well known that any vocalic segment before [v z ʒ r vr j]<sup>41</sup> – also [b d g] – in closed syllable occurring in absolute final context, i.e. prepausally, is lengthened. In the two utterances *c’est une abeille* and *c’est une abbaye*, occurring prepausally, it is normal that [ɛ] of *abeille* followed by [j] is lengthened, thus [abe:j], but this is not the case with [e] followed by [i], thus [abei]. The property of ‘lengthening the vocalic segment’ is shared where the vocalic segment is followed other consonantal segments as well, for instance the sequence [vr].<sup>42</sup> See in this connection Armstrong & Jones (1955: § 413 and § 415 (ii)).

**11.5.** The reason for my view that /j/ which is realized by [j] is one of the *consonant* phonemes of French in its own right is fundamentally its opposability to the vowel phoneme /i/, as evidenced in the cases of *abeille* vs. *abbaye*, *paye* vs. *pays*, *caillement* vs. *caïman*, *ail* vs. *hai*, *traille* vs. *trahi*, etc.<sup>43</sup> I consider this opposability between /i/ and /j/ to be of paramount importance. Consequently /j/ is realized in such a way that it is distinguished from /i/ in its realizations. In the realizations of /j/, the antedorsum is raised higher than it is in realizations of /i/. This is why /j/ is realized by [j] (a fricative).

**11.6.** Many writers employ the phonetic symbol ‘j’ only, by which they refer to its occurrence not only in prevocalic syllable-initial context (e.g. *yak*), in syllable-internal intervocalic

<sup>39</sup> For example, Walter (2005: 307) writes: ‘La semi-voyelle /j/ est fricative surtout à la finale absolue, mais aussi en position interne : [abej], [fãtiji], [tʁavajõ].’

<sup>40</sup> Except when a Bloomfieldian analyst views that semivowels occur postvocally (as well as prevocally and intervocalically), as seen in Bloch and Trager (1942: 23) who write that ‘[j] occurs not only ... but also after vowels in words like *hay*, *high*, *boy* [hɛj, haj, bɔj] ... the nonsyllabic elements of these diphthongs are semivowels.’

<sup>41</sup> Hammarström (1972: 19) treats of this subject but, unfortunately, leaves out [j].

<sup>42</sup> MacCarthy (1975: §294 fn 1) says that [j] which he counts as a consonant and classifies as a fricative ‘causes lengthening of a previous vowel’ and refers us to § 135 (ii). One of the examples he gives is appropriately *fille*.

<sup>43</sup> These are some well-known examples (see Builles 1998: 203).

context (e.g. *meilleur*) and in post-consonantal prevocalic context (e.g. *bien*) but also in post-vocalic syllable-final context (e.g. *abeille*). In view of the opposition that exists between /i/ and /j/, it seems desirable to employ two separate symbols, i.e. ‘i’ and ‘j’, in addition to ‘j’ (which will be used to stand for ‘frictionless palatal continuant’ or ‘unrounded palatal semi-vowel’<sup>44</sup> or ‘unrounded palatal approximant’<sup>45</sup>).

**11.7.** I referred above (in § 11.5) and will also refer immediately below (in § 11.8) specifically to the opposition /i/ vs. /j/ in syllable-final context and will continue to refer to it in the following pages. But we should not forget that /j/ is opposable in that context not only to the vowel phoneme /i/ but also to other consonant phonemes as well, so that /j/ (*tille*) is opposable to, for instance, /f/ (*tiffe*), /k/ (*tique*), /ʒ/ (*tige*) and /r/ (*tire*).

**11.8.** It is worth quoting here what Martinet (1956: 44) has to say about /i/ and /j/ in French being two distinct phonemes.

... en français, /i/ et /j/ [my /j/] doivent être considérés comme des phonèmes distincts ... uniquement parce que la différence entre /i/ et /j/ peut servir à distinguer entre les mots : *pays* /pei/ est distinct de *paye* /pej/ ... la consonne /j/ et la voyelle /i/ ... leur opposition se neutralise ailleurs qu’à la finale de la syllabe.<sup>46</sup>

**11.9.** I mentioned above that almost all writers are of the view that [j] occurs not only syllable-initially prevocalically (e.g. *yak*) and syllable-medially intervocalically (e.g. *meilleur*) but also in syllable-finally postvocalically (e.g. *filie*). They also say that [j] occurring syllable-finally exhibits *weak friction*. My own analysis differs from other writers’ in that [j] (which I specifically notate by [j]) occurring syllable-finally is not merely phonetically (characterized by fricativeness<sup>47</sup>) but also – more importantly – phonologically distinct from [j] occurring syllable-initially prevocalically or syllable-medially intervocalically and also distinct from [i] occurring syllable-finally postvocalically as in *abbaye* [abei] from which [j] as in *abeille* [abej] is distinguished. I have not put a length mark for [ɛ] here since the crucial difference between *abbaye* and *abeille* is the qualitative difference between [e] (*abbaye*) and [ɛ] (*abeille*). The lengthened rendition of [ɛ] in *abeille* is an automatism in final

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<sup>44</sup> See Jones (1964<sup>9</sup>: § 813) and Gimson (1962<sup>1</sup>: 208).

<sup>45</sup> See *IPA Alphabet* (revised to 2005).

<sup>46</sup> In my view, /pej/ (*paye*) and /pei/ (*pays*) should more appropriately be notated /p e-ɛ j/ and /p e-ɛ i/, as both [ɛ] of [pej] and [e] of [pei] are realizations of the archiphoneme /e-ɛ/ ‘front mid’ which occurs in closed syllable and in non-final open syllable, respectively, in French.

<sup>47</sup> ‘Spirantness’ is different from ‘fricativeness’. ‘Weak friction’ does not accurately characterize [j]. The difference between ‘spirant’ and ‘fricative’ is well explained by Martinet (1956: 24-25), Martinet (1960<sup>1</sup>: II-24), Martinet (1981a: 437), Martinet (1981b: 147) and Builtes (1998: 142-143). The appropriate examples that Martinet gives are ‘type du d d’esp. *ocupado*’ for a spirant and ‘type du th d’angl. *father*’ for a fricative. See also Akamatsu (1992b: 31) where I lay emphasis on the difference between a fricative and a spirant.

closed syllable ending with [j] in absolute final position in French. See Martinet & Walter (1973: 56) for their notation of *abeille*.

**11.10.** Another writer I have consulted is Herman (1966: 54-55) who writes as follows.

Le son [j] peut se rencontrer en position intervocalique (*le bouillon, meilleur, fouiller, nous voyons*); ...il peut se trouver aussi après voyelle en fin de mot ... *le détail, il travaille*. Dans ce cas, ce n'est pas la variante d'une voyelle [i], mais un son qui a une parfaite autonomie fonctionnelle et qui, dans la constitution de la syllabe, joue le rôle d'une consonne.

Herman refers to [j] (i.e. what I consider as [j]) as occurring syllable-finally. He adduces an example like (*qu'il*) *bouille*, which he says is opposable to *bouge, bouche, boule*, etc.

Herman thus clearly makes a distinction between [j] occurring prevocally or intervocalically on the one hand and [j] occurring syllable-finally (always postvocally) on the other. He, however, stops short of mentioning the phonetic nature of what he says occurs syllable-finally as a realization of what he considers as a consonant phoneme on the grounds that [j] ends a syllable as do other consonantal segments (as do [ʒ] in *bouge*, [ʃ] in *bouche*, [l] in *boule*, etc.). Also, he does not tell us what the sound [j] in syllable-final position he describes 'un son qui a une parfaite autonomie fonctionnelle' is phonologically.

**11.11.** Herman's view is that prevocalic and intervocalic [j] (i.e. [j] in my symbolization, too) are variants of /i/ while syllable-final (postvocalic) [j] (my [j]) is a realization of a consonant phoneme (which I symbolize by /j/). In other words, [j] and [j] relate to two separate phonemes.

A few examples that Herman gives of [j] occurring prevocally are [njɔ̃] *nion*, [bjɛ̃] *bien*, [parljɔ̃] *parlions*, [ɑ̃vjø] *envieux*, [krje/krie] *crier*, [ljɔ̃/liɔ̃] *lion*, [jɔd] *iode*, [jɑ̃b] *iambe*, etc. In all such cases, Herman regards [j] (a semivowel as he calls it) as a variant of [i] by which he presumably means the phoneme /i/.

**11.12.** I am not at all certain<sup>48</sup> how Herman means to symbolize the consonant phoneme (cf. [j] in syllable-final context). He may choose either 'j' (which he employs to indicate a semivowel) or some other special symbol. Nor am I certain how he means to characterize this phoneme in terms of relevant features. Incidentally, Herman does not mention 'weak friction' in connection with [j] occurring syllable-finally (i.e. [j]).

**11.13.** It is my view that /j/ which occurs postvocally syllable-finally is realized by [j]. I should add that many French speakers also realize this consonant phoneme by [jə] (that is,

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<sup>48</sup> This is because I have not been able to gain access to Herman's *Phonétique et phonologie du français contemporain* (1994) which I nonetheless include in the References.

adding a schwa after [j]) without their being necessarily speakers of southern French. This is not surprising as each consonant phoneme of French has two variants in its realizations, one with and the other without a schwa (see Martinet 1969b: 158, 216-217). Martinet refers to Vaudelin's (1713, 1715) view on this point).<sup>49</sup> /j/ can be realized by [j] or [jə]. It is the schwa in [tə] (*appartement* [-rtəm-]), [lə] (*parlement* [-rləm-]), [rə] (*sacrebleu* [-krəb-]), etc. which is brought into service to break a sequence of three or more consonantal segments (known as 'loi des trois consonnes' proposed by Grammont (1894)). The schwa appearing in such cases is phonologically irrelevant; in other words, the schwa is not a realization of a phoneme /ə/ (Martinet 1969b: 216-217).<sup>50</sup>

**11.14.** In the section entitled 'LE PHONÈME /j/', Walter (1977: 36) mentions that /j/ (her notation) occurring syllable-finally and opposed to the vowel phoneme /i/ is a consonant phoneme definable as "palatal non-nasal" but does not refer to realizations of /j/ being fricatives or spirants in the course of that section. When mentioning later 'non syllabique [j] (*piéd, rien, ... -ation, ... -sien*)' occurring prevocally, Walter (*op. cit. loc. cit.*) does not refer to this point.

Employing the symbol 'j', Walter (1976: 341) writes:

... en finale de syllabe (*abeille* ~ *abbaye, caillement* ~ *caïman*)<sup>51</sup> où il s'agit d'une véritable fricative [my emphasis] qui, dans cette ... position, s'oppose indiscutablement à la voyelle /i/ ... l'articulation [j] ne s'oppose pas à [i] devant voyelle ... par conséquent, l'opposition /i/ ~ /j/ se neutralise partout ailleurs qu'en finale de syllabe et que la réalisation de l'archi-phonème varie suivant les contextes et les locuteurs.

It is unmistakably clear that Walter regards [j] (a fricative according to her, i.e. [j] according to me) occurring in syllable-final context as a realization of a phoneme that is opposed to /i/ (*abeille* vs. *abbaye*), hence /i/ vs. /j/ (i.e. [j]) syllable-finally.<sup>52</sup> I agree with her here. However,

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<sup>49</sup> Martinet's (1969b: 158) words are as follows: 'Nous résumerions son [Vaudelin's] argumentation en disant que tout phonème consonantique peut se réaliser soit comme un son unique, soit comme ce son suivi de l'e instable.'

<sup>50</sup> But see Martinet (1969b: 217-219) who says '... une fonction distinctive de l'opposition de e muet, noté /ə/, à son absence' or 'une opposition de /ə/ à son absence' and cites cases like *le hêtre* /lætr/ vs. *l'être* /letr/ [lə e-ε tr/ vs. /lə e-ε tr/?] where there is opposition between the presence of /ə/ and its absence. Another example Martinet cites is *une hache* /ynɑʃ/ vs. *une ache* /ynaʃ/ where the presence of /ə/ is distinctive. But the use of /ə/ as a distinctive unit is marginal. Opposition between /ə/ and zero is valid in e.g. *le hêtre* /lætr/ vs. *l'être* /letr/ [lə e-ε tr/ vs. /lə e-ε tr/?] but is neutralized in all other contexts. See also Walter (1977: 49-51) for a discussion about the quality of 'e muet' in comparison with those of /ø/ and /œ/. For an in-depth discussion of 'e muet' in contemporary French, see Zwanenburg (1968).

<sup>51</sup> Walter (1976: 32) mentions 'en syllabe non finale' in connection with the examples *caïman* and *caillement*, but it should correctly be 'en syllabe finale', as Walter (*op. cit.* 341) herself correctly says, because syllable division occurs between [j] and [m] in both words.

<sup>52</sup> One would, however, not forget a case like *lion* [liɔ̃] /liɔ̃/ vs. *Lyon* [ljɔ̃] /l i- j̃ ɔ̃/. For further relevant information, see Walter (1977: 37).

I should be happier if Walter employed another symbol than ‘j’, say, ‘j̃’ (or perhaps ‘jz’) in the above quoted passage as well as elsewhere.

**11.15.** At this point, we will turn our attention to / $[ɲ]_n$ / as well, in conjunction with / $[j]_n$ /.

We remember that  $[j]_n$  occurs in CS 4 in Table 1 (in § 2.2), as seen in  $[kaj]$  *caille*.  $[j]_n$  occurs only syllable-finally.  $[ɲ]_n$  also occurs syllable-finally as in  $[kaɲ]$  *cagne* cited also in CS 4.  $[ɲ]_n$  occurs also word-initially as in *gnaf* or word-medially as in *pagnon*.<sup>53</sup> We know that  $[j]_n$  is a ‘voiced palatal fricative’ and  $[ɲ]_n$  is a ‘voiced palatal nasal’. This means that / $[ɲ]_n$ / and / $[j]_n$ / form the ‘palatal’ order and, furthermore, that / $[ɲ]_n$ / and / $[j]_n$ / are differentiated from each other through / $[ɲ]_n$ / being ‘nasal’ and / $[j]_n$ / being ‘fricative’.

**11.16.** We are now ready to define / $j$ / and / $ɲ$ /. In other words, we will determine the relevant features of / $j$ / and those of / $ɲ$ /. I suggest that / $j$ / is characterized as “palatal non-nasal” and / $ɲ$ / as “palatal nasal”. I will explain. It is not difficult to determine that / $ɲ$ / is characterized as “palatal” since / $ɲ$ / is opposed to / $m$ / “bilabial nasal”, / $n$ / “apical nasal” and / $ŋ$ / “dorsal nasal”. / $[j]_n$ / by which / $j$ / is realized is differentiated from / $[s]_n$ /, / $[z]_n$ /, / $[ʃ]_n$ / and / $[ʒ]_n$ / by which / $s$ /, / $z$ /, / $ʃ$ / and / $ʒ$ /, respectively, are realized, so that / $j$ / is characterized as “palatal” as against “hiss” of / $s$ / and / $z$ / and against “hush” of / $ʃ$ / and / $ʒ$ /. As / $ɲ$ / and / $j$ / are both characterized as “palatal”, we need to determine next the relevant feature attributable to / $j$ / that is opposed to the relevant feature “nasal” which is already attributed to / $ɲ$ /. It is these two relevant features the opposition between which distinguishes between / $j$ / and / $ɲ$ /. The relevant feature which we wish to determine should be opposed to “nasal” and is attributable to / $j$ /. It is true that / $[j]_n$ / is fricative while  $[ɲ]_n$  is nasal, and the differentiation between them consists in ‘fricative’ vs. ‘nasal’. However, ‘fricative’ is bound to be ‘non-nasal’ (there is no nasal fricative). Consequently, the phonological content of / $ɲ$ / is “palatal nasal” and that of / $j$ / is “palatal non-nasal”.

