

# PHRASE-LEVEL SOUND STRUCTURES IN FRENCH

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## 1. The research question

It is a well established fact that the pronunciation of words at the utterance level within the same geographical or social dialect is synchronically very variable, and that this variability is structured. These phrase-level regularities have been described for only very few languages, and in many cases only in a partial way or even in an example-oriented anecdotal fashion. German is the only language for which a comprehensive system of phrase-level phonetic rules has been presented and validated with reference to the statistical data distribution in large corpora of read and spontaneous speech, as well as explained, at least partially, in relation to the speaker, the listener, the communicative situation and the language community (Kohler, 2001).

It is a worthwhile research goal to provide similar exhaustive phrase-level accounts for many languages that also differ in their phonological and phonetic word structures, but descriptions of segmental variability at the utterance level in otherwise well documented languages like Danish, English, French, Italian, Russian, Spanish, Swedish should be our first concern. The problem in this type of research is the availability of large annotated speech data bases which at the same time provide information on canonical word pronunciations to which the actual realizations recorded in the data labelling can be related. None of the languages listed fulfil this requirement adequately. But if there are sufficient references to phrase-level segmental processes in the literature, which may be supplemented by some data collected from spontaneous speech recordings, it becomes possible to evaluate the limited corpus in relation to general articulatory production patterns, known from other studies. French represents such a language.

This paper gives an overview of the categorizations of the phrase-level processes of assimilation, reduction and elision that are found in the literature on the phonetics of French, fills in, and expands, the classes established there with data from a few

spontaneous recordings, relates the classified data to the dynamics of speech production, enters into an explanatory discussion of phrase-level reduction patterns in French, and finally compares these patterns to those of German.

## 2. Traditional focus on word-phonology in the phonetics study of French

Apart from the phonological description of vowels and consonants, the phonetics of French has traditionally focussed on two morphophonological areas: *liaison* and *ecaduc*. In all cases, the central question has been as to how lexical entities are pronounced in word citation, with standardised alternatives for final consonants (*liaison*) and for schwa (*ecaduc*) in different contextual linguistic patterns governed by orthoepic concerns. It is interesting to note that in a very recent publication of semi-transcribed French television news programmes the aim of processing this corpus of spoken journalistic French is stated as:

"L'objectif de notre étude a été d'analyser la variation en ce qui concerne trois phénomènes: la réalisation du [ə] instable, des liaisons (dites *obligatoires* ou *facultatives*) et de la forme de la négation *ne - pas* (*composée* ou *non-composée*). La transcription rend compte de ces trois traits." (Lindquist, 2001)

Although the presence or absence of schwa is quite clearly a phrase-level phenomenon in French, it has to a very large extent been treated from the perspective of word-phonology. The very formulation of *la loi des trois consonnes* by Grammont (1894), which started off an extensive literature, was primarily oriented towards phonological rather than speech performance rules, apart from the admission of stylistic, social and regional factors (*poetry-prose* ; *la bonne prononciation française - le langage populaire* ; *Paris-Midi* ).

To this day, and in spite of the phonetic research by Delattre (1948, 1949, 1951, 1966) and Malécot (1955, 1976), who introduced phonetic factors (articulatory force, monotonic aperture decrease and back-to-front articulatory sequence of surrounding consonants), *ecaduc* has been treated as a phonological either-or. But the reduction of schwa is a graded temporal and phonatory phenomenon: schwa covers a wide range from a long voiced vowel segment to complete elision, including voiceless vocalic resonances, e.g. aspiration of plosives, which may be found in such forms as

[pskʃpãs] "*parce que je pense*" and [pskʃkrwa]. "*parce que je crois*" (quoted by Malécot 1976, p.98).

Léon (1966) introduced phonostylistic factors, and thus finally approached the topic from the point of view of reduction or elaboration in speech. He particularly pointed out rhythmic factors, governing the elision in compounds, e.g. "*porte-manteau*" (without schwa) vs. "*porte-mine*" (with schwa) or "*quatre-chevaux*" [katʃəvo] vs. "*quatre-vingts*" [katrəvɛ̃]. But here again the rules are word-oriented, they do not include rhythm in prosodic structures, although it is a very important factor as well. Prosodic patterning not only determines the positioning of schwa syllables initial – medial – final (Malécot, 1976). Just as schwa elision is avoided when it results in two successive heavy (non-schwa) syllables in final word position across an internal compound boundary, it is also avoided when such a syllable sequence arises finally in major prosodic phrases. Passy and Rambeau (1918) provide a relevant example in their transcription:

[le ʃo:z ã rɛstə ʼla pur l ɛʼstã .] (p.16, l.13)  
as against

[lə bɔnʼɔm: , ... nə kɔ̃prã ʼpa , e rɛstə ʼla , tu kɔ̃fy .] (p.18, l.15);

in the first, non-final prosodic position, schwa may be elided (transcribed in italics), in the second, final position it is obligatory. This is paralleled by the optional deletion and obligatory preservation, respectively, of [rə] in *arbre de Noël* vs. *arbre vert*. There are, however, further linguistic, e.g. morphological and collocational, conditions on [rə] deletion, because the numeral *quatre* is generally [kat] before consonant (or [kad] with regressive voicing assimilation, cf. 5.3), irrespective of the number of non-schwa syllables following: *quatre centimes* and *quatre sous*, *quatre journaux* and *quatre jours* can have the same phonetic form [kat] or [kad], respectively.

The preoccupation with word phonology has not only prevented the systematic investigation of the phrase-level conditions for the manifestation of schwa under the general heading of reduction and elaboration, but it has also prevented the analysis of comparable phrase-level phenomena in connection with other vowels (e.g. *p's que = parce que*), which have not had the morphophonological and orthoepic backing, but are entirely due to phrase-level factors (function words, prosody, speaking style). It is, however, quite obvious that the first IPA phoneticians, especially Paul and Jean Passy as well as Franz Beyer, were well aware of the wide range of phrase-level reductions and elaborations in vowels more generally and also in consonants, because they incorporated them in their text (as against word) transcriptions, intuitively taking account of prosodic factors. What they did not do systematically was to provide

descriptive, rule-based accounts. This is a task for us today, and I shall make a start by examining their descriptions and transcriptions, supplementing them by the analysis of recorded data and deriving systematic statements for phrase-level phonetics of French from the three, admittedly limited, datasets.

### 3. Phrase-level phonetic data in the literature

#### 3.1. Classified data by Paul Passy

Some of Paul Passy's phrase-level phonetic observations are first of all found in his PhD thesis of 1890 *Étude sur les changements phonétiques et leurs caractères généraux* (Passy, P., 1890), where he includes examples of synchronic variation of French pronunciation as illustrations of phonetic features involved in sound change. In the following, I give a listing of instances under his discussion headings.