That  $[j]_n$  is ‘fricative’, not ‘plosive’ like / $[p]_n$ /, / $[b]_n$ /, / $[t]_n$ /, / $[d]_n$ /, / $[k]_n$ /, / $[g]_n$ / does not prevent / $j$ / from being considered “non-nasal” which is opposed to “nasal” of / $ɲ$ /.

All the same, we should not forget that the fricateness of  $[j]$  serves to differentiate  $[j]$  from  $[i]$  which is a vocalic segment and hence non-fricative and which occurs in French as a realization of the vowel phoneme / $i$ /.<sup>54</sup>

<sup>53</sup> It so happens that the word *pagnon* does not appear in Table 1 because none of the 4 commutative series I set up refers to a phonetic context in which the consonantal segments occur intervocalically.

<sup>54</sup> Some examples in which  $[j]$  and  $[i]$  are opposed to each other syllable-finally are: *abeille*  $[abɛj]$  vs. *abbaye*  $[abɛi]$ , and *paye*  $[pɛj]$  vs. *pays*  $[pɛi]$ , phonologically, / $ab e-ɛ j$ / vs. / $ab e-ɛ i$ /, and / $p e-ɛ j$ / vs. / $p e-ɛ i$ /. / $e-ɛ$ / is the archiphoneme definable as “front mid”, the product of the neutralization of / $e$ / (“front 2nd-opening”) vs. / $ɛ$ / (“front 3rd-opening”) which occurs in non-final open syllable. A few more examples are: *haï*  $[ai]$  vs. *ail*  $[aj]$ , phonologically / $ai$ / vs. / $aj$ /; and *trahi*  $[trai]$  vs. *traille*  $[traj]$ , phonologically / $trai$ / vs. / $traj$ /. Examples of  $[j]$  and  $[i]$  which are opposed to each other syllable-finally in word-medial position are *caillement*  $[kajmã]$  vs. *caïman*  $[kaimã]$ , phonologically, / $kajmã$ / vs. / $kaimã$ /.

**11.17.** I mentioned above (§ 11.2) that there exist diverse phonetic descriptions given by different writers about realizations of /j/ which occurs syllable-finally. These realizations are said to be fricatives ([j]) characterized by different degrees of fricativity or even to be spirants [j<sup>h</sup>], or even [j] or [i]. In point of fact, such different phonetic qualities with regard to degrees of fricativity in realizations of /j/ are of little importance from a phonological point of view. So long as /j/ is “palatal” (which it is in addition to being “non-nasal”), it does not matter, from a phonological viewpoint, whether realizations of /j/ are fricatives or spirants, or even devoiced ([j̥] ≠ [ç]) which occasionally happens in absolute final prepausal position (e.g. *soleil* pronounced [sɔlə:j̥]).

**11.18.** It will be interesting to look into the possible whys and wherefores of varied degrees of fricativity in realizations of /j/ mentioned by many writers. The fundamental reason may be, in my opinion, that /j/ has a very wide field of dispersion (F. ‘champ de dispersion’<sup>55</sup>) since French has no such other consonant phoneme whose palatal fricative realizations are obligatorily and consistently more fricative than are realizations of /j/ and which is in opposition to /j/. Not only has /j/ a very wide field of dispersion but also it has practically no margin of security (F. ‘marge de sécurité’<sup>56</sup>). /j/ enjoys a huge freedom in its realizations along the dimension of fricativity. The sole restriction is for /j/ not to be confused with /i/ in syllable-final position (*abbaye* vs. *abeille*, *haï* vs. *ail*, *trahi* vs. *traille*, *paye* vs. *pays*, etc.), the restriction being only at one end of the field of dispersion.

**11.19.** It will have become clear that we needed to consider /[ɲ]<sub>n</sub>/ and /[j]<sub>n</sub>/ *in conjunction with each other* in order to see how /[ɲ]<sub>n</sub>/ and /[j]<sub>n</sub>/ are differentiated from each other and to attribute “palatal” and “nasal” to /ɲ/ which is realized by /[ɲ]<sub>n</sub>/ and “palatal” and “non-nasal” to /j/ which is realized by /[j]<sub>n</sub>/. Thus, the conclusion is that /ɲ/ and /j/ cannot be examined and defined separately from each other. They are defined simultaneously, so to speak, /ɲ/ as “palatal nasal” and /j/ as “palatal non-nasal”.

We already have the designations for the different orders, viz. “bilabial”, “labiodental”, “apical”, “hiss”, “hush” and “dorsal”. We will henceforth add the designation “palatal” between “apical” and “dorsal” in tables of the consonant phoneme systems of French as we now have the “palatal” order consisting of /ɲ/ “palatal nasal” and /j/ “palatal non-nasal”.

**11.20.** I wish to add some remarks about the question of stability of /ɲ/. We have seen that, whilst /[m]<sub>n</sub>/, /[n]<sub>n</sub>/ and /[ŋ]<sub>n</sub>/ are differentiated from /[p]<sub>n</sub>/ and [b]<sub>n</sub>/, /[t]<sub>n</sub>/ and /[d]<sub>n</sub>/, and /[k]<sub>n</sub>/ and /[g]<sub>n</sub>/, respectively, which are phonetically ‘plosive’ and either ‘voiceless’ or ‘voiced’, /[ɲ]<sub>n</sub>/ is differentiated from /[j]<sub>n</sub>/ which is phonetically ‘voiced’, ‘palatal’ and ‘fricative’. In

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<sup>55</sup> For ‘champ de dispersion’ and ‘marge de sécurité’ see Martinet (2.10. & 2.11. in 1955<sup>1</sup>, 1964<sup>2</sup>, 2005<sup>3</sup>).

<sup>56</sup> As fn 55.

other words, / $[ɲ]$ <sub>n</sub>/ is not differentiated from either / $[j]$  (‘voiced palatal plosive’) or / $[ç]$  (‘voiceless palatal plosive’), neither of which exists in French. This shows that / $[ɲ]$ <sub>n</sub>/ in French does not entirely share the characteristics borne by / $[m]$ <sub>n</sub>/, / $[n]$ <sub>n</sub>/ and / $[ŋ]$ <sub>n</sub>/ and that the behaviour of / $[ɲ]$ <sub>n</sub>/ in French differs from that of / $[m]$ <sub>n</sub>/, / $[n]$ <sub>n</sub>/ and / $[ŋ]$ <sub>n</sub>/ . For one thing, / $[m]$ <sub>n</sub>/, / $[n]$ <sub>n</sub>/ and / $[ŋ]$ <sub>n</sub>/ are firmly anchored and stable for being in the ‘nasality’ correlation. / $[m]$ <sub>n</sub>/ is directly linked to both / $[p]$ <sub>n</sub>/ and / $[b]$ <sub>n</sub>/ (direct neighbours in the ‘bilabial’ order and to / $[n]$ <sub>n</sub>/ and / $[ŋ]$ <sub>n</sub>/ (direct neighbours in the ‘nasal’ series). Likewise, *mutatis mutandis*, / $[n]$ <sub>n</sub>/, and / $[ŋ]$ <sub>n</sub>/ . The interlocking of the ‘nasality’ correlation and the ‘voice’ correlation can only ensure the stability of / $[m]$ <sub>n</sub>/, / $[n]$ <sub>n</sub>/ and / $[ŋ]$ <sub>n</sub>/ as well as that of / $[p]$ <sub>n</sub>/, / $[b]$ <sub>n</sub>/, / $[t]$ <sub>n</sub>/, / $[d]$ <sub>n</sub>/, / $[k]$ <sub>n</sub>/ and / $[g]$ <sub>n</sub>/ . Also, / $[ɲ]$ <sub>n</sub>/ is not stably anchored as, whilst being directly linked to / $[m]$ <sub>n</sub>/, / $[n]$ <sub>n</sub>/ and / $[ŋ]$ <sub>n</sub>/ which are in the ‘nasal’ series, the only direct neighbour of / $[ɲ]$ <sub>n</sub>/ is / $[j]$ <sub>n</sub>/ in the ‘palatal’ order. Moreover, / $[ɲ]$ <sub>n</sub>/ is the direct neighbour of / $[j]$ <sub>n</sub>/ in syllable-final context only, the only context where / $[j]$ <sub>n</sub>/ occurs. There is no such restriction on the occurrence of / $[m]$ <sub>n</sub>/ and / $[n]$ <sub>n</sub>/ . (In word-initial context, / $[ɲ]$ <sub>n</sub>/ occurs only in a handful of specific kinds of words (slang, onomatopoeia, etc.). The occurrence of / $[ŋ]$ <sub>n</sub>/ is certainly restricted in that it occurs only after [i] but, on the other hand, its articulation is unproblematical and stable for the French. For all such reasons, / $[ɲ]$ <sub>n</sub>/ in French is generally unstable in comparison with / $[m]$ <sub>n</sub>/, / $[n]$ <sub>n</sub>/ and / $[ŋ]$ <sub>n</sub>/ . It is not impossible that the well-known progressive loss of / $[ɲ]$ <sub>n</sub>/ in favour of [nj] over many years may be, at least partially, attributable to the instability of / $[ɲ]$ <sub>n</sub>/ in French and the role of its overall function in all contexts in the language. Later on in this paper, I will operate with two different French consonant phoneme systems, one which includes / $ɲ$ / and the other which does not. What is significant, as I will explain, is that / $[j]$ <sub>n</sub>/ in the latter system will keep its phonetic quality but / $j$ / in terms of which / $[j]$ <sub>n</sub>/ is phonologically evaluated undergoes a change in its phonological content.

**11.21.** How about the question of stability of / $j$ / ? In French, / $[j]$ <sub>n</sub>/ (‘voiced palatal fricative’) is not matched by / $[ç]$ <sub>n</sub>/ (‘voiceless palatal fricative’) which French does not have. Consequently / $[j]$ <sub>n</sub>/ is not part of either the ‘voiced’ series or the ‘voiceless’ series; in other words, / $[j]$ <sub>n</sub>/ is not part of the ‘voice’ correlation. What crucially matters is that / $[j]$ <sub>n</sub>/ is ‘palatal’ as is / $[ɲ]$ <sub>n</sub>/ . / $j$ / and / $ɲ$ / are both “palatal” and form the new ‘order’, i.e. the “palatal” order. The crucial difference between / $j$ / and / $ɲ$ / is that the former is ‘non-nasal’ and the latter is ‘nasal’ . We need to reckon with two French consonant phoneme systems. / $ɲ$ / is not included in one of the two systems and, in that case, the phonological content of / $j$ / undergoes a change while / $[j]$ <sub>n</sub>/ continues to exhibit the same phonetic behaviour as in the other system which includes / $ɲ$ / .

**11.22.** The addition of / $j$ / and / $ɲ$ / and the creation of the “palatal” order in the consonant phoneme system are shown in Fig. 6 below. The “palatal” order is placed between the “apical” order and the “dorsal” order. / $ɲ$ / is added in the “nasal” series, which now consists of / $m n ɲ$ /. The “non-nasal” series consists of / $p t k b d g$ / to which / $j$ / is added. However, / $j$ / cannot be so placed as to be part of the “voice” correlation. / $j$ / is therefore placed in the place *inter-*



mediate between the “voiceless” series and the “voiced” series, in the “palatal” order consisting of /j/ which is “non-nasal” and /ɲ/ which is “nasal”. /j/ is both “palatal” and “non-nasal” but neither “voiceless” nor “voiced”. I am fully aware that the placement of /j/ in Fig. 6 may be unorthodox, but this is the only way to avoid repeating “non-nasal” twice.

		“bilabial”	“apical”	“palatal”	“dorsal”
	“voiceless”	/p/	/t/		/k/
“non-nasal”				/j/	
	“voiced”	/b/	/d/		/g/
“nasal”		/m/	/n/	/ɲ/	/ŋ/

Fig. 6

In Fig. 6, I deliberately have not included, as not being of immediate concern, /f v/ (“labiodental”), /s z/ (“hiss”) and /ʃ ʒ/ (“hush”) which are not part of the ‘nasality’ correlation and cannot be characterized as “non-nasal”, unlike /p b/ (“bilabial nasal”), /t d/ (“apical nasal”), /k g/ (“dorsal nasal”).

**11.23.** At this juncture we will take a look at the consonant phoneme system of French that Martinet & Walter (1973: 36) and Walter (1977: 39) present<sup>57</sup>. I deliberately leave out of account, just for the moment, Walter’s and Martinet & Walter’s placement of /f v s z ʃ ʒ r l/ of French which has no direct relevance to the particular point under discussion.

	CONSONNES				
	bilabiales	apicales	palatales	dorsales	
sourdes	p	t		k	
sonores	b	d		g	
nasales	m	n	ɲ		
“semi-voyelles”			j		

Fig. 7

**11.24.** What puzzles me is Martinet & Walter’s indication of /j/ (their symbol, mine being /j/) as “semi-vowels”. I have placed “non-nasal” for /j/ (see Fig. 6) whereas Walter puts it as “semi-voyelles” which does not seem to be a relevant feature, unlike all the rest of the labels which stand for relevant features. I fail to see the meaning of the pair of quotation marks enclosing semi-voyelles, thus “semi-voyelles”. Does this mean that what Martinet & Walter indicate as “semi-voyelles” is *not* a relevant feature in French? By “semi-voyelles” Martinet & Walter seem not to mean what I understand by ‘semivowel’. Be that as it may, in Martinet & Walter’s presentation of the French consonant phonemes (see Fig. 7 shown above), it appears that /j/ is characterized as “palatal semi-vowel” whereas I characterize it as “palatal

<sup>57</sup> The symbols in Walter’s schematic presentation stand for the phonemes, though without the customary oblique bars on both sides of the symbols. Thus, e.g. p stands for /p/. Walter employs the symbol ‘j’ – as does e.g. Martinet (1960<sup>1</sup>: III-14) – which stands for the same phoneme as the one I indicate by /j/.

non-nasal”. Martinet & Walter’s presentation is certainly neat but is ambiguous about the fact that /j/ (Martinet & Walter’s /j/) is “non-nasal”. Incidentally it strikes me as curious that the terms ‘sourdes’, ‘sonores’ and ‘nasales’ which I understand to be the relevant features are shown in the plural.

In another work of hers, Walter (2005: 307) writes: ‘La semi-voyelle /j/ est *fricative* [my emphasis] surtout à la finale absolue mais aussi en position interne: [abɛj], [ʃãtiji], [tʁavajɔ].’ It seems to me that her defining concept of ‘semi-voyelle’ is different from mine.

**11.25.** At this point we will bring back /f v s z ʒ/ into Fig. 8 below.

	“bilabial”	“labiodental”	“apical”	“hiss”	“hush”	“palatal”	“dorsal”
“non-nasal”	“voiceless” /p/	/f/	/t/	/s/	/ʃ/	/j/	/k/
	“voiced” /b/	/v/	/d/	/z/	/ʒ/		/g/
“nasal”	/m/		/n/			/ɲ/	/ŋ/

Fig. 8

I have placed “non-nasal” for /j/ (Figs. 6 and 8) while Martinet & Walter put “semi-voyelles”, the rest being the same for us all.

**11.26.** Martinet (1960<sup>1</sup>) and in the subsequent editions except Martinet (2008<sup>5</sup>) give the table of the French consonant phonemes (except /l/ and /r/) in III-14 which is the same as that in Fig. 7 except that no relevant feature is indicated against /j/ (his symbol). In other words, “semi-voyelles” seen Fig. 7 has simply been removed but is not replaced by another relevant feature (say “non-nasal”?). In Martinet (2008<sup>5</sup>: III-14) this table is withdrawn for a reason unknown to me.

## 12. DEFINING /[l]<sub>n</sub>/ AND /[r]<sub>n</sub>/

There remain /[l]<sub>n</sub>/ and /[r]<sub>n</sub>/ to consider. They neither form a series or an order nor take part in either the ‘voice’ correlation or the ‘nasality’ correlation. They are non-correlated altogether. It is clear from CS 1, CS 2, CS 3 and CS 4 that not only are /[l]<sub>n</sub>/ and /[r]<sub>n</sub>/ differentiated from each other, but they are each differentiated from each of the other pre-phonemes. The phonological value of /[l]<sub>n</sub>/ and that of /[r]<sub>n</sub>/ are such that /l/ is defined as “lateral” and /r/ as “uvular”. This can be shown through series of minimal or near-minimal multiplets such as the following. The two phonetic contexts which I have randomly chosen for this purpose are: [# – i (#)] and [# a –].

- (i) [# – i (#)]: [pi] *pi* vs. [bi(s)] *bi(s)* vs. [fi] *fi* vs. [vi] *vie* vs. [ti] *ti* vs. [di] *dis* vs. [si] *si* vs. [zi(g)] *zi(g)* vs. [ʃi(k)] *chi(c)* vs. [ʒi(t)] *gi(te)* vs. [ki] *qui* vs. [gi] *Guy* vs. [li] *lit* vs. [ri] *ris* vs. [mi] *mi* vs. [ni] *ni* vs. [na(f)] *gna(f)* vs. [pij] *pille*

- (ii) [ɥ a -]: [ap] *happe* vs. [ab(a)] *ab(a)* vs. [af(ame)] *aff(amé)* vs. [av(al)] *av(al)* vs. [at(e)] *ath(é)* vs. [ad(aʒ)] *ad(age)* vs. [as(e)] *assez* vs. [az(ote)] *az(oté)* vs. [aʃ] *hache* vs. [aʒ(u)] *aj(out)* vs. [ak(u)] *acc(ou)* vs. [ag(as)] *ag(asse)* vs. [al(e)] *all(er)* vs. [ar(é)] *arrêt* vs. [am(a)] *amas*<sup>58</sup> vs. [an] *Ann(ie)* vs. [aɲ(o)] *agn(eau)* vs. [aj] *ail*

### 13. DEFINITION OF THE 19 CONSONANT PHONEMES (INCLUDING /p/) OF FRENCH

**13.1.** We have up to now evaluated the *phonological status* of 17 pre-phonemes in French by defining all 17 consonant phonemes in terms of their relevant features. We will now add 2 more phonemes, /l/ and /r/, to the consonant phonemes already seen in Fig. 8. This means that all 19 consonant phonemes including /p/ have now been defined as shown in Fig. 9 below, which schematically presents all 19 consonant phonemes of French I have identified in terms of their relevant features.

	“bilabial”	“labiodental”	“apical”	“hiss”	“hush”	“palatal”	“dorsal”
“non-nasal”	“voiceless” /p/	/f/	/t/	/s/	/ʃ/	/j/	/k/
	“voiced” /b/	/v/	/d/	/z/	/ʒ/		/g/
“nasal”	/m/		/n/			/ɲ/	/ŋ/

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/l/ “lateral” /r/ “uvular”

Fig. 9

### 13.2. List of all the relevant features which define the 19 consonant phonemes

The following, in Table 2 below, is a list of all the relevant features whereby all 19 consonant phonemes of French have been defined.

<sup>58</sup> I have chosen *amas* in which the first vocalic segment is [a] in preference to e.g. *âme* in which the vocalic segment is usually [ɑ] rather than [a].

/p/ : “voiceless bilabial non-nasal”	/m/ : “bilabial nasal”
/b/ : “voiced bilabial non-nasal”	/n/ : “apical nasal”
/f/ : “voiceless labiodental”	/ŋ/ : “dorsal nasal”
/v/ : “voiced labiodental”	/ɲ/ : “palatal nasal”
/t/ : “voiceless apical non-nasal”	/j/ : “palatal non-nasal”
/d/ : “voiced apical non-nasal”	/l/ : “lateral”
/s/ : “voiceless hiss”	/r/ : “uvular”
/z/ : “voiced hiss”	
/ʃ/ : “voiceless hush”	
/ʒ/ : “voiced hush”	
/k/ : “voiceless dorsal non-nasal”	
/g/ : “voiced dorsal non-nasal”	

Table 2

**13.3.** Table 3 below shows how all the relevant features contribute to defining the 19 consonant phonemes.

“voiceless”	/p f t s ʃ k/	“palatal”	/j ɲ/
“voiced”	/b v d z ʒ g/	“dorsal”	/ŋ k/
“bilabial”	/b p/	“nasal”	/m n ɲ ɳ/
“labiodental”	/v f/	“non-nasal”	/b p d t g k j/
“apical”	/d t n/	“lateral”	/l/
“hiss”	/z s/	“uvular”	/r/
“hush”	/ʒ ʃ/		

Table 3

**13.4.** We can see in Tables 2 and 3 how economy is achieved by combining a smaller number (13) of the relevant features to produce a larger number (19) of the phonemes. We see that the 19 consonant phonemes are not characterized by mutually different 19 single relevant features.

**13.5.** Martinet (1960<sup>1</sup>, 1970<sup>2</sup>, 1980<sup>3</sup>, 1996<sup>4</sup>, 2008<sup>5</sup>) verbally presents in III-13 the French consonant phoneme system. He mentions that /p f t s ʃ k/ [ʃ = j] and /b v d z ʒ g/ [ʒ = ʒ]<sup>59</sup> form a correlation consisting of the “voiceless” series and the “voiced” series. I am in full agreement with him. Martinet does not reckon with /ŋ/ whilst retaining /ɲ/, so that for him the “nasal” series consists of /m n ɲ/. This has the consequence that /k g/ cannot be characterized, as it should be, as “non-nasal” and that they do not enter into the ‘nasality’ correlation. /k g/ retain the relevant features “voiced” and “voiceless”, respectively, as well as “dorsal”. Martinet retains /j/ [j = j] and /ɲ/ as “palatal”.

<sup>59</sup> A minor misprint has crept in (Martinet 2008<sup>5</sup>: 89). Read /p f t s ʒ k/ for /p f t s ʃ k/.

#### 14. REVISING /ɲ/ AND /j/

**14.1.** We have already defined both /ɲ/ and /j/ above (see § 11.16; see also Figs 6, 7, 8 and 9, and Table 2 in § 13.2). However, we need to return to these two phonemes now as the absence of /ɲ/ in many French speakers' consonant phoneme systems requires us to reckon with two different consonant phoneme systems in French, one which includes /ɲ/ (this is actually what we have dealt with) and the other which does not. The French consonant phoneme system that includes /ɲ/ has been shown above; see Figs 6, 7, 8 and 9. The absence of /ɲ/ in the French consonant phoneme system has a major repercussion on the phonological content of what we have so far identified as /j/, "palatal non-nasal". This is what I wish to investigate in what follows (§§ 14.2, 14.3).

**14.2.** In connection with the consonant phoneme system which does not include /ɲ/, alterations such as the following are necessary in Table 2 (§ 13.2), Table 3 (§ 13.3) and Fig. 6 (§ 11.22), Fig. 7 (§ 11.23), Fig. 8 (§ 11.25) and Fig. 9 (§ 13.11).

With regard to Table 2,

- (i) /ɲ/ : "palatal nasal" is to be removed.
- (ii) /j/ : "palatal non-nasal" is to be changed to "palatal".

With regard to Table 3,

- (i) "palatal" /j ɲ/ is to be removed.
- (ii) "nasal": /m n ŋ ɲ/ is to be changed to "nasal" /m n ŋ/.
- (iii) /j/ is to be removed from "non-nasal" /b p d t g k j/.

With regard to Fig. 9,

- (i) the "palatal" order consisting of /j / and / ɲ/ is to be removed.
- (ii) /j / is to be moved from the correlations altogether and to join /l/ and /r/.

Here below, in Fig. 10<sup>60</sup> is the schematic representation of the consonant phoneme system that does not include /ɲ/,

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<sup>60</sup> This consonant phoneme system is shown in e.g. Builles (1998: 210) who describes it as '... le système ... qui est celui d'un assez grand nombre de locuteurs de la région parisienne'. It differs from the system shown in Martinet & Walter (1973:36) which *has* /ɲ/. Incidentally, Builles (1998: 203 fn. 22) writes that 'L'auteur ne possède pas la nasale palatale /ɲ/ dans son idiolecte.'

		“bilabial”	“labiodental”	“apical”	“hiss”	“hush”	“dorsal”
“non-nasal”	“voiceless”	/p/	/f/	/t/	/s/	/ʃ/	/k/
	“voiced”	/b/	/v/	/d/	/z/	/ʒ/	/g/
“nasal”		/m/		/n/			/ɲ/
/l/ /r/ /j/							

Fig. 10

The following will be observed.

(1) The relevant feature “palatal” has been removed from the series “bilabial” ... “dorsal”.

(2) /j/ which has lost its only direct neighbour /ɲ/ becomes altogether uncorrelated (out of both the ‘voice’ correlation and the ‘nasality’ correlation).<sup>61</sup>

(3) /j/ joins /l/ and /r/, two non-correlated consonant phonemes, to become the third non-correlated consonant phoneme.

(4) /j/ is characterized as “palatal” and is opposed to not only /l/ and /r/ but also to each of all the other 15 consonant phonemes.

**14.3.** The two French consonant phoneme systems, shown in Fig. 9 (§ 13.1) and Fig. 10 (§ 14.2), respectively, are those we have finally established at the end of the commutation test. They may conveniently be referred to as (i) the consonant phoneme system which includes /ɲ/ (Fig. 9) and (ii) the consonant phoneme system which does not (Fig. 10).

**14.4.** The on-going trend in the loss of /ɲ/ in French is well documented in the literature. Martinet has written about the regressive fate of /ɲ/ in conjunction with the progressive prevalence of [ɲ] (used instead of [ɲ]) in several of his writings. Martinet (1955: 31) mentions the non-distinction among many French speakers between ‘*n mouillé*’<sup>62</sup> and ‘*n + yod*’ (i.e. [ɲ]), citing e.g. *l’agnelle* and *la nielle*. Martinet (1955: 36) briefly notes that Parisians preserve fairly well the said distinction but points out that the confusion is constantly spreading, particularly among the Parisians born after 1910, compared with those born before 1900 who

<sup>61</sup> Walter’s (1977: 38-39) words are as follows: ‘Lorsqu’il n’y aura plus aucun locuteur pour opposer un /ɲ/ à [n + j], il n’y aura plus aucune raison d’intégrer /j/ [j] dans le système, puisqu’il ne partagera plus aucun trait pertinent avec les autres consonnes ...’

<sup>62</sup> ‘*n mouillé*’ is an inexact term which comes under fire from a few writers. A precise term is ‘palatal nasal’. I agree with Malmberg (1972<sup>2</sup>: 105) who writes: ‘On appelle incorrectement /ɲ/ «n mouillé». Ce n’est pas une consonne mouillée (palatalisée) mais une consonne palatale.’ The term ‘*n mouillé*’ would better be phonetically notated as [n<sup>ʲ</sup>] (palatalized [n]).

preserve the distinction. Given the well-known ‘enquête’ conducted by Martinet in 1941, whose results were published in 1945 (Martinet 1945<sup>1</sup>; see also Martinet 1971<sup>2</sup>: 170-174), the said confusion between [ɲ] and [nj] can safely be presumed to be incomparably greater at the present time.

**14.5.** In the pronunciation with [ɲ] or [nj] in e.g. *gnaf*, *agneau* and *champagne*, [nj] is, in my view, phonologically evaluated as /n i-j/ (in which /i-j/ is an archiphoneme), not /nj/,<sup>63</sup> in the context ‘preceded by a consonant phoneme’ which is one of the contexts of neutralization of /i/ vs. /j/. (The question of the neutralization of /i/ vs. /j/ and its product the archiphoneme /i-j/ is a subject of substantial discussion further below.) This is why I did not put /ni/ for [nj] earlier. It may additionally be mentioned that, for all speakers of French, [mj] as in *miel* and in *camion* is likewise phonologically interpreted as /m i-j/, not /mi/.

**14.6.** Traditionally [ɲ] and [nj] are differentiated in e.g. *brugnon* (with [ɲ]) vs. *union* (with [nj]) and *accompagner* (with [ɲ]) vs. *panier* (with [nj]) (Walter 1977: 33). Martinet & Walter (1973: 163) say *brugnon* is pronounced with [ɲ] or [nj], but this differentiation in intervocalic position is observed by few speakers nowadays, the loss of the differentiation resulting in [nj]. As noted by a number of writers (e.g. Walter 1977: 33-34), a noticeable progressive trend has been on-going among many French speakers for a very long time so that [nj] as well as [ɲ] occur<sup>64</sup> in intervocalic position (for example, *agneau* is pronounced [anjo] as well as [ɲjo])<sup>65</sup> or in final position (for example, *champagne* is pronounced [ʃãpanj] by a minority of speakers as well as [ʃãpaɲ]) by a majority of speakers.<sup>66</sup> This reality has been remarked by all contemporary writers, though some are prescriptively opposed to it.<sup>67</sup> Both [ɲ] and [nj] coexist in competition with each other in the speech of French speakers, but [ɲ] is exhibiting a regressive trend while [nj] is showing a progressive trend. The coexistence in contemporary French of [ɲ] and [nj] mentioned above requires that we should reckon with two different consonant phoneme systems in competition with each other. One of two such systems is presented in Fig. 9 (§ 13.1) in which [ɲ] as in *l’agnelle* is not confused with [nj] as in *la nielle* and consequently this system has both /ɲ/ and /n/. The other system is presented in Fig. 10 (§ 14.2) in which /ɲ/ is absent.

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<sup>63</sup> Walter (2005: 307) writes ‘/n/ + /j/’.