##### (a) Quantity in consonants (p. 72)

<i>d'autant plus</i>	[t:ãplys]
<i>de temps en temps</i>	[t:ãzãtã]
<i>je ne sais pas</i>	[s:epa]

##### (b) Influence of stress on vowel and consonant reduction and elision, in some cases involving whole syllables (pp. 123, 126)

<i>vous vous y prenez bien mal</i>	[ <sup>1</sup> vuvzi prəne <sup>1</sup> bjẽ <sup>1</sup> mal]
<i>qu'est-ce que c'est que ça</i>	[ <sup>1</sup> kɛssek <sup>1</sup> sa]
<i>il n'y est pastout à fait</i>	[(n)je <sup>1</sup> patta <sup>1</sup> fɛ]
<i>il me semble que oui</i>	[m <sup>1</sup> sãbkə <sup>1</sup> wi][ <sup>1</sup> psãmkə <sup>1</sup> wi]
<i>elle les a nettoyé avec du sable</i>	[ɛllezanetwaj <sup>1</sup> eegdy <sup>1</sup> sa:ɓ]
<i>tiens, voilà ton paletot</i>	[ <sup>1</sup> tjẽülato <sup>1</sup> pal'to]
<i>hein? qu'est-ce que t'as dit?</i>	[ <sup>1</sup> ẽ sty <sup>1</sup> di]
<i>Blanchette, j'étais chez M. Motte. –</i>	[blã <sup>1</sup> ʃet ʒveʃemsjømɔt]
<i>Jesuis en chanté, mon ami.</i>	[ <sup>1</sup> ʃ:ãtemnami]
<i>il est dans le champ</i>	[ <sup>1</sup> il:dãl <sup>1</sup> ʃã]
<i>ils' est sauvé?</i>	[ <sup>1</sup> sso:ve]

*nonnon, ilestattaché* [nə'nõtata'ʃe]  
*viens-tuvs. tul'asvu* [vjẽty]vs. [tlavy]

(c) *Vowelandconsonantnasalizationanddenasalization(p.183)*

*maman* [mãmã]  
*vingt-deux, trente-deux, endedans* [vẽndø], [trãndø], [ãndã]  
 [vëndø], [trandø], [andã]  
*pendantcetemps-là* [pãnã]/[panã] [stãla]

(d) *Undertheheadingofdialects,thereareexamplesof[l]and[r]el ision*  
 (p.18).

*quandtus'rasque'qu'un*  
*i'n'saventpasc'qu'i'disent*  
*suici*  
*quèq'chose*  
*metsçasu'latable*

### 3.2. *ClassifieddatabyJeanPassyandFranzBeyer*

In a review of Franz Beyer's *Französische Phonetik* (Cöthen, 1888), Jean Passy discusses relevant examples of phrase-level reductions under two headings (Passy, J., 1890).

(a) *Reductioninspokenlanguage(pp.350–352)*

Referring to the consequence of unequal stressing of different syllables as a reduction factor, Jean Passy gives the following explanation for reduced phonetic forms:

"Nous voyons ici dans quelques pages remarquables comment les syllabes se réduisent de plus en plus, comment leur voyelle s'altère et disparaît souvent, comment les consonnes elles-mêmes s'assimilent ou tombent parfois, dans la rapidité de la conversation. De là des contractions qui peuvent paraître improbables aux observateurs superficiels et surtout aux français, parce que leur habitude de la langue

leur permet de retrouver immédiatement sous la forme abrégée la forme pleine." (Passy. J., 1890, 350-351).

Beyer's examples, which Jean Passy classifies in this general way, were:

<i>sivousavezbesoindequelquechose</i>	[sivuzavebzwẽd̥kɛk'ʃo:z]
<i>peut-être</i>	[pøtɛ:tr̥] > [pøtɛ:tr̥][ptɛtr̥][(p)tɛt]
<i>voilà</i>	[vwala] > [wala][vla]
<i>déjà</i>	[deʒa] > [dʒa]
<i>cetteannée</i>	[sɛtane] > [stane]
<i>cetteheure</i>	[sɛtœ:r] > [stœ:r]
<i>cette</i> before consonant	not in <i>sept heures</i>
<i>cette femme, bouteille</i>	[stə]
<i>qu'est-cequetufais?</i>	[kɛsty'fɛ]
<i>il</i> before consonant	[i]
<i>ilveut,ilsera</i>	[ivø], [isʁa]
<i>il n'y a pas de quoi</i>	[ɲapatkɔ̃wa] [japatkɔ̃wa]

The first example in this list has been given in the version Beyer quoted in the 4th edition of his book (Beyer, 1929, p. 137), whereas in the first edition he transcribed *quelque* as [kɛlk], which Jean Passy declared as being rare, unless [ə] was also pronounced. To these examples Jean Passy added the ones quoted from Paul Passy in 3.1 (b), commenting that he had taken them from casual conversation in his own pronunciation: so Paul Passy must have got them from him for his thesis.

In his review, Jean Passy adds further instances of reduction:

<i>probablement</i>	[prɔbabləmã] > [prɔabləmã] > [prɔaβləmã] > [prɔa'lmã]
<i>par conséquent, vous voyez, c'est</i>	['kɔ̃se'kã vuwa'je sɛtalafwan]
<i>à la fois une question d'argent</i>	[kɛs'tjɔ̃dar'ʒã]
<i>il était écrasé!</i>	[iltɛtɛ'kraze]
<i>as-tu montre?</i>	[tyta'mɔ̃'tr]

It is very interesting from the point of view of the modern concept of coarticulation (and of Firthian prosodies) to take note of Jean Passy's general characterization of these reductions:

"Dans tous ces exemples, les réductions sont involontaires, et inconscientes pour tout autre qu'un

phonéticien. Celui-ci même laisse échapper sans les remarquer une foule de faits semblables s'il n'y applique pas constamment son attention. Cela tient en partie à ce que les sons et syllabes disparues pour l'auditeur ne le sont pas toujours pour celui qui parle. Il en reste souvent des mouvements de langue ou de lèvres ... Souvent aussi un son disparu laisse une trace dans les sons qui l'entouraient ..." (Passy, J., 1890, 352).

In the 4th edition, Beyer provides some additional examples of vowel and consonant reduction (pp. 197f).

<i>je lui ai écrit une petite lettre</i>	[ʒɥie:'kʁi yntit'lɛt(ʁ)]
<i>c'est très drôle</i>	[s'tʁɛ:'dro:l]
<i>qu'est-ce que tu fais donc là</i>	[s:ty'fɛdɔ̃'la]
<i>entends-tu ce que je t'edis?</i>	[t:ã'tyskəʃtə'di]
<i>il aurait dû filer (= se sauver)</i>	[lɔʁɛ'dy'fi'le]
<i>tiens, déjà trois heures</i>	[tjɛ̃dʒatʁɔ'zœʁ]
<i>il est aussi bien amusant</i>	[ilto'sibjɛnamy:'zã]
<i>quid on cest-ce qui (devait l'amener)</i>	[ki'dɔ̃(s)ki]
<i>(as-tu jamais) vu une foire?</i>	[vyn'fɥar]
<i>oui, papa</i>	['wi'p:a]
<i>elle ne peut pas</i>	[ɛnpø'pa]
<i>je suis sur le pavé</i>	[ʃ(s)ʁisylpa've]
<i>monsieur</i> (p.192)	[møsjø] [msjø] [m̥sjø] [psjø]

(b) Assimilation

Jean Passy criticises disorder and omissions in Beyer's discussion of sandhi (Passy, J., 1890, p.353).