<sup>64</sup> Malmberg (1972<sup>2</sup>: 106-107) interestingly remarks that ‘Une tendance populaire à réaliser le groupe /n/ + /j/ (dans *panier*) comme [ɲ] implique que le phonème /ɲ/ (*baïgner*) se scinde en deux unités phonologiques. Dans la mesure où cette tendance se généralise, le phonème /ɲ/ disparaît du consonantisme français en même temps que le son se fait plus fréquent.’

<sup>65</sup> This phenomenon was observed and written about at least half a century ago. See e.g. Passy (1925<sup>10</sup>: § 187).

<sup>66</sup> Among some other words with final *-gne* pronounced [-ɲ, -nj] are e.g. *campagne*, *cagne*, *signe*. Not all word-final *-gne* is pronounced [-ɲ, -nj], however. Many more are pronounced [-ɲ], according to Martinet & Walter (1973), e.g. *bagne*, *compagne*, *digne*, *grogne*, *guigne*, *montagne*, *pagne*, *peigne*, *pigne*, *règne*, *trogne*, *vigne*.

<sup>67</sup> Nyrop (1963<sup>8</sup>: 63) strongly condemns the confusion between [ɲ] and [nj]. A similar stricture comes from Classe (1940: 51).

## 15. NEUTRALIZATION OF /i/ VS. /j/

### 15.1. Martinet (1960<sup>1</sup>: III-21) writes:

... un phoneme /j/ ... un phoneme /i/ ... l'opposition se neutralise ailleurs qu'en finale de syllabe ...

Walter makes correct statements in connection with the neutralization of /i/ vs. /j/ as follows. Walter resorts to the symbol 'j' whereas I use 'j'.

En dehors de la position finale de syllabe, et en particulier devant voyelle, l'opposition /i/ ~ /j/ se neutralise et l'archiphonème se réalise différemment suivant les contextes : [j], [i], [ij], etc. (Walter 1976: 378)

... une neutralisation de l'opposition /j/ ~ /i/. On dira que le produit de cette neutralisation, ou archiphonème, qui est la base commune à /j/ et /i/, se réalise [j] ou [ij] selon les contextes. (Walter 1977: 37).

These statements, with which I concur, raises two points. Firstly, [j] in *yak* and *meilleur*, [ij] in *lier* (when pronounced [lije]) and [i] in *lier* (when pronounced [lie]) are not realizations of /i/ but are realizations of the archiphoneme /i-j/. Secondly, it is necessary to define this archiphoneme in terms of relevant features. Walter stops short of specifying the phonological content of this archiphoneme.

### 15.2. In fact, I know of no-one who has defined the archiphoneme, and I venture to hazard my own tentative (only tentative) analysis below (which I will eventually withdraw).

It may be remembered that, according to my tentative analysis, /j/ is defined as “palatal non-nasal” in the French consonant phoneme system that includes /ɲ/ (Fig. 9 in § 13.1). This consonant phoneme system includes, more likely than not, /ŋ/ (“dorsal nasal”) as well, but its presence or absence has no direct impact on the definition of either /j/ or /ɲ/. The phonological content of the archiphoneme is said to correspond to the common base of those of /i/ and /j/. The vowel phoneme /i/ in French is defined as “close front unrounded”. The term ‘palatal’ is used by some writers to refer to vowels like [i], [e], [ɛ] and [a] in French, as distinct from the term ‘velar’ to refer to vowels like [u], [o], [ɔ] and [ʊ] (Malmberg 1972<sup>2</sup>: 30, 31; Malmberg 1974: 113)<sup>68</sup>. The term ‘palatal’ employed in this way corresponds to ‘front’. My own understanding of the term ‘palatal’, which differs from Malmberg’s, is such that it refers to an articulatory interaction between the antedorsum and the pre-palatal area, the approximation between them varying in the articulation of different sounds (CV[a] ... CV[i], ... [j·], [j], [ç], [ʃ]/[ç]/[ʃ]). CV = Cardinal Vowel.

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<sup>68</sup> Malmberg employs term ‘palatales’ as a synonym of the term ‘antérieures’ which I believe corresponds to ‘front’. According to Malmberg, ‘antérieures’ can be ‘fermés’, ‘mi-fermés’, ‘mi-ouverts’ or ‘ouverts’. Consequently, “close (opening)” corresponds to ‘palatal fermé’. In Brosnahan & Malmberg (1970: 86), the term ‘front’ appears but not the term ‘palatal’.



**15.3.** By using Malmberg's term 'palatal' but with a different sense, /i/ is definable as "palatal front unrounded". In the articulation of [i] the antedorsum is raised towards the pre-palatal area consistent with causing no local friction in the oral cavity. The phonological content "close front unrounded" earlier mentioned would then correspond to "palatal front unrounded". The common base of /i/ "palatal front unrounded" and /j/ "palatal non-nasal" will be "palatal", which would be the phonological content of the archiphoneme /i-j/.<sup>69</sup>

**15.4.** My tentative solution just indicated poses a serious problem because, so far as one of the two different consonant phoneme systems that includes /ɲ/ is concerned, "palatal" is found in /ɲ/ "palatal nasal" as well as in /j/ "palatal non-nasal". If the opposition /i/ vs. /j/ is a neutralizable opposition, then the common base of /i/ and /j/ which is the phonological content of the archiphoneme /i-j/ should *not* be found in any phoneme of French since a neutralizable opposition must be an exclusive opposition.<sup>70</sup> It seems that my tentatively suggested definition of the archiphoneme /i-j/ as "palatal" hits a hurdle so far as the consonant phoneme system that includes /ɲ/ is concerned.

**15.5.** However, so far as one of the two consonant phoneme systems is concerned (Fig. 10 in § 14.2), the phonological content of the archiphoneme /i-j/ "palatal" is *not* found in any phoneme of French as this consonant phoneme system does not include /ɲ/, so that /i/ vs. /j/ is effectively an exclusive opposition and also a neutralizable opposition. If so, the problem seems to be solved, but not entirely because /i/ vs. /j/ is supposed to be the *same* neutralizable opposition even in the phoneme consonant system that includes /ɲ/ (Fig. 9 in § 13.1). An optimal solution being sought should satisfy *both* consonant phoneme systems but my tentative solution does not.

Be that as it may, defining the archiphoneme /i-j/ as "palatal" might seem all the same to be valid within the confines of the consonant phoneme system which does not include /ɲ/, the system that has been being favoured by many French speakers. However, serious reservations must be expressed because the relevant feature "palatal" does not have the same functional value in the vowel system and the consonant system (see § 15.6 which immediately follows).

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<sup>69</sup> To those who find the symbol 'i-j' cumbersome to represent the archiphoneme /i-j/, particularly in running notations, I might suggest that they employ a single symbol such as 'I' or 'J'. In fact, Builles (1998: 204) employs the symbol 'i', i.e. with a short horizontal stroke beneath 'i', e.g. /i/ *île*, /malj/ *Mali*, /bjer/ *bière*.

<sup>70</sup> The concept and term of 'exclusive opposition' (and those of 'non-exclusive opposition') were first proposed in Akamatsu (1988: 58-63). There are several more references to them in some of my subsequent writings as well, in e.g. Akamatsu (1992a: 53-55), Akamatsu (2000: 29-31 *et passim*), Akamatsu (2013: 150-152) and Akamatsu (2015). Incidentally, Maiden (1990: 566) makes a factual error in attributing the term 'exclusive opposition' to Martinet who stops short of proposing the term 'exclusive opposition' and, what's more, misrepresents 'exclusive opposition' as 'bilateral opposition'.

**15.6.** I believe that the difficulty encountered in defining the archiphoneme /i-j/ derives from the fact that, on the one hand, the relevant features of the *consonant phonemes* are determined on the basis of mutual relationships entertained by the consonant phonemes while those of the *vowel phonemes* are determined on the basis of mutual relationships entertained by the vowel phonemes. The functional value of “palatal” in /j/ in the consonant phoneme system that includes /ɲ/ is established in terms of the direct opposition it enters into with /ɲ/ “palatal nasal”, this “palatal” being in turn in direct opposition to “bilabial” (in /m/), “apical” (in /n/) and “dorsal” (in /ŋ/). As for the relevant feature “palatal” (which is equivalent to “close”) found in /i/, it is opposed to “half-close” (as in /e/), “half-open” (as in /ɛ/) and “open” (as in /a/). The functional value of “palatal” within the consonant phoneme system and that of “palatal” within the vowel phoneme system are not identical. The two relevant features which are both identically designated as “palatal” cannot be held to be identical because their functional values are non-identical. The relevant features of the ‘oral’ vowel phonemes of French are determined according to the parameters of (i) different degrees of opening on the vertical axis (“close”, “half-close”, “half-open”, “open”), the location of the highest point of the tongue (“front”, “mid”, “back”), and the posture of the lips (“rounded”, “unrounded”). On the other hand, the relevant features of the consonant phonemes are determined with regard to the glottal status (“voiceless”, “voiced”), points of articulation along the articulatory channel (“bilabial”, “labiodental”, “apical”, “hiss”,<sup>71</sup> “hush”,<sup>72</sup> “palatal” and “dorsal”) and manners of articulation (“nasal”, “non-nasal”, “fricative”, “spirant”, etc.). As can be seen, there are practically no relevant features which are shared by the vowel phonemes and the consonant phonemes.

Besides, in the vowel phoneme system, if “close” is equated with “palatal”, how should we understand “half-close”, “half-open” and “open” in relation to “palatal”?

**15.7.** It seems that, in the case of a neutralizable opposition between a vowel phoneme and a consonant phoneme such as /i/ vs. /j/ in French, it is impossible to find the relevant feature(s) which a vowel phoneme (e.g. /i/) and a consonant phoneme (e.g. /j/) share so that the common base of the vowel phoneme and the consonant phoneme by which the archiphoneme (/i-j/) can be specified and defined in terms of relevant features. It is clearly easier within either the vowel phoneme system or the consonant phoneme system in French to identify the phonological contents of the member phonemes (e.g. /e/ “front half-close unrounded”) and /ɛ/ “front half-open unrounded”; /p/ “voiceless bilabial non-nasal” and /b/ “voiced bilabial non-nasal”) of a neutralizable opposition (/e/ vs. /ɛ/; /p/ vs. /b/) and the phonological content of the associated archiphoneme (e.g. /e-ɛ/ “unrounded front mid”; /p-b/ “bilabial non-nasal”). My stance that a neutralizable opposition is necessarily an exclusive opposition seems to be valid provided that a neutralizable opposition occurs within either a consonant phoneme system or a vowel phoneme system. On the hand, my stance does not seem valid if

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<sup>71</sup> Alternatively, “blade-alveolar” (Jones 1964<sup>o</sup>: § 709) or “lamino-alveolar” (Catford 1988: 90).

<sup>72</sup> Alternatively, “palato-alveolar” (Jones<sup>o</sup>: § 726) or “lamino/apico-postalveolar” (Catford 1988: 90-91).

the member phonemes of a neutralizable opposition straddle across the vowel phoneme system and the consonant phoneme system, for instance /i/ vs. /j/ in French. The few problems mentioned seem to be *sans issue* and unresolvable.

**15.8.** It is worth quoting here at some length very important but rarely made remarks such as the following made by Martinet:

... le rôle des voyelles et des consonnes en tant que telles n'est pas de former des oppositions DANS LE SYSTÈME ..., c'est-à-dire de pouvoir apparaître dans des contextes identiques, mais d'établir, DANS LE FIL DU DISCOURS, les **contrastes** nécessaires [Martinet's boldface]. C'est, en effet, une succession d'articulations fermées et ouvertes qui semble offrir les conditions optima pour le processus de communication vocale. (Martinet 1956: 44)

Ce qu'on attend des consonnes et des voyelles, ce n'est pas qu'elles apparaissent dans les mêmes contextes, c'est-à-dire qu'elles s'opposent, mais qu'elles se succèdent les unes aux autres dans le fil du discours, c'est-à-dire qu'elles soient en contraste. (Martinet 1960<sup>1</sup>; III-21)

... rapprochés sur la base de leurs traits pertinents, la plupart des phonèmes se groupent en deux systèmes qui n'ont, l'un avec l'autre, aucun contact ... (Martinet 1965: 90)

Presence of such cases as *cahot* vs. *cap* vs. *cab* vs. *canne*, etc. gives rise to phonological oppositions, /o-ɔ/ vs. /a/ vs. /b/ vs. /n/, etc. Their occurrence is essentially determined by the syntagmatic necessity of vowel-consonant alternation. In my view, hypothetically, the word *cahot* [-o] was presumably not expressly created so that this word could be minimally differentiated from e.g. *cap* [-p]. The existence of *cahot* vs. *cap* vs. *cab* vs. *canne*, etc. does not invalidate the essential characteristics of vowels and consonants whose nature exhibits the necessary contrast (not opposition).

**15.9.** It is understandable that /i/ (from the vowel system) and /j/ (from the consonant system) happen to constitute an opposition in French (cf. *abbaye* vs. *abeille*). Martinet (1956: 44) says that '... en français, la consonne /j/ et la voyelle /i/ sont phonologiquement étroitement apparentées, car leur opposition se neutralise ailleurs qu'à la finale de la syllabe.' However, because the vowel system and consonant system are separate organizations, it is impossible to produce such relevant features which can be identical across the vowel and consonant systems. Hence the impossibility I have indicated to identify the relevant feature(s) common to /i/ and /j/ in my unsuccessful tentative attempt to find the phonological content of the archiphoneme /i-j/.

**15.10.** Some might suggest that /i/ and /j/ could, as an alternative nonce analysis, be defined in terms of distinctive features such as those operated with in generative phonology in which the same set of pre-established distinctive features can be used for both consonants and vowels, so that the chance would be greater to find an appropriate distinctive feature common to /i/ and /j/. I am not ready to acquiesce in such a suggestion since the concept of 'relevant

feature' with which I operate is fundamentally incompatible with that of 'distinctive feature'.<sup>73</sup>

**15.11.** So far as I know, a neutralizable opposition is always such that its (two or more, as the case may be) member phonemes are in the same 'order' or in the same 'series' within either the vowel phoneme system or the consonant phoneme system in a given language. In addition, the 'orders' and 'series' in the vowel phoneme system are independent of those in the consonant phoneme system. The phonemes of an 'order' or a 'series' are direct neighbours to each other. In French, for example, the member phonemes of the neutralizable opposition /p/ vs. /b/ are both in the "bilabial" order while those of the neutralizable opposition /e/ vs. /ɛ/ are both in the "front unrounded" series. It is evident that /i/ and /j/ are not in either the same 'order' or the same 'series' in either the vowel phoneme system or the consonant phoneme system. The neutralizable opposition /i/ vs. /j/ is the only case, to my knowledge (at least so far), of a neutralizable opposition whose member phonemes are not both in the vowel phoneme system or in the consonant phoneme system. It seems to me that if /j/ were a member of a neutralizable opposition, it would rather be with /p/, but /j/ vs. /p/ in French is actually not a neutralizable opposition.

**15.12.** It seems that, the opposition /i/ vs. /j/ having been declared to be a neutralizable opposition, the task of defining the archiphoneme /i-j/ is bypassed by all writers, most probably because of the impossibility to accomplish the task. What strikes me as strange is that, to the best of my knowledge, no writer in his writings has explicitly suggested or even warned about the impossibility of defining the phonological content of the archiphoneme /i-j/ for the reason that the member phonemes of the neutralizable opposition (i.e. /i/ vs. /j/) belong to the two separate phoneme systems which have intrinsically no contact with each other and the phonological oppositions in one of the systems are different from those in the other system.