(b1) Nasalization

"Il n'y a rien, par exemple, sur le passage habituel d'une occlusive entre voyelle et consonne nasale, à la nasale correspondante:

<i>point de mire</i>	[pwɛ̃mi'r]
<i>mademoiselle</i>	[manmwazɛl]

*une heure et demie* [ynœrenmi]  
*admirable* [anmirablə]"(Passy,J.,1890,p.353).

In the 4th edition (pp. 187f), Beyer defines the conditions of the nasalization process even more precisely than Passy by referring to voiced plosives (occasionally also voiceless ones). He then lists all the above examples as well as the ones from Paul Passy (3.1(c)) and adds

<i>St-Dié</i>	[sɛ̃n'je]
<i>lendemain</i>	[lɑ̃nmɛ̃]
<i>du vin de Malaga</i>	[vɛ̃nmalaga]
<i>celatombemal</i>	[satɔ̃m'mal] [satɔm'mal]
<i>unelonguemain</i>	[lɔ̃ŋmɛ̃]
He also says that many other consonants can change to nasal in nasal context, e.g.	
<i>revenir</i>	[rœ̃mni:r]
<i>avenue</i>	[amny]
<i>envenant</i>	[ɑ̃mnɑ̃]

(b2) Elision of [l] or [r] before labial semivowel

"Rien non plus sur la disparition fréquente dans le peuple et même parmi les gens cultivés, d'un l ou d'un r suivi d'une semivoyelle labiale; *trois* devient *twa* (seulement dans le peuple); *pluie* devient *pyi*; *plus*, *py*." (p. 353)

(b3) Elision of [ʏ] before [i]

"Le *ʏ* disparaît souvent devant *i*, en passant par *j*: *pi* pour *puis* est très fréquent (*épi* pour *et puis*), *pisã.s* pour *puissance* l'est moins." (p. 353)

(b4) Regressive assimilation of voicing and devoicing

In his review, Jean Passy does not specifically refer to the discussion of voicing assimilation in Beyer's book, but gives a few examples of partial regressive voicing (*cap Vert* [kabʋɛr], *tasse de café* [taʒdɔkafɛ], *sac gonflé* [saɡɔ̃fle], *avec Jules* [avɛɡʒyl], *dites donc* [diʔdɔ̃]) (p.354). Beyer (4th edition, pp.185f) gives an account of regressive devoicing and voicing in French and lists six examples:

<i>là-dessus</i>	[latsy]
<i>coup de pied</i>	[kutpʃe]
<i>valet de chambre</i>	[valɛtʃã:brə]
<i>sauve-toi</i>	[so'ftwɑ]
<i>chauve-souris</i>	[ʃo'fsuri]
<i>ils ne peuvent pas</i>	[pœ'fpa]
<i>ils ne savent plus</i>	[sa'fpɔly]
<i>chemin de fer</i>	[ʃm̃ɛ̃tfe:r]
<i>vient de sortir</i>	[vjɛ̃tsɔrti:r]
<i>l'amide Paul</i>	[lamitpɔl]
<i>je pense</i>	[ʃpã:s]
<i>je te le dis</i>	[ʃtlɔdi]
<i>second</i>	[zgɔ̃]
<i>cap Vert</i>	[kabvɛ:r]
<i>dites donc</i>	[diddɔ̃]
<i>tasse de café</i>	[ta'zdəkafɛ]
<i>chef de gare</i>	[ʃɛvdɔga:r]
<i>chaque jour</i>	[ʃagʒu:r]
<i>avec Jules</i>	[avɛgʒyl]
<i>sac gonflé</i>	[saggɔ̃'fle]
<i>que faites-vous là</i>	[fɛdvu]
<i>provinces du nord</i>	[pʁɔvɛ̃'zdynɔ:r]

Whereas Passy transcribes partial voicing for the voiceless–voiced sequence of obstruents, Beyer indicates complete regressive voicing. Both descriptions capture phonetic reality because this regressive assimilation of the voicing feature is scalar from 'absent' to 'complete'. The same applies to regressive devoicing, where completion presupposes a high degree of cohesion between the juxtaposed lexical elements, either in compounds or phrasal collocation.

### 3.3. Data from transcribed texts

The sources of the transcribed text data to be discussed are the text in 'rapid colloquial pronunciation' from Paul Passy's *French Phonetic Reader* (P. Passy 1929, pp. 23ff) and the second text in 'transcription rapide' from Jean Passy and A. R. Ambeau's

*Chrestomathie française* (Passy and Rambeau, 1918, pp. 12-15). As regards the second piece—reprint of Jean Passy's contribution to *Le Maître Phonétique* 1893—the authors give the following general instruction:

"Nous donnons, dans la transcription rapide du second des textes suivants, une énonciation beaucoup plus contractée que dans la transcription correspondante du premier. Il nous a paru intéressant de donner un spécimen d'élocution tout à fait rapide et négligée, non pour la proposer comme modèle, mais pour permettre d'étudier, dans un exemple concret, jusqu'où va l'instabilité du langage." (p. 3)

This not only shows the early IPA phoneticians' awareness of phrase-level reductions conditioned by speaking style but also highlights the rich data source for modelling speech production at the phrase-level in French and how impoverished word-phonology oriented accounts of French phonetics have since become. I shall classify the transcriptions from both texts together, using categories that were already applied by Paul and Jean Passy and augmenting them by additional ones to deal with further types of reduction. Transcription symbols in italics indicate optional reductions.

### 3.3.1. Realization of 'il(s)'

<i>ilya</i> <i>vait</i> , <i>qu'ily</i> <i>avait</i>	[j avɛ], [ki j avɛ]
<i>mais ilyen</i> <i>aeuun</i>	[me j ɔ̃n a y 'œ̃]
<i>iln'ya</i> <i>queleplusjeune</i>	[j a k lə ply 'ʒœn]
<i>ilvous</i> <i>croqueraittous</i>	[i vu 'krœkre 'tu:s]
<i>et ilsse</i> <i>sontsauvés</i>	[e i s sɔ̃ 'sorve]
<i>ilsont</i> <i>dit</i>	[iz ɔ̃ 'di]
<i>et ila</i> <i>dit</i>	[e il a 'di]
<i>et illui</i> <i>adit</i>	[e i lɥi a 'di]
<i>ilesta</i> <i>lléchezleboulangier</i>	[il t a 'le ʃe l 'bulã:'ʒe]

## 3.3.2. Elisionofunaccentednon- schwavowels

<i>puis <b>il</b> est alléchezlemeunier</i>	[ˈpɥi il t aˈle ʃe l ˈmøːnje]
<i><b>elle</b> était blanche</i>	[ɛl tɛ ˈblɑ̃ʃ]
<i>et <b>il</b> était ennuyé</i>	[eiletətɑ̃ˈnuɥije]
<i><b>c'</b>étaitleloup</i>	[s tɛ l ˈlu]
<i><b>voilà</b> unchevreauquisautedehors</i>	[vla ˈœ ʃəvro ki ˈsot deˈɔːr]
but et <i><b>voilà</b>qu'elleapperçoit</i>	[e waˈla k ɛl aperˈswa]
<i><b>situ</b> nem'enmetspastoutdesuite</i>	[s ty n m ɑ̃ mɛ pa ˈtutsɥit]
<i>à <b>cet</b>hôtel-là</i>	[astɔtɛlˈla]
<i><b>nous</b>n 'avonspasbesoindefromage</i>	[nuˈnavɔ̃ˈpabəzwẽdʁɔˈmaːʒ]
<i><b>pour</b>au jourd'hui</i>	[pɔːʁɔzɔˈdɥi]
<i>maisj'aiepourqu'on <b>nous</b>en tende</i>	[mezɛˈpœːr kɔ̃nuzɑ̃ˈtɑːd]
<i>non, <b>attend</b>ez</i>	[ˈnɔ̃ɑ̃ˈtɑ̃ˈde]
<i><b>vous</b>prendrezbienquelquechose</i>	[vɔ̃ˈprɑ̃ːdrebjɛ̃ kɛkˈʃoːz]

## 3.3.3. Lenitionofplosivesandfricativesinfunctionwords

<i>maisils <b>n'</b>avaientpas</i>	[meinavɛˈpa]
<i><b>j'</b>yvais toutdemême</i>	[ʒivɛˈtunˈmɛːm]
<i>qu'est-ceque <b>vous</b>voulez</i>	[ˈkɛswuuˈle]
<i>qu'est-ceque<b>vous</b> medonneriez</i>	[ˈkɛswumdɔ̃nriˈje]
<i>nous <b>n'</b>avonspas</i>	[nuˈnavɔ̃ˈpa]
<i>je <b>voudrais</b>vousdire</i>	[ʒvuˈdrevuˈdir]
<i>je <b>vais</b>vous fairedéjeuner</i>	[ʒˈvɛvuˈfɛːrdiˈne]
<i>oùiln'y <b>avait</b>personne</i>	[uinjaˈvɛperˈsɔːnː]
<i>vous <b>m'</b>avezdemander</i>	[vumaˈvedmɑ̃ˈde]

## 3.3.4. Deletionofpreconsonantal[r]infunctionwords

<i><b>parce</b> qu'il voulait</i>	[paskivuˈlɛ]
<i><b>parce</b> que moi j'ai une patte blanche</i>	[paskə ˈmwa ʒ e yn pat ˈblɑ̃ːʃ]
<i><b>sur le</b> pas de la porte</i>	[syrləˈpadlaˈpɔːrt]

### 3.3.5. [w]instead of [vw] and deletion of [ʏ], especially in function words

<i>voilà</i> la mère chère	[wala la mɛr 'ʃɛ:r]
qu'ils <b>voyaient</b>	[kiwa'jɛ]
<b>voyons</b> voir ça	['wɔjɔ̃war'sa]
et <b>avoir</b> le morceau d'or	[ea'warlɛmɔ̃rso'dɔ:r]
ennuyé de <b>voir</b>	[ã'nɥije d'war]
et <b>puis</b> un autre, et <b>puis</b> tous les six	[epi œn 'o:tr, e pi 'tu le 'sis]
but <b>puis</b> il est allé	[ 'pɥi il t a'le]
et <b>puis</b> nous verrons	[e'pɥi nu've:rɔ̃]

### 3.3.6. Nasalization of voiced stops

<i>pendant</i> que	[pã̃nã kə]
<i>combien</i>	[kɔ̃mjɛ̃]
<i>j'y</i> vais <i>tout</i> de même	[ʒive'tun'mɛ:m]

## 4. Recorded spontaneous speech data

### 4.1. Database

The data come from two sources:

- recordings of unscripted monologues from male and female speakers of the Paris region, made in the late 1990s in the sound-treated room of the Phonetics Department at Paris III by Angélique Amelot and Patricia Bass et for their PhD theses, and kindly made available to me (referenced f(1)s...)
- two recordings of unscripted dialogues between two female students each, made in the late 1970s and the early 1980s, respectively, in the studio of the Phonetics Department at Kiel University; all four speakers were exchange students from Brest, studying in Kiel (referenced Hum, Cib; frcon1, frcon2).

The acoustic quality of all these recordings is not very good, but sufficient for descriptive phonetic investigation.

## 4.2. Dataclassification

### 4.2.1. Realizationof'il(s)'

*enaméricain ilva yavoirdesexemples* (f1s0163)  
[ãn amɛʁi'kɛ ijvɛɛwa ʒezɛɣ'zãmp]

*ilya laplageici* (frcon2\_3)  
[ja la 'plɑːʒ isi]

*ilssont pasrestétrèslongtempsàl'école* (frcon1\_5)  
[i sɔ̃ pa 'ʁɛstɛ 'tʁɛ lɔ̃'tɑː l e'kɔl]

*ilsont apprislefrançais* (frcon1\_5)  
[iz ɔ̃ apʁi l 'fʁãsɛ]

*comme ilsétaient agriculteurs* (frcon1\_5)  
[kɔm iz ɛtɛ aɣʁikyl'tœːʁ]

*ouparcequ' ilsles onteusqu'àladeuxièmesessionderattrapage* (Hum2s01)  
[u pask i ez ɔ̃ 'y k a la 'dɔzjɛm sɛsjɔ̃ n ʁatʁa'paʒ]

### 4.2.2. Deletionofotherpostvocalic[l]

*quelqu'un... quelqu'un*(f1s0163)  
[ ... keʒ'kɛ ...kel'kœ]

### 4.2.3. Reduction/elisionof unaccented non-schwa vowels

*pendant, jenesais pas,unedemi-heure* (f1s0063)  
[pə'nã ʃ:pa yn dɛmi 'œːʁ]

*parexemple, moi,j'aidesexemplesentête... éventuellement*(f1s0113)  
[pʁɛɣ'zãm mwə ʒeezɛɣzãpl ɑ̃'tɛt ... evãtyũã]

*ben, parce que ... en américain il va y avoir des exemples qui ... quelqu'un ...*  
*quelqu'un*(f1s0163)  
[bɛ̃ pask ... ãn amɛʁi'kɛ ijvɛɛwa ʒezɛɣ'zãmp ki ... keʒ'kɛ ...kel'kœ]

*parceque jevoulais* (fs40023je)  
[pskə ʒulɛ]

*parceque c'estdrôle* (frcon2\_1)  
[pəs kə se 'dʁɔl]

*puisque j'allais le voir au début de/del'année dernière* (fs50023je)  
[pəʒ ʒalɛ l 'vwɑ:k odeβy də/ d lane dɛʁ'njɛ:k]