**15.13.** There is one writer who has tackled in detail the problem of the neutralization of /i/ vs. /j/ but *not* the definition of the archiphoneme /i-j/ in terms of relevant features. Builles (1998: 203-204), in a section entitled 'La Neutralisation de l'opposition /i-/j/ en français', does just this. It should be borne in mind that Builles consistently employs the symbol 'j', not the symbol 'j' I employ. As Builles (1998) has never been reprinted since its publication and, for this reason, may be unlikely to be easily accessible and widely consulted, I will vicariously give his analysis in detail below with my occasional comments. The consonant phoneme system in connection with which Builles presents his analysis of the opposition /i/ vs. /j/ and refers to various realizations of the archiphoneme /i-j/ is the same consonant phoneme system in which /p/ does not occur (see Fig. 10 in § 14.2). I repeat that Builles himself employs the symbol 'j' rather than 'j'. In what follows (§§ 15.14, 15.15), however, I will retain Builles's symbol 'j'. in order to be faithful to his own presentation.

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<sup>73</sup> Martinet (1964<sup>2</sup>: 67-68 fn. 8).

**15.14. The archiphoneme /i-j/ (i.e. /i-j/ for me) and its realizations (Builles)**

(1) The opposition /i/ vs. /j/ is valid

(i) postvocally in absolute syllable-final context (/ai/ *hai* vs. /aj/ *aïe*);

(ii) also in syllable-final context, between vowel and consonant (e.g. /kaimã/ *caïman* vs. /kajmã/ *caillement*); and

(iii) in absolute syllable-finally after /n/ (/kõpani/ *compagnie* vs. /kõpanj/ *compagne* [the phonological notations are Builles's]).

Builles says that, word-finally he pronounces *gne* + 'e muet' with [ɲ] (as in *compagne*) which he says he interprets as /n+/j/. I therefore understand that /-nj/ in /kõpanj/ is realized by [-ɲ], not [-nj]. Builles says that, in intervocalic context, he pronounces e.g. *accompagner* and *panier* identically (probably [ɲ]).<sup>74</sup>

(2) In principle, one *cannot* talk about neutralization of /i/ vs. /j/ since /i/ and /j/ are not in exclusive relation, i.e. /i/ vs. /j/ is not an exclusive opposition.

(3) Builles explains why /i/ vs. /j/ is not an exclusive opposition. /i/ which is integrated in the vowel phoneme system is defined as 'oral', 'front', 'spread' and 'close'.<sup>75</sup>

(4) /i/ forms the peak of syllable and is realized by an oral front spread and close vocalic segment, i.e. [i].

(5) In numerous idiolects, the phoneme /j/ which lies outside the consonantal correlation is defined by only one relevant feature, "palatal".<sup>76</sup> Judging from the definitions of /i/ and /j/ (see (3)), /i/ vs. /j/ is not an exclusive opposition.

(6) /j/ "palatal" is realized, depending on various contexts and various speakers, by [j] (i.e. [j] for me) which is a fricative or a spirant (i.e. [j·]).<sup>77</sup>

(7) When Builles considers realizations of /i/ and /j/, the two phonemes are regarded to be very close to each other.

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<sup>74</sup> Martinet (1955 (Repr.): 38) writes as follows: 'Là où *la nielle* et *l'agnelle* se réalisent de façon identique, c'est-à-dire phonétiquement avec un [ɲ] suivi d'un *yod* plus ou moins net, nous interpréterions tout naturellement [ɲ] comme une réalisation particulière du phonème *n* devant [j].'

<sup>75</sup> It seems to me that 'oral' is unnecessary as the French vowel phoneme system does not have /i/. I translate Builles's 'étiré' as 'spread' and his 'fermé' as 'close'.

<sup>76</sup> This is the only time Builles presents the relevant feature «palatal» ("palatal"). Builles defines /j/, i.e. my /j/, correctly as "palatal", not "palatal nasal", as the consonant phoneme system which is his own and to which he is referring does not have /ɲ/.

<sup>77</sup> Note that Builles employs one and the same phonetic symbol 'j' for both a fricative and a spirant while I employ two distinctive phonetic symbols, 'j' for a fricative and 'j·' for a spirant.

(8) /i/ and /j/ possess a common base that they are alone in sharing, i.e. ‘voiced, oral, (lips) spread, front’ [these are phonetic features as such] which they are alone in sharing.<sup>78</sup>

(9) Builles notes that the difference between [i] (a realization of /i/) and [j] (a realization of /j/) consists in the different degree of the narrowing in the expiratory channel in the oral cavity, less for [i] and more for [j].

(10) Builles’s identification of the common base is in phonetic terms, not in terms of phonologically relevant features.<sup>79</sup>

(11) The above-mentioned ‘common base’ is regarded as the archiphoneme /i-j/, which Builles notates by /i̇/, i.e. the symbol ‘i’ to which a diacritic ‘˙’ is attached underneath it.

(12) Builles considers that /i/ and /j/ are very close to each other, judging from the mutual closeness of their realizations. Therefore, in the name of *phonetic realism* /i/ vs. /j/ is considered to be neutralized in those contexts where /i/ and /j/ are not opposed to each other.

(13) Having acknowledged that /i/ vs. /j/ is after all an exclusive and neutralizable opposition, Builles gives an account, firstly, of the contexts where /i/ vs. /j/ is neutralized and, secondly, an account of how the archiphoneme /i̇/ is realized. They are as follows. All the example words are his.

(i) word-initially followed by a consonant phoneme (/i̇l/ *ile*) or by a vowel phoneme (/i̇er/ *hier*)

(ii) between consonant phonemes (/mi̇l/ *mil*)

(iii) syllable-finally preceded by a consonant phoneme other than /n/ (/mȧli/ *Mali*)

(iv) between a consonant phoneme and a vowel phoneme (/bi̇er/ *bière*, /pi̇er/ *pierre*)

(v) between two consonant phonemes and a vowel (/uvri̇e/ *ouvrier*, /pøpli̇e/ *peuplier*)

(vi) between two vowel phonemes (/kȧie/ *cahier* or *caillé*)

(vii) between a vowel phoneme and /i̇/ (/tai̇i/ *taillis*)

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<sup>78</sup> It is here that Builles implicitly abandons his earlier statement that /i/ vs. /j/ is not an exclusive opposition. He acknowledges that /i/ and /j/ are after all an exclusive opposition (and consequently neutralizable).

<sup>79</sup> Would Builles define the archiphoneme /i-j/ (my /i-j/) “voiced oral, close, front”?

Depending on the contexts of neutralization, the archiphoneme /i/ is realized by either [i] (/il/, /mil/, /mai/), or voiced [j] (/ier/, /bier/, /kaie/, /tai/) or voiceless [j] (/pier/), or by [ij] (/uvrie/, /pøpli/).<sup>80</sup>

**15.15.** The criterion whereby Builles identifies the common base of /i/ and /j/ (my /j/) and the closeness between the realizations of /i/ and those of /j/ (my /j/) are never in terms of relevant features. The incompatibility in French between relevant features in the vowel phoneme system and those in the consonant phonemes such as I have mentioned further above does not seem to be Builles's concern.

It is not known to me how Builles might analyze the neutralization of /i/ vs. /j/ (i.e. /i/ vs. /j/ for me) and define the archiphoneme /i-j/ (i.e. /i-j/) in terms of relevant features. It is also not known to me how Builles might analyze them with regard to a different consonant phoneme system in which /ɲ/ is found (see Fig. 9 in § 13.1).

Be that as it may, Builles's analysis also seems to point to the difficulty of characterizing an archiphoneme if the member phonemes of a neutralizable opposition straddle across the vowel phoneme system and the consonant phoneme system.

## **16. THE DEFINITION OF ALL 19 CONSONANT PHONEMES OF FRENCH**

**16.1.** This concludes my attempt, through the commutation test, to identify the relevant features of all French consonant phonemes and thereby simultaneously establish the French consonant phoneme systems one of which includes /ɲ/ and the other which does not. One of the two consonant phoneme systems has 19 consonant phonemes (Fig. 9 in § 13.1) while the other consonant phoneme system has 18, i.e. excluding /ɲ/ (Fig. 10 in § 14.2).

**16.2.** The question of the neutralization of /i/ vs. /j/ and the associated archiphoneme /i-j/ was discussed, with the result that no positive and conclusive analysis was found.

**16.3.** My task of eliciting and identifying the distinctive consonantal units of the second articulation of French in terms of relevant features is not yet at an end. My next task which follows is, again through the commutation test, to discover and discuss instances of neutralization of oppositions between consonant phonemes of French and to elicit and identify the associated consonant archiphonemes which are also the distinctive consonantal units of the second articulation.

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<sup>80</sup> I believe that /ier/ and /bier/ should correctly be /i̠ e-ε r/ and /b̠i̠ e-ε r/ where /e-ε/ is the archiphoneme ("front mid unrounded") associated with the neutralization of /e/ vs. /ɛ/ in a closed syllable ending with /r/.

**16.4.** The well-known definition by Martinet of the second articulation (F. deuxième articulation) has it that, for instance, as Martinet (1960<sup>1</sup>: I-9) says:

... une face signifiante qui la manifeste sous forme phonique et qui est composée d'unités de deuxième articulation. Ces dernières sont nommées des **phonèmes** [Martinet's boldface].

To me mind, the minimal units of the second articulation are phonemes and archiphonemes. I would say that archiphonemes are not excluded. If a phonological analysis of a language proves that the language has archiphonemes as well as phonemes in its phonematic system, the archiphonemes deserve *droit de cité* as the minimum units of the second articulation along with the phonemes. Phonemes and archiphonemes are minimum distinctive units which occur successively. Archiphonemes are neither hyperphonemic nor hypophonemic.

## 17. DISCUSSING CS 5, CS 6, CS7 AND CS 8

**17.1.** It may be remembered that I presented CS 1, CS 2, CS 3 and CS 4 towards the beginning of this paper (§ 2.2). I will now set up 4 further commutative series below, i.e. CS 5, CS 6, CS 7 and CS 8 (see Table 4). These 4 additional commutative series differ somewhat from CS 1 to CS 4 in that I do not intend to establish more phonemes (i.e. the 18 or 19 I have already established on the basis of CS 1 to CS 4) but to establish instead the archiphonemes which are the distinctive units of the second articulation just as are the phonemes. The phonetic contexts with which CS 5 to CS 8 are associated differ from those with which CS 1 to CS 4 are associated. The consonantal segments shown in the leftmost column ([p]<sub>n</sub>, [b]<sub>n</sub>, [f]<sub>n</sub>, [v]<sub>n</sub> ...) in CS 5 to CS 8 occur after specific consonantal segments, i.e. 'after [s]' (in CS 5), 'after [p]' (in CS 6), 'after [f]' (in CS 7) and 'after [k]' (in CS 8), word-initially, word-medially or word-finally, as the case may be. Thus, for example, in CS 5, [# s -] refers to the occurrence of e.g. [p] after word-initial [s]. [- s -] refers to the occurrence of e.g. [p] word-medially after [s], and [- s - #] refers to the occurrence of e.g. [p] word-finally after [s].



*Commutation test in action:  
Establishing the French consonantal phonematic system*

		CS 5			CS 6		
		[# s -]	[- s -]	[- s - #]	[# p -]	[- p -]	[- p - #]
[p] <sub>n</sub>	<i>spire</i>	<i>transpirer</i>	<i>aspe</i>	—	—	—	
[b] <sub>n</sub>	( <i>sbire</i> )	<i>asbeste</i>	—	—	—	—	
[f] <sub>n</sub>	<i>sphère</i>	<i>asphalte</i>	—	<i>pfennig</i>	—	—	
[v] <sub>n</sub>	( <i>svelte</i> )	—	—	—	—	—	
[t] <sub>n</sub>	<i>stable</i>	<i>castine</i>	<i>piste</i>	<i>ptose</i>	<i>adapter</i>	<i>crypte</i>	
[d]	—	—	—	—	—	—	
[s] <sub>n</sub>	—	—	—	<i>psoque</i>	<i>absent</i>	<i>laps</i>	
[z]	—	—	—	—	—	—	
[ʃ]	—	—	—	—	—	—	
[ʒ]	—	—	—	—	—	—	
[k] <sub>n</sub>	<i>scare</i>	<i>mesquin</i>	<i>casque</i>	—	—	—	
[g] <sub>n</sub>	( <i>sgraffite</i> )	—	—	—	—	—	
[m] <sub>n</sub>	<i>smash</i>	<i>asthmatique</i> <sup>81</sup>	<i>asthme</i> <sup>82</sup>	—	—	—	
[n] <sub>n</sub>	<i>snob</i>	—	—	<i>pneu</i>	—	—	
[ɲ]	—	—	—	—	—	—	
[j]	—	—	—	—	—	—	
[l] <sub>n</sub>	<i>slave</i>	<i>islamiser</i>	—	<i>plus</i>	<i>ampli</i>	<i>souple</i>	
[r] <sub>n</sub>	—	—	—	<i>prêt</i>	<i>après</i>	<i>âpre</i>	
		CS 7			CS 8		
		[# f -]	[- f -]	[- f - #]	[# k - #]	[- k -]	[- k - #]
[p] <sub>n</sub>	—	—	—	—	—	<i>picpouille</i>	—
[b] <sub>n</sub>	—	—	—	—	—	<i>paquebot</i>	—
[f] <sub>n</sub>	—	—	—	—	—	<i>Roquefort</i>	—
[v] <sub>n</sub>	—	—	—	—	—	<i>Riquewihr</i>	—
[t] <sub>n</sub>	<i>phtisie</i>	<i>naphtaline</i>	<i>aphte</i>	<i>cténaire</i>	<i>ictère</i>	<i>acte</i>	
[d]	—	—	—	—	—	—	
[s] <sub>n</sub>	—	—	—	<i>ksar</i> <sup>83</sup>	<i>action</i> <sup>84</sup>	<i>axe</i>	
[z]	—	—	—	—	—	—	
[ʃ]	—	—	—	—	—	—	
[ʒ]	—	—	—	—	—	—	
[k]	—	—	—	—	—	—	
[g]	—	—	—	—	—	—	
[l] <sub>n</sub>	<i>flot</i>	<i>affliger</i>	<i>rafle</i>	<i>clef</i>	<i>racler</i>	<i>oncle</i>	
[r] <sub>n</sub>	<i>franc</i>	<i>affront</i>	<i>affres</i>	<i>crêt</i>	<i>micro</i>	<i>sacre</i>	
[m] <sub>n</sub>	—	—	—	<i>kmer</i>	<i>acmé</i>	—	
[n] <sub>n</sub>	<i>Fnac</i>	—	—	<i>cnémide</i>	<i>acné</i>	—	
[ɲ]	—	—	—	—	—	—	
[j]	—	—	—	—	—	—	

Table 4

It would be desirable to consider separately *sbire*, *svelte* and *sgraffite* provisionally listed within parentheses in CS 5 from the other linguistic forms in CS 5 due to their specific phonetic manifestations. See further below (§§ 17.12 - 17.17) for my discussion about *sbire*, *svelte* and *sgraffite*.

**17.2.** It is evident that conspicuously fewer consonantal segments occur in all of CS 5, CS 6, CS 7 and CS 8 and that consequently there is a notable reduction in the number of differentiations between the consonantal segments. This situation represents a sharp difference between CS 1 to CS 4 on the one hand and CS 5 to CS 8 on the other. In comparison with the 19 consonantal segments found in the phonetic context [ʃ ka – ʃ] with which CS 4 is associated and in which we found the maximum differentiation (resulting from the maximum number of multiplets available), there occur only 7 in [ʃ s –] in CS 5, viz. [p], [f], [t], [k], [l], [m] and [n]. (I have intentionally not counted [b] (*sbire*), [v] (*svelte*) and [g] (*sgraffite*).) Of these, [l] (*slave*) in CS 5 is considered as a realization of /l/ “lateral” as are also [l]<sub>n</sub> (in CS 1 to CS 4), and *mutatis mutandis*, [m] (*smash*) in CS 5 as a realization of /m/ “bilabial nasal” and [n] (*snob*) in CS 5 as a realization of /n/ “apical nasal”.

**17.3.** How about [p]<sub>n</sub>, [f]<sub>n</sub>, [t]<sub>n</sub> and [k]<sub>n</sub> in CS 5? After word-initial [s], there occurs [p] (*spire*) but not [b], [f] (*sphère*) but not [v], [t] (*stable*) but not [d], and [k] (*scare*) but not [g]. We have seen earlier that in all of CS 1, CS 2, CS 3 and CS 4, both /p]<sub>n</sub>/ and /b]<sub>n</sub>/, both /f]<sub>n</sub>/ and /v]<sub>n</sub>/, both /t]<sub>n</sub>/ and /d]<sub>n</sub>/, and both /k]<sub>n</sub>/ and /g]<sub>n</sub>/ occur and the two pre-phonemes of the respective pairs are differentiated from each other. We have also seen that these consonantal segments are interpreted to be realizations of the phoneme /p/ “voiceless bilabial non-nasal”, /b/ “voiced bilabial non-nasal”, /f/ “voiceless labiodental”, /v/ “voiced labiodental”, /t/ “voiceless apical non-nasal”, /d/ “voiced apical non-nasal”, /k/ “voiceless dorsal non-nasal” and /g/ “voiced dorsal non-nasal”, respectively. We have /p/ vs. /b/, /f/ vs. /v/, /t/ vs. /d/, and /k/ vs. /g/ in CS 1 to CS 4. We now see that, in CS 5, the differentiation between /p]<sub>n</sub>/ and /b]<sub>n</sub>/, between /f]<sub>n</sub>/ and /v]<sub>n</sub>/, between /t]<sub>n</sub>/ and /d]<sub>n</sub>/, and between /k]<sub>n</sub>/ and /g]<sub>n</sub>/ is inconceivable as one member of each pair of these consonantal segments is non-occurrent. I will explain what happens to the phonological oppositions in CS 5, CS 6, CS 7 and CS 8, but for convenience sake, by taking only CS 5 as an example. What we observe phonetically in CS 5 is as follows.

<sup>81</sup> The sequence of letters *th* in *asthmatique* and *asthme* corresponds to zero sound, i.e. it is silent.

<sup>82</sup> I have avoided citing e.g. *prisme* since it is pronounced with [ism] or [izm].

<sup>83</sup> This word (a Berber word; first occurrence in French 1857) which means ‘fortified place in North Africa’ is entered in Martinet & Walter (1973: 514). Another French word, *xénon* (a chemical element, atomic number 54, Symbol Xe) could be cited here instead, though *xénon* is never spelled *ksénon* in French.

<sup>84</sup> In this word, the letter *c* corresponds to [k] and the letter *t* to [s]. This word is never spelled *acsion* in French. Alternatively, e.g. the French word *taxi* could be cited, though *taxi* is never spelled *taksi* in French.

[sp] occurs word-initially (*spire*), word-medially (*transpirer*) and word-finally (*aspe*);  
[sf] occurs word-initially (*sphère*) and word-medially (e.g. *asphalte*);<sup>85</sup>  
[st] occurs word-initially (*stable*), word-medially (e.g. *castine*) and word-finally (e.g. *piste*);  
[sk] occurs word-initially (*scare*), word-medially (*mesquin*) and word-finally (*casque*).

**17.4.** We must understand that [p] (in *spire*), [f] (in *sphère*), [t] (in *stable*) and [k] (in *scare*) in CS 5 are *not to be identified with* /p]<sub>n</sub>/, /f]<sub>n</sub>/, /t]<sub>n</sub>/ and /k]<sub>n</sub>/, respectively, found in CS 1, CS 2, CS 3 and CS 4, since, in CS 5, [p]<sub>n</sub> is *not* differentiated from [b], [f] from [v], [t] from [d], and [k] from [g]. This means that [p], [f], [t] and [k] in CS 5 are realizations of distinctive consonantal units (not phonemes; see below) in which the opposition between the relevant features “voiceless” (in /p f t k/) and “voiced” (in /b v d g/) is cancelled. Thus, after word-initial /s/, only valid are the common bases of the phonological contents of /p/ and /b/, /f/ and /v/, /t/ and /d/, and /k/ and /g/, that is, the archiphonemes /p-b/ “bilabial non-nasal”, /f-v/ “labiodental”, /t-d/ “apical non-nasal”, and /k-g/ “dorsal non-nasal”, respectively. By ‘distinctive consonantal units’ here I meant these archiphonemes. In other words, /p/ vs. /b/, /f/ vs. /v/, /t/ vs. /d/, and /k/ vs. /g/, are neutralized ‘after word-initial /s/’. Here below is the summary of my partial analyses, so far, of CS 5 to CS 8.

**17.5.** In CS 5 which is associated with the phonetic contexts [# s –], [– s –] and [– s – #], there occur ‘after word-initial /s/’ the neutralization of /p/ vs. /b/ (*spire*), that of /f/ vs. /v/ (*sphère*), that of /t/ vs. /d/ (*stable*), and that of /k/ vs. /g/ (*scare*); there occur ‘after word-medial /s/’ the neutralization of /f/ vs. /v/ (*asphalte*), that of /t/ vs. /d/ (*castine*) and that of /k/ vs. /g/ (*mesquin*); and there occur ‘word-finally after /s/’ the neutralization of /p/ vs. /b/ (*aspe*), that of /t/ vs. /d/ (*piste*) and that of /k/ vs. /g/ (*casque*). The archiphonemes /p-b/ “bilabial non-nasal”, /f-v/ “labiodental”, /t-d/ “apical non-nasal” and /k-g/ “dorsal non-nasal” occur in these contexts. Note that there occurs *no* neutralization of /p/ vs. /b/ after /s/ word-medially ([– s –]) in CS 5, on the evidence of *transpirer* [träspire] vs. *asbeste* [asbest].

**17.6.** In CS 6 which is associated with the phonetic contexts [# p –], [– p –] and [– p – #], there occur ‘after word-initial /p/’ the neutralization of /f/ vs. /v/ (*pfennig*), that of /t/ vs. /d/ (*ptose*), and that of /s/ vs. /z/ (*psoque*). The archiphonemes /f-v/ “labiodental”, /t-d/ “apical non-nasal” and /s-z/ “hiss” occur in these contexts.

**17.7.** In CS 7 which is associated with the phonetic contexts [# f –], [– f –] and [– f – #], there occur the neutralization of /t/ vs. /d/ ‘after word-initial /f/’ (*phtisie*), ‘after word-medial /f/’ (*naphthaline*), and ‘word-finally after /f/’ (*aphte*). The archiphoneme /t-d/ “apical non-nasal” occurs in these contexts.

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<sup>85</sup> I have been unable to find an example in which [sf] occurs word-finally.

**17.8.** In CS 8 which is associated with the phonetic contexts [# k – #], [– k –] and [– k – #], there occurs the neutralization of /t/ vs. /d/ ‘after word-initial /k/’ (*cténaire*), ‘after word-medial /k/’ (*ictère*) and ‘after word-prefinal /k/’ (*acte*). The archiphoneme /t-d/ ‘apical non-nasal’ occurs in these contexts. /p/ vs. /b/ and /f/ vs. /v/ are only valid word-medially in [– k –] while /p/, /b/, /f/ and /v/ are systematically absent in [# k – #] and [– k – #]. There also occurs the neutralization of /s/ vs. /z/ ‘after word-initial /k/’ (*ksar*), ‘word-medial /k/’ (*action*) and ‘after word-prefinal /k/’ (*axe*). The archiphoneme /s-z/ ‘hiss’ occurs in these contexts. The opposition /s/ vs. /z/, as we have seen, is valid in the various contexts shown in CS 1, CS 2, CS 3 and CS4. In all the contexts shown in CS 5 and CS 7, /s/ and /z/ are systematically absent.

**17.9.** Here is a summary of the archiphonemes associated with the above-mentioned different neutralizations in connection with CS 5 to CS 8: /p-b/ ‘bilabial non-nasal’ which is realized by [p], /f-v/ ‘labiodental’ which is realized by [f]; /t-d/ ‘apical non-nasal’ which is realized by [t]; /k-g/ ‘dorsal non-nasal’ which is realized by [k]; and /s-z/ ‘hiss’ which is realized by [s].<sup>86</sup>

**17.10.** In the word *kvas* (*kwas*) which I cited in CS 8, /f/ vs. /v/ is neutralized after word-initial /k/. The realizations of the archiphoneme /f-v/ ‘labiodental’ are not regular or straightforward, as they can be [v] or [f], both being labiodental. Even [w] which is a ‘voiced labial-velar frictionless continuant’ is observed.<sup>87</sup> [gv] is also observed; [gv] may be thought to occur by regressive assimilation of voice ([kv] < [kf]).

**17.11.** There are some words which defy straightforward analytical statements with regard to the neutralization of /p/ vs. /b/, /t/ vs. /d/, or /k/ vs. /g/. The difficulty concerns e.g. *sbire*, *svelte* and *sgraffite*. French speakers as a whole pronounce words spelt *sb-*, *sv-* and *sg-*<sup>88</sup> in two different ways. For example, *sbire* is pronounced with [sb] by some and [zb] by others<sup>89</sup>; *svelte* is pronounced with [sv] by some and [zv] by others<sup>90</sup>; and *sgraffite* is pronounced with [sg] by some and [zg] by others.<sup>91</sup>

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<sup>86</sup> At least in principle, I prefer to notate an archiphoneme e.g. /p-b/, by indicating the symbols for the phonemes of the neutralizable opposition /p/ vs. /b/. I am aware that the predominant majority of writers would notate this archiphoneme by /P/. My customary practice has drawn a brief comment from Heselwood (2013: 158). He describes the symbolization by me as (one type of) ‘multiple symbols’ and as ‘indirect symbolization’.

<sup>87</sup> The sound [w] here has nothing to do with neutralization as it is not ‘labiodental’. [w] is a realization of the vowel /u/ in French. [w] may well be just a spelling pronunciation of *kwas*.

<sup>88</sup> See Martinet & Walter (1973: 790, 841, 805).

<sup>89</sup> *Le Petit Robert* shows [sb] but not [zb].

<sup>90</sup> *Le Petit Robert* shows [sv] but not [zv].

<sup>91</sup> *Le Petit Robert* shows [sg] but not [zg].

**17.12.** For those French people who pronounce *sbire* with [sb]<sup>92</sup>, [b] is a realization of /b/ since [sp] occurs in *spire* where [p] is a realization of /p/.<sup>93</sup> Therefore it can be said that no neutralization occurs of /p/ vs. /b/ after word-initial /s/ for this particular word.<sup>94</sup> For all French speakers, /p/ vs. /b/ is neutralized after word-initial /s/ for all those words that are spelt *sp-* (*spl-*, *spr-* as well).

**17.13.** For those French speakers who pronounce *sbire* with [zb] ([zp] is non-occurrent), /p/ vs. /b/ is neutralized after word-initial /z/, and the archiphoneme /p-b/ “bilabial non-nasal” is realized by [b].

**17.14.** Likewise, *mutatis mutandis*, for those French speakers who pronounce *svelte* with [sv] ([sf] being non-occurrent so far as this word<sup>95</sup> is concerned), /f/ vs. /v/ is neutralized after word-initial /s/, and the archiphoneme /f-v/ “labiodental” is realized by [v]. For those French speakers who pronounce *svelt* with [sf] ([sv] being non-occurrent for this word), /f/ vs. /v/ is also neutralized in the same context. I should add that [sf] occurs in the speech of all speakers for words like *sphère*, *sphinx*, *sfumato*, etc. which are never pronounced with [sv]. In such words, too, /f/ vs. /v/ is neutralized and the archiphoneme /f-v/ “labiodental” is always realized by [f].

**17.15.** When *sgraffite* is pronounced with [sg] by some French speakers, /k/ vs. /g/ is neutralized after word-initial /s/ ([sk] being non-occurrent for this particular word) and the archiphoneme /k-g/ “dorsal non-nasal” is realized by [g]. For yet other speakers who pronounce *sgraffite* with [zg] ([sg] being non-occurrent for this particular word), /k/ vs. /g/ is neutralized after word-initial /z/.

**17.16.** In our analysis of *sbire*, *svelte* and *sgraffite*, it is important to envisage that, in word-initial position, /p/ vs. /b/, /f/ vs. /v/, and /k/ vs. /g/ are valid, since *pan* vs. *ban*, *faon* vs. *van*, and *Caen* vs. *gant* are attested, but that, when preceded word-initially by [s] /s/ (hence [sb], [sv], [sg]) or [z] /z/ (hence [zb], [zv] and [zg]), the neutralization occurs of /p/ vs. /b/, /f/ vs. /v/, and /k/ vs. /g/ after word-initial /s/ or /z/.

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<sup>92</sup> See Martinet & Walter (1973: 43): ‘Assimilation de sonorité peu marquée.’ This is fact a reference to Martinet’s own pronunciation as an informant.

<sup>93</sup> There is no reason why we absolutely need to cite *spire* and *sbire*, which happen to constitute a minimal pair if one just wants to observe the validity of /p/ vs. /b/ after word-initial /s/. Any of many other words such as *spath*, *spécial*, *spicule*, *spondé*, etc. whose pronunciation starts with [sp] will do, not necessarily *spire*.

<sup>94</sup> This is the only word with *sb-* which is pronounced with [sb] or [zb]. *Le Petit Robert* shows only [sbir].

<sup>95</sup> And also for *sveltesse* and *svastika* (*swastika*).

**17.17.** We have seen above phonetic and phonological phenomena of some complexity exemplified by *sbire*, *svelte* and *sgraffite*. These words are obviously loanwords, all from Italian, as easily shown by their orthography. Their etymology is *sbire* < It *sbirro*, *svelte* < It *svelto*, *sgraffite* < It *sgraffito*.<sup>96</sup> French words whose spelling starts with *sp-* corresponds to [sp], never [zɸ]. Likewise, *mutatis mutandis*, *st-* corresponds to [st], never [zd], *sph-* or *sf-* to [sf], never [zv], and *sk-* to [sk], never [zg]. Such being the case, it seems reasonable not to treat cases like *sbire*, *svelte* and *sgraffite* with the rest as they are amenable to a separate phonological system.