*c'est même idéal* (frcon1\_3)  
[sə mm ide'al]

*ils ont appris le français aux coups des baguettes* (frcon1\_5)  
[iz ð apʁi l 'fʁɑ̃sɛ kʰu de ba'gɛt]

*et puisquerien qui nous intéresse* (frcon2\_1)  
[ɛ pi kə 'kʁjɛ ki nɪz ɛtɛ'kɛs]

*j'ai déjà fait surtout ça avec mes parents et après on a recommencé avec le DAAD*  
(Hum5s04)  
[ʒɛ dʒa fe sə'tu sa ɛk me pa'kɑ̃ e apʁɛ ðn a ʁkɔmɑ̃'se k lə deaa'de]

*de discuter avec les gens* (frcon2\_1)  
[də 'diskyte ɛʁk lɛ 'ʒɑ̃]

*pour arriver à se comprendre* (frcon2\_1)  
[pʁɛ aʁive s kɔ'pʁɑ̃kɔ]

*après avoir vécu à Francfort* (frcon2\_2)  
[apʁɛ awaʁ 'vɛky a fʁɑ̃k'fɔ:k]

*c'est agréable* (frcon2\_3)  
[s aɡʁɛ'abl]

*j'étais rentrée en France* (frcon2\_2)  
[ʒɛtɛ 'kɑ̃tʁɛ ã 'fʁɑ̃s]

*mes parents habitent aussi au bord delmer* (frcon2\_3)  
[me pa'kɑ̃: bit 'osi o bɔʁ d la 'mɛ:k]

*je lui ai dit* (fs60023je)  
[ʒɛdi]

*pour ceux qui sont deuxième année* (Cib1s03)  
[pʁɛ sɔ k s ɑ̃ nʃjɛm anɛ]

#### 4.2.4. Lenition of plosives and fricatives in unaccented syllables, especially in function words

*comme ils étaient agriculteurs* (frcon1\_5)  
[kɔm iz ɛtɛ aɣyikyl'tɔɛ:k]

*par exemple, moi, j'ai des exemples en tête* (f1s0113)  
[paɛy'ʒɑ̃m mwə ʒɛzɛy'zɑ̃pl ɑ̃'tɛt]

*ben, parce que ... en américain il va y avoir des exemples qui ... quelqu'un ...*  
*quelqu'un* (f1s0163)  
[bɛ pəsk ... ɑ̃n amɛʁi'kɛ ijvɛwa ɔzɛy'zɑ̃mp ki ... keʃ'kɛ ... kel'kɔɛ]

*puisque j'allais le voir au début de/del'année dernière* (fs50023je)  
[pəʒ ʒalɛ l 'vwa:ʁ odeβy də/ d lane dɛʁ'njɛ:ʁ]

*je me suis vraiment en du compte* (fs20023je)  
[ʒ mə sy ʁɛmɑ̃ ʁɑ̃dy 'kɔ̃t]

*j'ai déjà fait surtout ça avec mes parents et après on a recommencé* *avec le DAAD*  
(Hum5s04)  
[ʒɛ dʒa fe sɑ'tu sa ɛk me pa'kɑ̃ e apʁɛ ðn a ʁkɔmɑ̃'se k lə deaɑ'de]

*de discuter avec les gens* (frcon2\_1)  
[də 'diskyte ɛʁk lɛ 'zɑ̃]

*parce que je voulais* (fs40023je)  
[pskə ʒulɛ]

#### 4.2.5. Deletion of postvocalic [ʁ] in function words

*ben, parce que ...* (f1s0163)  
[bɛ̃ pəsk ... ]

*parce que je voulais* (fs40023je)  
[pskə ʒulɛ]

*parce que c'est drôle* (frcon2\_1)  
[pəs kə se 'dʁol]

*j'ai déjà fait surtout ça ...* (Hum5s04)  
[ʒɛ dʒa fe sɑ'tu sa]

*il y a avoir des exemples* (f1s0163)  
[ijvɛɛwa ɔzɛzɥ'zɑ̃mp]

*par exemple, ...* (f1s0113)  
[pɑɛɥ'zɑ̃m]

*ou parce qu'ils les ont eus...* (Hum2s01)  
[u pask i ez ɔ̃'y]

#### 4.2.6. Realization of [vw] and [ɥi], especially in function words

*en américain il y a avoir des exemples* (f1s0163)  
[ɑ̃ amɛʁi'kɛ̃ ijvɛɛwa ɔzɛzɥ'zɑ̃mp]

*après avoir vécu à Francfort* (frcon2\_2)  
[apʁɛ awaʁ 'vɛky a fʁɑ̃k'fɔ:ʁ]

*quand je suis arrivée* (frcon1\_4)  
[kɑ̃ ʃɥ aʁi've]

*jemesuis vraimentren ducompte* (fs20023je)  
[ʒ mə sy vʁɛmɑ̃ ʁɑ̃dy 'kɔ̃t]

*puisquej'allaislevoir...* (fs50023je)  
[pøɡ ʒale l 'vwa:ʁ]

*etpuis ...* (frcon2\_1)  
[ɛ̃ pi]

#### 4.2.7. Deletionofprevocalic[l],especiallyinfunctionwordsbefore [y] and [ʏ]

*quatreans plus tard* (frcon1\_5)  
[katʁ 'ɑ̃ py 'ta:ʁ]

*il sont plus jamaisparléfrançais* (frcon1\_5)  
[iz ɔ̃ 'py ʒame paʁle 'frɑ̃sɛ]

*c'est plusagréabledevenirenété* (frcon2\_3)  
[sɛ pyz aɡʁɛ'ab də vni:ʁ ɑ̃n e'te]

*ouparcequ'ils les onteus...* (Hum2s01)  
[u pask i ez ɔ̃ 'y]

#### 4.2.8. Nasalizationofstops,mostlyvoiced

*apprendre l'allemand* (frcon1\_4)  
[apʁɑ̃n lal'mɑ̃]

*pendant...unedemi-heure* (f1s0063)  
[pɑ̃nɑ̃ ... yn dəmi 'œ:ʁ]

*ladeuxième sessionde rattrapage*(Hum2s01)  
[la 'døzjɛm sesjɔ̃ n ʁatʁa'paʒ]

*par exemple,...* (f1s0113)  
[paɛʏ'ʒɑ̃m]

## 5. Reductionpatternsinthedataandtheirexplanation

Data from all three sources – word and text transcriptions in the literature and analysis of spontaneous speech recordings – converge in a set of reduction patterns, which affect function words more than content words and, in many cases, seem to be restricted to the former.

### 5.1. Lenition of plosives and fricatives

Postvocalic voiced plosives before vowel or liquid or fricative – inside words or across word boundaries – may be realised with closure undershoot, i.e. as fricatives, and, between sonorants, also as approximants or with complete deletion. *probablement, je vous dirais, a griculteurs, j'ai des exemples, il y a des* are relevant instances from the three sources. Lenition across word boundaries affects function rather than content words: *j'ai des/avoir des* vs. *vous dire*.