**17.18.** It may be wondered if any oppositions between “nasal” (consonant) phonemes in French undergo neutralizations. *A priori* there can be no instances of such neutralizations, since, in non-meridional French, there only occur sequences of a nasalized vocalic segment followed by a non-nasal segment like [õd] *onde* not [ond], or [ãt] *ante* not [ant], where a nasal segment ([n] in these examples) does not occur before a non-nasal segment ([d] or [t]). This is obviously very different from, say, English where the sequence [nt] occurs as in *ant* or the sequence [nd] as in *and* occurs. That said, I wish to mention a few marginal ‘counterexamples’ like *week-end* (predominantly with [-end] besides [-en] which Martinet (1977: 81) approvingly acknowledges), *shake-hand* (with [-and] and [-end] besides [-ãd] and *lunch* (with [-œntʃ] besides [-œntʃ]). One may also wonder about *stent* (in medical context) and *stunt* (‘cascade’). Obviously all such cases are English loanwords in French.

**17.19.** We do find cases like *caneton* [-nt-] and might at first wonder if [n] occurring before [t] is a realization of an archiphoneme definable as “nasal” which is the common base of /m/ “bilabial nasal”, /n/ “apical nasal”, /ŋ/ “dorsal nasal” and /ɲ/ “palatal nasal” (in the consonant phoneme system that includes /ɲ/) but of /m/, /n/ and /ŋ/ in the other consonant phoneme system which does not include /ɲ/. However, this view is rejected as we also find *Washington* [-ŋt-]<sup>97</sup>, *cimetière* [-mt-], though I have been unable to find a case for [-ɲt-]. On the other hand, we find *gagne-pain* for [-ɲp-] which, however, is a compound (see § 17.20). On the basis of the above-mentioned cases, we can say that the opposition /m/ vs. /n/ vs. /ŋ/ vs. /ɲ/, or /m/ vs. /n/ vs. /ŋ/, as the cases may be, is valid before /t/. To be completely adequate, we need to search for instances which do show that this opposition is valid before other consonant phonemes than /t/ as well – I have also found *ramequin* [-mk-], *ramdam* [-md-] and *peigne-cul* [-ɲk-]<sup>98</sup> – but this is considered to be hardly necessary.

**17.20.** If compounds can be freely taken into consideration, more examples are expected to be available. Here are just a small number of cases for [-ŋ-] which is followed by various consonantal segments. A substantial number of examples would be available for [-m-], [-n-],

<sup>96</sup> *Le Petit Robert* shows only [sbir].

<sup>97</sup> Martinet & Walter (1973: 921) enter *washingtonia* but not *Washington*.

<sup>98</sup> This word as well as *gagne-pain* happen to be examples of a compound. See just below.

[-ŋ-] and [-ɲ-], if the search along this line were further pursued. Note that all examples such as the following are loanwords from English and the first part of the compounds are English words ending with *-ing* [ɪŋ] some of which have been imported into French while other have not.

[-ŋp-] *melting-pot, ping-pong, sparing-partner*  
[-ŋb-] *punching-ball*  
[-ŋʃ-] *passing-shot*  
[-ŋ(t)ʃ-] *rocking-chair*  
[-ŋg-] *camping-gas, chewing-gum*  
[-ŋr-] *dressing-room, living-room*

**17.21.** There are no instances of neutralization between “nasal” consonant phonemes in (non-meridional) French.<sup>99</sup> If one or more of the “nasal” phonemes is/are non-occurrent before a consonant phoneme, it/they is/are judged to be systematically absent in that context.

**17.22.** Here is the list of all 6 archiphonemes I have established in this paper together with the relevant feature(s) that define each of them.

/i-j/: “palatal” (??)  
/p-b/: “bilabial non-nasal”  
/f-v/: “labiodental”  
/t-d/: “apical non-nasal”  
/k-g/: “dorsal non-nasal”  
/s-z/: “hiss”

All the archiphonemes listed are valid not only for the consonant phoneme system which includes /ɲ/ but also for that which does not. The presence or absence of /ɲ/ has had no repercussions on the analysis whereby we have established the archiphonemes.

## **18. THE NUMBER OF THE CONSONANTAL PHONEMATIC UNITS ESTABLISHED IS 25 OR 24**

**18.1.** We have thus established the total of 25 consonantal phonematic units (i.e. 19 phonemes and 6 archiphonemes) in the consonant phoneme system which includes /ɲ/ (see Fig. 9 in § 13.1), and the total of 24 consonantal phonematic units (i.e. 18 phonemes and 6 archiphonemes) in the consonant phoneme system which does not (see Fig. 10 in § 14.2.), respectively.

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<sup>99</sup> A few English (or pseudo-English) loanwords in French may be noted. I have cited in § 17.18 e.g. *lunch, shake-hand, stent, stunt* and *week-end*. One is tempted to think that there occurs the neutralization of /m/ vs. /n/ vs. /ŋ/ (vs. /ɲ/) for the nonce in the pronunciation of such English (loan)words ending with [t(j)], [t] or [d] in non-meridional French.

**18.2.** There is every justification for me to have identified and presented both the phonemes and the archiphonemes (they are both phonematic units) of the French consonant phoneme systems. I quote here what Martinet (1960<sup>1</sup>: III-22) says about the commutation test.

L'ensemble des opérations présentées jusqu'ici permet en principe de dégager les phonèmes et les archiphonèmes d'une langue et, en même temps, de classer chacun d'eux selon les rapports qu'il entretient avec les autres phonèmes et archiphonèmes du système. Tout repose donc sur l'opération dite **commutation** ... [Martinet's boldface]

**18.3.** It will have been amply seen that throughout the successive stages of the commutation test, the concept of 'opposition' is strictly borne in mind. Major recourse to the concepts of 'series', 'order' and 'correlation' (including 'bundle of correlations') will have been seen to be evident. I believe that operating with these concepts throughout the commutation test will methodically, progressively, and expediently, determine the relevant features of each of the French consonantal phonematic units, which are the phonemes and the archiphonemes.

## **19. CRITIQUE OF ROTHE'S ANALYSIS (STRICTLY IN TERMS OF MINIMAL PAIRS)**

**19.1.** The readers will have seen that the commutation test which I have performed in this paper and which I advocate as the only theoretically justified analytical procedure whereby to establish the phonematic units of a language (French consonant phonemes in this paper) bears no resemblance whatsoever to an analytical procedure which operates entirely with *minimal pairs*, as can be seen in Rothe's (1978<sup>2</sup>: 72ff) analysis. We will have a look at his analytical operation if only for comparison's sake.

**19.2.** Rothe sets out the general principles of his analysis in the following words.

Folgende Minimalpaare lassen sich zur Ermittlung der phonematischen Relevanz der Konsonanten im Französischen zusammenstellen. (*op. cit.* 72)

**19.3.** Rothe (*op. cit.* 73) first presents 6 groups of minimal pairs, 24 of which occur in word-initial position; 17 phonemes are involved to form these 24 minimal pairs. Rothe (*op. cit.* 74) next presents another 6 groups of 27 minimal pairs, 21 of which occur in word-medial position and 6 of which occur in word-final position; 11 phonemes are involved to form these 27 minimal pairs. The total number of minimal pairs Rothe presents would be 51 (= 24 + 27) (but see § 19.6). The manner in which Rothe presents the minimum pairs occurring in word-medial position and those occurring in word-final position is such that they are jumbled together in 4 of the 6 groups of minimal pairs; this presentation gives an impression of disorderliness. He provides linguistic items orthographically (e.g. *poule* vs. *boule* for /pul/ : /bul/) for each minimal pair, but I omit these linguistic items in orthographic form in copying his



minimal pairs. I will only copy, horizontally for convenience sake instead of vertically as presented by Rothe himself, the first 6 groups of minimal pairs which pertain to word-initial position.

**19.4.** Here is Rothe's list of minimal pairs pertaining to word-initial position.

/p/ : /b/	/pul/ : /bul/	/p/ : /t/	/pø/ : /tø/	/t/ : /d/	/trwa/ : /drwa/
/f/ : /v/	/fê/ : /vê/	/b/ : /d/	/bu/ : /du/	/s/ : /z/	/sɛl/ : /zɛl/
/b/ : /v/	/by/ : /vy/	/f/ : /s/	/fo/ : /so/	/d/ : /z/	/deby/ : /zeby/
/p/ : /f/	/pœt/ : /fœt/	/v/ : /z/	/vo/ : /zo/	/t/ : /s/	/tê/ : /sê/
/b/ : /m/	/bil/ : /mil/	/m/ : /n/	/mê / : /nê/	/d/ : /n/	/dat/ : /nat/
				/d/ : /l/	/djø/ : /ljø/
/ʃ/ : /ʒ/	/ʃu/ : /ʒu/	/t/ : /k/	/taje/ : /kaje/	/k/ : /g/	/kri/ : /gri/
/s/ : /ʃ/	/sās/ : /ʃās/	/d/ : /g/	/de/ : /ge/	/g/ : /ʁ/	/gu/ : /ʁu/
/z/ : /ʒ/	/zɛst/ : /ʒɛst/				
/ʒ/ : /j/	/ʒɛt/ : /jɛt/				

Table 5

It will have been immediately noticed that Rothe does not reckon with /p/ : /m/ and /t/ : /n/ at all, though he does with /b/ : /m/ and /d/ : /n/. Is he a victim of 'phoneticism' here? Besides, he does not reckon with either /k/ : /ŋ/ or /g/ : /ŋ/ in his list of minimal oppositions, possibly because of his ambivalence about the status of /ŋ/ in the French consonant phoneme system (Rothe 1978<sup>2</sup>: 75).<sup>100</sup> Ultimately, Rothe does not include /ŋ/ in the French consonant phoneme system. On the other hand, Rothe lists /ɲ/ and presents /ɲ/ vs. /n/ (but neither /ɲ/ vs. /m/ nor /ɲ/ vs. /ŋ/), citing /bœɲ/ *borgne* vs. /bœn/ *borne*, i.e. in word-final position. In what follows I disregard his failure on these points and continue with the list of the minimal pairs he himself presents.

**19.5.** By presenting minimal pairs, Rothe is actually working on what I call 'minimal oppositions', i.e. simple oppositions whose two member phonemes are in opposition to each other through the opposition between two relevant features, one of which belongs to one member phoneme and the other belongs to the other member phoneme.

**19.6.** Three minimal oppositions need to be specifically mentioned. /ɲ/ : /n/ is listed in respect of 'final position' only, while /z/ : /ʒ/ and /j/ : /ʁ/ are listed in respect of 'medial position' only. All this means that actually a total of 27 *different minimal oppositions* are listed by Rothe, not 51. Note specifically that /ɲ/ figures in respect of 'final position' only and that /ŋ/ does not figure at all in the whole list, though Rothe discusses at some length the case of /ŋ/ in French (*op. cit.*: 75) after giving the list, citing e.g. /dāsɲ/, /kāpiɲ/, /ʃœpiɲ/, etc. What

<sup>100</sup> Rothe's ambivalence echoes Malmberg's (1972<sup>2</sup>: 106) to which Rothe refers. I myself have already referred to this source *supra* in § 10.4.

Rothe presents by the notation /j/ is listed as pertaining to ‘medial position’ only. This means that what he presents as /j/ is actually a vowel phoneme which is realized by [j] in ‘medial position’. More significantly, he does not take into account what I notate by [j] (voiced palatal fricative) occurring in syllable-final position. This means in turn that the question of the opposition syllable-finally between /i/ and /j/ and the neutralization of this opposition elsewhere does not concern him. Indeed, where he does explain the phenomenon of neutralization (*op. cit.* 34-35), the examples of neutralization he cites are all from German consonant phoneme system, and no reference is made to the neutralization of /i/ and /j/ in French.

**19.7.** In Rothe’s analysis, no attempt is made to present minimal oppositions occurring in an identical context. The first group of 5 minimal oppositions, already partially copied above, looks like this (*op. cit.* 73).

/p/ : /b/	/pul/ : /bul/	<i>poule vs. boule</i>
/f/ : /v/	/fẽ/ : /vẽ/	<i>fin vs. vin</i>
/b/ : /v/	/by/ : /vy/	<i>bu vs. vu</i>
/p/ : /f/	/pɔr/ : /fɔr/	<i>port vs. fort</i>
/b/ : /m/	/bil/ : /mil/	<i>bile vs. mille</i>

Table 6

As can be easily seen, no single given identical context is chosen for all of the 5 minimal oppositions. Five different contexts are chosen for the 5 minimal oppositions considered. However, if an identical context is chosen, say, /- ul/, all 5 minimal oppositions would be presented as /pul/ : /bul/, /ful/ : /vul/, /bul/ : /vul/, /pul/ : /ful/, and /bul/ : /mul/. Alternatively, another identical context can be chosen, say, /- ẽ/, so that the 5 minimal oppositions would be presented as /pẽ/ : /bẽ/, /fẽ/ : /vẽ/, /bẽ/ : /vẽ/, /pẽ/ : /fẽ/, and /bẽ/ : /mẽ/. If this procedure were adopted, one would have 5 minimal oppositions which could constitute a commutative series consisting in a single minimal multiple opposition /p/ : /b/ : /f/ : /v/ : /m/, which Rothe does not choose to operate with.

**19.8.** It is easy to see that the two member phonemes of each minimal opposition are opposed to each other through an opposition between two relevant features. Witness /p/ : /b/ and /f/ : /v/ (“voiceless” vs. “voiced”), /b/ : /m/ (“non-nasal” vs. “nasal”), /b/ : /v/ and /p/ : /f/ (“bilabial” vs. “labiodental”). These minimal oppositions are direct oppositions in that /p b/ and /b m/ are in the same ‘order’, i.e. the “bilabial” order, and /p f/ and /b v/ are in the same ‘series’, i.e. the “voiceless” series and the “voiced” series, respectively.

**19.9.** 5 minimal oppositions that Rothe presents are indirect oppositions. They are: /d/ : /l/, /z/ : /j/, /ʒ/ : /j/, /g/ : /ʁ/ and /j/ : /ʁ/.<sup>101</sup> Of these, 3 minimal oppositions, viz. /d/ : /l/, /ʒ/ : /j/ and /g/ : /ʁ/ appear doubly in Rothe's list of minimal oppositions. In other words, 3 minimal oppositions, viz. /d/ : /l/, /ʒ/ : /j/, /g/ : /ʁ/ are presented with regard to 'initial position'; /d/ : /l/, /z/ : /j/, /ʒ/ : /j/ and /j/ : /ʁ/ with regard to 'medial position'; and /g/ : /ʁ/ with regard to 'final position'. Consequently, as already said, we should count just 5 minimal oppositions, viz. /d/ : /l/, /z/ : /j/, /ʒ/ : /j/, /g/ : /ʁ/ and /j/ : /ʁ/. Rothe's presentation of the 5 indirect oppositions is unnecessarily complex and uneconomical.