In its use as a modal filler with little semantic content, *probablement* occurs in several, progressively more reduced variants: [prɔabləmã] [prɔaβləmã] [prɔa'lmã]; in the case of complete elision of the second plosive, the lenition process can be coupled with [ə] elision, thus reducing the number of syllables by one. The lengthening, which Jean Passy indicates in the most reduced form (cf. 3.2(a)), is most likely a residue of the segmental elision (see also 5.5.2 and 5.6).

Pre-vocalic, more particularly intervocalic, [v], which is frequently realised as an approximant, may disappear altogether in function words and words whose semantics is reduced to that of modal particles. The various forms of *avoir* and *va* etc., as well as *avec* are frequently recorded examples. *vraiment* provides an instance of a modal filler. In *vous* and forms of *vouloir*, the initial consonant may be produced with lip rounding as [w] before [u], or be dropped, as in *qu'est-ce que vous voulez* (twice) or *je voulais*. [vw], as in *avoir, voilà, voir, voyez, voyons, voyaient* may be reduced to [w], unaccented *voilà*, with additional elision of the first vowel, also to [vla] beside [wla].

[ʁ] may be added as a special case of fricative lenition. Postvocally in function words, it disappears as a consonant, either completely, or it leaves a trace in the quality of the preceding vowel (e.g. [ɑ] instead of [a]): *par, parce que, avoir, sur, surtout*. In *parce que* the reduction may go further, reduce the vowel to [ə] and even drop it altogether. Pre- or intervocalically it turns into an approximant, as in *vraiment rendu*, where the tongue seems to retract only slightly further in the transition between the two nasalized vowels, resulting in a reduced amplitude of the otherwise nasal vowel resonance.

### 5.2. Place assimilation of consonants

There are very few examples of place assimilation of consonants in the data. The succession of postalveolar and alveolar fricatives – [ʒə] with schwa elision followed

by a word beginning with [s], e.g. *sais*—may result in either [ʃ:] or [s:]. If schwa is dropped in an initial syllable [pət] the first plosive articulation may also be given up, as in *petite, peut-être*. If an apical nasal precedes, it may be shifted to labial place of articulation, as for [p], even if the plosive is no longer produced: *une petite* [ymtit].

### 5.3. Regressive assimilation of voice and voicelessness

Of all the phrase-level assimilation processes in French, regressive spreading of voicing or devoicing has been described best and has also been included in textbooks on French phonetics from quite early on, e.g. Armstrong (1932), Grammont (1934), Malmberg (1969).

Armstrong, standing in the IPA tradition, based her statements on a cute observation, remarking that "Generally the voicing of the assimilated sounds is only partial. In quick speech, however, it is often complete." (p. 183), e.g. *je passe vite, avec vous, chaque jour*, and that in expressions of a high degree of cohesion, regressive devoicing is complete, e.g. *chemin de fer, tout de suite, rez-de-chaussée*, whereas "in expressions of less common use the devoicing is generally only partial" (pp. 184f), e.g. *une grande salle, une fameuse scène, quinze sous*. At the same time, she also refers to a difference of force between original and assimilated voicing—as weak versus strong—and between original voicelessness and assimilatory devoicing—as strong versus weak.

The twofold dichotomy of voicing and strength was stressed by Grammont, who did not make the fine distinctions between full and partial voicing and assimilation, depending on phrasal cohesion, nor did he differentiate between voicing and devoicing in respect of the completeness of the process. Malmberg then combined the voicing and force features into four phonological categories. The instrumental analyses of a large corpus of read sentences in the Kiel Phonetics Department (Kohler & Künzel, 1979; Kohler, van Dommelen & Timmermann, 1981) found that the four-way opposition of obstruents was not a reality of spoken French, that complete coalescence of original and assimilated voicing was possible, and that the distribution patterns showed voicing and devoicing assimilation to be scalar, not categorical. This is also a result of the study of Jean Passy's and Beyer's data descriptions (3.2(b4)).

Since in the French phonological system of obstruents, presence and absence of voicing are the distinguishing features – as in other Romance and in Slavonic languages, compared with, e.g., Germanic ones – voicing has to be combined with extreme vocal tract narrowing in fricative and plosive strictures to provide a positive

identifier for one class of consonants. The combination of semi-periodic pulsing with either a strong airflow through a narrow opening or a complete blockage of air in the vocal tract requires costly articulatory adjustments in order to avoid either devoicing or the transition to approximants. This compensatory action to guarantee presence of voicing in one class of obstruents may result in premature voice onset in voiceless-voiced obstruent clusters. The facts that regressive voicing is more likely to be complete in French, and that total regressive devoicing presupposes a high degree of phrasal cohesion point in the same direction. Furthermore, all the languages that have a phonetic voiced – voiceless opposition in obstruents seem to have regressive assimilation of voicing as well, which is absent from languages where phonetic voicing plays a minor role in differentiating between lenis and fortis obstruents.

#### 5.4. Nasalization of segments in nasal environments

Nasalization as a change to one of the nasalized vowel or nasal consonant phonemes, including [ŋ], (as against the spreading of coarticulatory nasality) affects four types of segments

- vowels embedded in nasal context, *maman* [mãmã]
- the approximant [v] before a nasal consonant (also after schwa elision), *revenir* [rəmni:r], *avenue* [amny], *en venant* [ãmnã]
- voiceless plosives after a nasalized vowel (and before a nasal consonant following schwa elision) *maintenant* [mẽnnã], *parexemple* [paɛy'zãm]
- voiced plosives in four contexts
  - (1) after a nasalized vowel and before a nasal consonant, *lendemain* [lãnmẽ], *unel onguem ain* [lõŋmẽ], *p ointdem ire* [pwẽnmi:r]
  - (2) between nasalized vowels, *pendant* [pãnã], *combien* [kõmjẽ]
  - (3) after a nasalized vowel alone, *apprendre l'allemand* [apɕãnlal'mã], *end edans* [ãndã], *session d'attrapage* [sɛsjõnkatʁa'paʒ]; also in connection with regressive voicing: *vingt-deux* [vẽndø], *tr ente-deux* [trãndø]
  - (4) before a nasal consonant alone, *admirable* [anmirablø], *mademoiselle*, [manmwazɛl], *une heure et demie* [ynœrenmi], *tout dem ême* [tun'mɛ:m]

Only conditions (1) and (3) for plosive nasalization have been given any treatment in text books (Armstrong, 1932). Nasalization of plosives is either bidirectional, or progressive after a nasalized vowel, or regressive before a nasal consonant; nasalization of the approximant [v] is also regressive before a nasal consonant; nasalization of vowels is bidirectional and also seems to be subject to vowel harmony. Progressive nasalization after a nasal consonant is not attested in the three data sources examined, but I would hypothesize that it can occur in such cases as *unefemme detrenteans* [mnə].

Bidirectional assimilation between nasal consonants is not possible for phonotactic reasons. As nasal consonant + plosive cannot occur word-final, the plosive must belong to the following word, but cannot be followed by a nasal consonant within that word, so the constellation plosive + nasal consonant must be the result of, e.g., schwa elision, which would not be possible if it leads to a sequence nasal consonant + plosive + nasal consonant.

Regressive nasalization of plosives before nasalized vowels can be excluded on production constraints. Lowering the velum is less costly than raising it and can therefore be synchronized quite well with oral stricture formation so that a premature lowering is not contextually conditioned, and since the plosive in such a segmental structure is syllable-initial (e.g. *donc, regardons, or ilengar de un*) it tends to be less reduced than in the syllable-final position of the reverse structure (e.g. *tombepas*). A very high degree of reduction in the extent and the timing of articulatory gestures would have to be introduced into the production programme to generate these nasal assimilations. In sequences of unaccented function words (e.g. *le monde qu'il y avait dans les rues*), nasalization of plosives before nasalized vowels cannot be excluded, but would probably also go together with lenition: this is an empirical question requiring more research on more spontaneous speech data.

From the point of view of production constraints, nasalization of plosives is most likely in bilateral nasal contexts, because this eliminates an additional velic raising–lowering gesture. In a unilateral nasal context to the left, the slow raising of the velum may result in velic – oral desynchronization and thus produce progressive nasalization. Regressive nasalization in a unilateral nasal consonant context to the right has to be assessed differently, because velic lowering for nasal consonants can be as precise as for nasalized vowels, so that one of the arguments put forward above for the absence of regressive nasalization before nasalized vowels again holds. But in the structure plosive + nasal consonant, the plosive is syllable-final, and only voiced plosives are involved. With the value attributed to the voicing feature in the obstruent system of French (cf. 5.3), a relaxation of velic closure can produce the supraglottal

pressure increase during oral closure and thus prevent the stoppage of glottal pulsing; at the same time this produces nasalization of voiced plosives.

The temporal extension of nasality in plosive nasalization after nasalized vowels is variable to the extent that nasality may even be shifted from the vowel to the plosive, resulting in denasalizing the vowel, at least with regard to the strong nasality of French nasalized vowels: *pendant* [panã]/[pənã], *vingt-deux* [vɛndø], *trente-deux* [trãndø], *endedans* [ãndã].

The opposite process of denasalizing nasal consonants in oral contexts that require a firm velic closure, e.g. fricatives, also occurs: *il me semble que oui* [m'sãbkə'wi] ['psãmkə'wi], *monsieur* [møsjø] [msjø] [m̥sjø] [psjø]. In these cases, glottal pulsing may be absent in utterance-initial position or after prosodic phrase-boundaries, generating voiceless nasals, and this may be combined with early velic raising to guarantee velic closure for the fricative, producing voiceless plosives.

## 5.5. Reduction of syllables

### 5.5.1. Reduction of word-final [ʁə] and [lə] syllables

In final position of utterances and prosodic phrases, [ʁə] and [lə] syllables can lose their vowel, and the consonant is devoiced, irrespective of the phonation feature of the preceding consonant: *quatre*, *cadre*, *peuple*, *capable*. This devoicing is part of reducing these words by one syllable, i.e. these so-called liquids do not become syllabic in French, and devoicing is a natural process finally in prosodic phrases, particularly on a falling pitch. Phrase-internally syllabic reduction may result in completed deletion of these syllables under rhythmic and linguistic constraints (cf. 2.).

### 5.5.2. Reduction/elision of unaccented non-schwa vowels

In vowel hiatus across word boundaries and word-internally, also combined with consonant elision according to 5.1, three possibilities of vowel reduction occur in unaccented syllables.

- If two hiatus vowels have the same degree of opening and similar tongue positions along vowel results with the resonance of the first: *vuu nefoire* [y:], *je lui ai écrit* [ʒɥie:'kʁi], *parents habitent* [ã:] (with continued nasal resonance). In function words the syllabic reduction may end in a short vowel: *çaave* c[ aɛ].
- An unaccented opening–closing, or successively opening, vowel sequence is levelled by reducing the maximal opening and adjusting the starting point, resulting in a reduction of the number of syllables: *discuter ave c* [ eɛɛ], *nettoyéave c* [eɛ], *arriverà* [ɛ]. If the starting point is accented the sequence levelling is adjusted to it, again reducing the number of syllables: *recommencé avec* [ek]. These levellings are obviously scalar and therefore allow of great variability in their actual phonetic manifestation. In the more complex opening–closing–opening vowel sequence of *ilvaya voir* [ijveɛwa], the levelling results in a high vowel for the first opening between high-vowel targets than for the second, which is followed by another low-vowel target.
- In an unaccented opening vowel sequence, the transition from a consonantal stricture may be so fast that the resonance for the first vowel is not (properly) formed: *après on a* [apʁɛ̃ ñn a], *sont en* (without t-liaison) [s ɔ̃], *c'est agréable* (without [t]-liaison) [ a], *après a voir* (without [z]-liaison) [ a], *rentrée en* [ã], *je lui ai dit* [ʒɥedi], *je suis arrivée* [ʃɥ aʁi've]. In an unaccented closing vowel sequence, the transition to a consonantal stricture may be so fast that the final vowel resonance is not formed: *à la fois une question* [wan]. Both types of transitions reduce the number of syllables.

The levellings of hiatus vowels in these examples are more extreme if they involve function words.

Outside hiatus positions, non-schwa vowels in initial unaccented syllables of function words may also be reduced to schwa or be elided. This particularly affects

- the high vowels in *nous, vous, pour, tout à fait, si, qui sont, surtout*
- the mid-close vowels in *déjà, aux coups* [kʁ'hɥ], *d'autant plus* [t:ãplys], *peut-être* [pøtɛ:tr̥] > [pøtɛ:tr̥] [ptɛtr̥] [(p)tɛt], *deuxième* [døzjɛm] > [døzjɛm] [d(z)jɛm], and with progressive nasalization after *en* (cf. 5.4) > [ɲjɛm]
- the mid-open vowels in the auxiliary verb forms *est, était*, in the deictic pronouns *cel(te)*, and in the modal particle *même* (*c'est même idéal* [sə mm ide'al])

- as well as the sequence [wa/a] in *moi* [mwə], *voilà* [vla]
- and finally a variety of vowels in *parce que* [p(ə)sk], *puisque* [pəg], *pendant* [pə'nã], *monami* [mnami].

Vowel elision may leave phonetic traces in the environment, e.g. lip rounding in *qui nous intéresse* [ki nɔz ẽtɛ'ʁɛs], *ils ont appris le français aux coups des baguettes* [kɔ'hɥ], *s'ont en* [s ɑ̃], or voiceless vowel resonance in *surtout* [sə'tu]. As with schwa elision, other vowels are thus again not simply present or absent, but their reduction is scalar due to variously conditioned dynamic processes. In this connection, we can also refer to the realization of *qu'est-ce que*, e.g. in *qu'est-ce que tu fais?* [kɛsty'fɛ], *qu'est-ce que tu fais donc là?* [s:ty'fɛdɔ̃'la], *qu'est-ce que tu dis?* [sty'di]. The different degrees of phonetic reduction of the whole phrase found in these instances can be put on a scale that ranges from devoicing of schwa in the second *que* to simply having a [k] release burst and to eliminating the [k] gesture altogether (comparable to what happens in *peut-être*, *petit(e)*, cf. 5.2). Similarly for *qu'est-ce*, there is a phonetic range from a voiceless vowel to [k] released into [s] and to its complete elimination, still with a trace of the removed plosive gestures in the lengthened fricative, which may, however, be reduced as well.