**19.10.** What is important to observe is that these 5 minimal oppositions are not direct oppositions. As for /d/ : /l/, /l/ is a non-correlated phoneme while /d/ is at the intersection of the "apical" order and the "voiced" series. As to /z/ : /j/ and /ʒ/ : /j/, /j/ is a non-correlated phoneme while /z/ is at the intersection of the "voiced" series and the "hiss" order while /ʒ/ is at the intersection of the "voiced" series and the "hush" order. As regards /g/ : /ʁ/, which seems to me to be an unexpected minimal opposition, /g/ is found at the intersection of the "dorsal" order and the "voiced" series and consequently fully correlated while /ʁ/ is "uvular" and non-correlated.

**19.11.** I should also mention in connection with /j/ : /ʁ/ which is listed as pertaining to 'medial position' only, both /j/ and /ʁ/ are non-correlated phonemes. As to /z/ : /j/ which Rothe lists with regard to 'medial position' only, /z/ is at the intersection of the "hiss" order and the "voiced" series, while /j/ is non-correlated.

**19.12.** Rothe considers [ʁ] to be a 'velar-postdorsale Frikative' and be in opposition to [g] which is a 'velar-postdorsal Verschluss' (*op. cit.*: 73 fn 47). This is why he presents /g/ : /ʁ/ as a minimal opposition. His notation of this minimal opposition should correctly be /g/ : /ɣ/ in which [ɣ] (a realization of /ɣ/) stands for 'voiced dorso-velar fricative', which would justify /g/ : /ɣ/ to be a minimal opposition implying "plosive" vs. "fricative". However, since, in my view, [ʁ] is a 'voiced uvular' (whether it be a spirant, a fricative, a roll), /g/ : /ʁ/ is in reality not a direct opposition.

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<sup>101</sup> It must be said here once and for all that the symbol 'ʁ' for a voiced uvular fricative that I have been using in reference to Rothe's analysis is actually not the symbol employed by Rothe himself (and by not a few other writers). The symbol that Rothe employs, 'ʁ', is *not* the one recognized by the IPA (International Phonetic Association) and in its International Phonetic Alphabet. The symbol recognized by the IPA is 'ɣ' (see *Handbook of the International Phonetic Association*: ix). The symbol Rothe employs is obtained by swivelling 'ɣ' leftwards by 180 degrees. I will continue to use the IPA-approved symbol 'ɣ' in the following pages in discussing Rothe's analysis.

**19.13.** What interests us is what relevant features which Rothe may be able to identify on the basis of a total of 28 different minimal oppositions he works on. Judging from the table of French consonant phonemes he gives (*op. cit.*: 78) in which he indicates the (phonetic/phonological) features,<sup>102</sup> I take it that the following are the relevant features Rothe may identify.

/p/ : /b/	“voiceless” : “voiced”	/t/ : /s/	“denti-apical” : “alveolar-predorsal”
/p/ : /f/	“bilabial” : “labiodental”	/d/ : /n/	“non-nasal” : “nasal”
/f/ : /v/	“voiceless” : “voiced”	/d/ : /l/	“denti-apical” <sup>103</sup> : “lateral”
/b/ : /v/	“voiceless” : “voiced”	/ʃ/ : /ʒ/	“voiceless” : “voiced”
/p/ : /t/	“bilabial” : “denti-apical”	/s/ : /ʃ/	“alveolar-predorsal” : “prepalatal-apical”
/b/ : /m/	“non-nasal” : “nasal”	/z/ : /ʒ/	“alveolar-predorsal” : “prepalatal-apical”
/p/ : /t/	“bilabial” : “denti-apical”	/ʒ/ : /j/	“prepalatal-apical” : “palatal-mediodorsal”
/b/ : /d/	“bilabial” : “denti-apical”	/t/ : /k/	“denti-apical” : “velar-postdorsal”
/f/ : /s/	“labiodental” : “alveolar-predorsal”	/d/ : /g/	“denti-apical” : “velar-postdorsal”
/v/ : /z/	“labiodental” : “alveolar-predorsal”	/k/ : /g/	“voiceless” : “voiced”
/m/ : /n/	“bilabial” : “alveolar-apical”	/ɲ/ : /ɳ/	“palatal-predorsal” : “alveolar-apical”
/t/ : /d/	“voiceless” : “voiced”	/z/ : /j/	“alveolar-predorsal” : “palatal-mediodorsal”
/s/ : /z/	“voiceless” : “voiced”	/j/ : /ʁ/	“palatal-mediodorsal” : “velar-postdorsal” <sup>104</sup>
/d/ : /z/	“denti-apical” : “alveolar-predorsal”	/g/ : /ʁ/	“plosive” : “fricative” <sup>105</sup>

Table 7

**19.14.** The terms ‘denti-apical’, ‘alveolar-apical’, ‘alveolar-predorsal’, ‘prepalatal-apical’, ‘palatal-predorsal’, ‘palatal-mediodorsal’ and ‘velar-postdorsal’ are all Rothe’s. The correspondence between my terms (on the left) and Rothe’s (on the right) is as follows:

‘apical’	= ‘denti-apical’ + ‘alveolar-apical’
‘hiss’	= ‘alveolar-predorsal’
‘hush’	= ‘prepalatal-apical’
‘palatal’	= ‘palatal-predorsal’ + ‘palatal-mediodorsal’
‘velar’	= ‘velar-postdorsal’
‘uvular’	= ‘velar-postdorsal’

Table 8

Rothe regards /k/, /g/ and /ʁ/ as being ‘velar-postdorsal’. This is why he reckons with /g/ : /ʁ/ in terms of “plosive” : “fricative”. To be precise, the distinction between ‘Verschluss’ (V) and ‘Dauerlaut’ (D) corresponds to “plosive” : “fricative”.

<sup>102</sup> For a proper discussion of Rothe’s view of the French consonant phonemes, one needs to look closely at this table. However, this is not a place for me to go into such a discussion.

<sup>103</sup> According to the table of the consonant phonemes that Rothe provides (*op. cit.*: 78), /l/ is defined as “apical lateral”, whereas I regard /l/ as “lateral” which is non-correlated and is opposed to all the other consonant phonemes.

<sup>104</sup> Rothe considers [ʁ] as ‘voiced velar fricative’, not ‘voiced uvular fricative’.

<sup>105</sup> To Rothe both [g] and [ʁ] are of velar articulation, so the differentiation between [g] and [ʁ] consists in “plosive vs. “fricative”.

In agreement with large numbers of writers, Rothe regards /t/ and /d/ as being of dental articulation (rather than of apical articulation which comprises dental articulation and alveolar articulation). On the other hand, he describes /n/ as being of alveolar-apical articulation.

**19.15.** Rothe's designations of all the relevant features are in articulatory terms (which is theoretically acceptable) but it must be said that they are very unwieldy. Martinet and other functionalists' short and adequate designations are certainly preferable both theoretically and practically.

**19.16.** Some of the relevant features listed above are redundantly duplicated. The new list in which the duplication is removed is shown below. We can now compare the list of the relevant features shown in the left column with the list of the relevant features (which I have already indicated in Table 8 in § 19.15) shown in the right column. The relevant features listed on the right are those that I have vicariously identified for Rothe. Those listed on the left are the ones that I have earlier identified during the course of the commutation test.

“voiced”	“voiced”
“voiceless”	“voiceless”
“bilabial”	“bilabial”
“labiodental”	“labiodental”
“apical”	“denti-apical + “alveolar-apical”(= “apical”)
“hiss”	“alveolar-predorsal” (= “hiss”)
“hush”	“prepalatal-apical” (= “hush”)
“palatal”	“palatal-predorsal” + “palatal-mediodorsal”
“dorsal”	“velar-postdorsal” (= “dorsal”)
“nasal”	“nasal”
“non-nasal”	“non-nasal” (not recognized by Rothe)
“lateral”	“lateral”
(no equivalent)	“plosive” (or “Verschluss”)
(no equivalent)	“fricative” (or “Dauerlaut”)
“uvular”	(no correspondent)

Table 9

**19.17.** The seeming quasi-resemblance between the two groups of relevant features presented above should not hide the fact that those relevant features were obtained differently from each other. The relevant features listed in the group on the left were obtained during the course of the commutation test conducted with a view to identifying the phonological contents of all the consonant phonemes in terms of the relevant features. The idea of minimal oppositions (i.e. minimal (oppositional) pairs) is not chosen as *the* analytical device whereby to arrive at the phonological contents of the consonant phonemes. On the other hand, the relevant features listed in the group on the right were obtained while examining how two

phonemes (e.g. /p/ : /b/) – presumably *already established* – of minimal pairs (e.g. *poule* vs. *boule*) are distinguished from each other phonetically and thereby to examine further what two relevant features of the minimal opposition are (i.e. “voiceless” vs. “voiced”). This analysis does not aim to, and it indeed fails to, identify the phonological contents (in terms of relevant features) of all the consonant phonemes. Rothe assumes at the very start that all the consonant phonemes have somehow or other been already been established in terms of the respective phonemes.

**19.18.** Rothe’s analytical procedure whereby to allegedly establish the relevant features of the consonant phonemes seems to be seriously flawed. In his presentation of minimal pairs (*op. cit.* 73-75), the phonemes constituting minimal oppositions have *implicitly and previously been identified*. No attempt is made to identify the phonological contents of the phonemes constituting the respective minimal oppositions in spite of the fact that the title of the relevant section is ‘Die phonematische Relevanz der Konsonanten’. Rothe shows that, for instance, /p/ and /b/ are distinguished from each other through the opposition between “voiceless” (in /p/) and “voiced” (in /b/). Yet he says nothing about the rest of the relevant features of /p/ and /b/, i.e. “bilabial non-nasal” which /p/ and /b/ share but which remain unidentified and which Rothe assumes to have been somehow established prior to the moment he shows /p/ and /b/ in opposition to each other and ascribes “voiceless” to /p/ and “voiced” to /b/. This is ‘putting the cart before the horse’.

**19.19.** Rothe’s analytical procedure whereby to establish the relevant features of the consonant phonemes is based on ‘binary opposition’ which in turn is based on total binarism. He operates entirely with minimal pairs of phonemes. In an attempt to show the relevant features of e.g. /p/, he cites /p/ vs. /b/, /p/ vs. /f/, /p/ vs. /t/ (but he misses out /p/ vs. /m/, probably due to phoneticism on his part), which will identify “voiceless” and “bilabial”, but not “non-nasal”, for /p/. Incidentally, he does cite /b/ vs. /m/ and attributes “non-nasal” to /b/ and “nasal” to /m/ (this may again be due to phoneticism on his part). The concept of what I call ‘multiple opposition’ is extraneous to Rothe who operates exclusively with what I call ‘simple opposition’, hence ‘minimal pair’.

**19.20.** In Rothe’s list of minimal pairs (*op. cit.* 73-75) a number of minimal oppositions which one would expect to be therein are curiously missing. For example, /p/ vs. /m/, /t/ vs. /n/, /k/ vs. /ŋ/, /g/ vs. /ŋ/, and /j/ are missing altogether.

**19.21.** My critique of Rothe’s analysis leads me to make the following remarks. We have seen that Rothe attempts to identify the relevant features (those conceived by him) by working on oppositions between the phonemes which he has somehow or other previously established. I will bring back here the whole of Martinet’s remark I previously quoted in § 18.2.

*Commutation test in action:  
Establishing the French consonantal phonematic system*

L'ensemble des opérations présentées jusqu'ici permet en principe de dégager les phonèmes et les archiphonèmes d'une langue et, en même temps, de classer chacun d'eux selon les rapports qu'il entretient avec les autres phonèmes et archiphonèmes du système. Tout repose donc sur l'opération dite **commutation** ... [Martinet's boldface] Martinet 1960<sup>1</sup>: III-22)

I thoroughly agree with Martinet on that point. The functional units called phonemes are indeed identified and established through the commutation test.

However, I do not expect to be able to establish the phonemes of a language as the *first direct* results of the commutation test, which is then supposedly pursued to identify the relevant features of the phonemes. What I do expect to achieve while continuously conducting the commutation test is to both elicit the relevant features and concomitantly establish the phonemes which consist in mutually different sums of relevant features. It is this point of view of mine which seems to conflict with Martinet's view when he writes as follows:

... la question de savoir si l'on doit interrompre la commutation après avoir dégagé les phonèmes ... (Martinet (1965: 63)

and

... il nous faudra pousser la commutation assez loin pour pouvoir dégager non plus seulement les phonèmes, mais les traits pertinents eux-mêmes. (Martinet 1965: 67)

What is at stake might seem like a chicken-and-egg story, yet what happens during the course of the commutation test is the identification of both the chicken and the egg. The chicken and the egg are concomitantly involved. We acquire at the same time both the chicken/egg (relevant features) and the egg/chicken (phonemes) during the course of the commutation test. Since my present paper is entirely concerned with various aspects of the commutation test, this would be the best place and occasion to air my query at this point and let it be seen whether or not my point of view may be justified.

In my view, the phonemes cannot be established without their relevant features being identified. There will be a back-and-forth process in the analysis in an attempt to define the phonemes in terms of relevant features during the course of the commutation test, as I have tried to show here and there in this paper. But there is no stage of 'interruption' during the commutation test at the stage where the phonemes have been established and then the commutation test has to be pursued further in order to identify their relevant features. Only when both the relevant features and the phonemes have been identified does the commutation test proper come to an end, not before.

I believe that my recourse, albeit unorthodox, to 'pre-phoneme', 'series', 'order' and '(bundle of) correlation(s)' – these latter three being applied to pre-phonemes as well as phonemes – has facilitated and enabled me to identify the relevant features and the phonemes concomitantly.

## 20. CONCLUDING REMARKS

**20.1.** It is the commutation test such as I have tried to explicate, not an analysis of a series of minimal pairs (hence that of minimal oppositions) of already established phonemes that can fully accomplish the task of establishing the French consonant phonemes (or for that matter, vowel phonemes) in terms of relevant features.

**20.2.** It goes without saying that the commutation test pertains to the concepts of the phoneme and the archiphoneme being *sums of relevant features* and not to the concept of the phoneme as an indivisible distinctive unit with which many writers operate. The analysis of minimal pairs is frequently performed by these writers with a view to establishing the phonemes of a language. The commutation test is naturally extraneous to the concept of the phoneme being inanalyzable into further distinctive units.

**20.3.** My explication in detail of the commutation test as presented in this paper is unorthodox in that I have, rightly or wrongly, recourse to the entity called ‘pre-phoneme’ which, having been proposed a long time ago (if not by me), lay dormant all this time and which I have revived in this paper. The operation of the commutation test described in this paper is what I personally believe to be appropriate and valid in functional phonology. I must emphasize that the commutation test I have explicated represents my own version and may not necessarily be shared by other functionalists. One of the features of the commutation test that I wish to emphasize is my recourse to the concepts of ‘pre-phoneme’, ‘series’, ‘order’, ‘correlation’ and ‘(bundle of) correlation(s)’ during the commutation test. These concepts have been applied during the whole of the commutation test.

**20.4.** Above all, I wish to re-emphasize that the bedrock on which the validity of the commutation test rests is the concept of ‘opposition’.

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