Vowel elision and reduction to schwa is also possible in unaccented syllables of content words if they are used in stereotyped phrases with semantic loss, e.g.

<i>Jesuis enchanté, monami.</i>	[ʃ:atɛmami]
<i>entends-tu ce que je te dis?</i>	[t:ã'tyskəʃtə'di]
<i>oui, papa</i>	[wi'p:a]
<i>non, attendez</i>	[nɔ̃'ã'tã:'de]
<i>pendant, jenesais pas, une demi-heure</i>	[pə'nã ʃ:pa yn dɛmi 'œ:ʁ].

Again a lengthening of the following or preceding consonant may remain as a residue of vowel elision.

### 5.6. Realization of laterals

The data offer examples for four types of reduction of laterals.

- Word-final [lə] syllables may be dropped altogether under certain rhythmic and linguistic conditions (see 5.5.1 and 2.).

- Prevocalic laterals may be deleted in the neighbourhood of high front vowels, especially in function words, more particularly before [y] and [ɥ]: *plus*, *pluie*, *je lui ai dit* [ʒɥe di], *celui-ci* [sɥi si] (with schwa deletion and reduction of the word by one syllable), *qu'ils le sont* [ki ez ɔ̃ y].
- Postvocalic laterals before consonants in function words are regularly deleted, especially in the personal pronouns *il(s)* (after a high front vowel) and *elle(s)* (*ellenepoutpas* [ɛnpø'pa]), but also in *quelque*.

The preconsonantal deletion of [l] in *il(s)* has become an established pattern: *il veut* [i vø], *il sera* [i sɛʁa], *ils se sont* [i s sɔ̃], *ils ont* [iz ɔ̃], *il lui* [i lɥi]. If *il* is followed by *y*, the semivowel [j] results: *ily avait* [j avɛ], *qu'ily avait* [k j avɛ], *ily en a* [j ɑ̃ a], *il n'ya que le* [j a k lə]. Before vowels, the lateral is preserved (*ila* [il a]), but [i] may be elided instead: *il aurait dû* [l ɔʁɛ 'dy]. If another function word following *il* loses its initial vowel (cf. 5.5.2), the lateral stays in spite of becoming preconsonantal: *il est aussi* [il t ɔ'si], *il est allé* [il t a'le], *il était ennuyé* [il tɛt ɑ̃'nyje], *il était écrasé* [iltɛtɛ'kraze].

Laterals require complex muscular adjustments of the tongue for central contact and lateral opening, which it may be costly to maintain in the dynamics of speech sound chaining, e.g. in the neighbourhood of [i], which requires a reversal to lateral contact and central opening of the tongue. These dynamic constraints are greatest in unaccented syllables, especially in function words. The consequence is therefore the reduction of laterals at the phrase-level, to adjust them to their articulatory contexts in patterns, as they have been found in the French data. Laterals in the context of high front vowels tend to be elided, more particularly in syllable-final position. Prevocalically, i.e. syllable-initially, before non-high vowels the lateral is preserved, and lateral–central stricture adjustment results in deletion of a preceding [i]. The lateral also stays if the preconsonantal position arises through vowel elision, which means that the production programme takes the post-lateral vowel into account. There may even be differences of duration and secondary articulation in laterals that become preconsonantal through vowel elision, as against laterals that are preconsonantal originally. One of Paul and Jean Passy's examples points in this direction: *il est dans le champ* ['il:dɑ̃'ʃɑ̃].

### 5.7. Realization of [ɥi]

The rather small datasets suggest that [ɥi] takes two opposed routes of development:

- The semivowel is dropped after labial consonants, particularly in the function words *puis*, *puisque* when they are unaccented, less readily under the accent and in unaccented syllables of content words, e.g. *puissance*. In *puisque* the reduction can go further to [ə]. This elimination of a rounded semivowel after a labial plosive finds its parallel in the phonotactic restriction of [w] to [tw] and [kw] in, e.g., English.
- [i] disappears, [ɥ] stays before vowels, or [y] before consonants, in the auxiliary verb *suis*, which, when immediately preceded by *je*, is regularly realised as [ʃɥ]/[ʃy], with a fricative that has strong lip rounding anyway:

*je suis arrivée* [ʃɥ aʁi've],

*je me suis vraiment rendu compte* [ʒ mɛ sy vʁɛmã ʁãdy 'kõt].

## 6. Comparison of French and German phrase-level reduction patterns

The data analysis presented in this paper shows a number of clear trends in French phrase-level speech production. They will now be summarized under the headings of consonant assimilation and consonant and vowel reduction/elision, and compared with the corresponding trends in German.

### 6.1. Assimilation

Consonant assimilation can involve phonation, manner of articulation or place of articulation/active articulator. These parameters are weighted differently in the two languages.

(1) French has regressive assimilation of voicing or voicelessness in obstruent clusters inside words and across word boundaries. The degree of phonatory adjustment depends on phrasal cohesion, and is more likely to be complete for assimilation of voicing than of voicelessness. Under equivalent segmental, prosodic and morphological conditions, German is, on the other hand, characterised by progressive assimilation of voicelessness, which results in a phonological switch to the fortis obstruent only for /z/. These different phrase-level patterns can be related to the different weight that is given to voicing in obstruents in the two phonological systems (cf. 5.3).

(2) Nasalization of voiced plosives in nasal environments, also across word boundaries, is a very common phrase-level assimilation in French. It occurs after nasalized vowels, most commonly before another nasal segment following, but it is also found when there is only a nasal consonant after it. Only the latter context has an equivalent in German, and again nasalization of voiced plosives is very frequent. The nasalization processes in the two languages have in common that they result from the imperfect synchronization of velic control with oral stricture formation in short-closure, lenis stops, due to different speeds of movement.

Fortis stops are usually not affected because their longer occlusions provide a temporal safety zone for the desynchronization to take effect, unless there are additional factors, such as shortening under reduced stress or bidirectional influence.

In addition to these identical production constraints in the two languages, there are also significant differences that have to be taken into account in the evaluation of the nasalization processes in the two languages. The bulk of the German examples for the structure 'voiced plosive + nasal consonant' are homorganic and therefore produced with nasal plosion (and related to canonical 'voiced plosive + schwa + nasal consonant'). In this articulatory constellation a slight desynchronization of velic control can transform the short-closure plosive into the corresponding nasal consonant. The French examples of the structure 'voiced plosive + nasal consonant' are not produced with nasal plosion, but involve a change of oral closure as well. And since coarticulation of articulators, resulting in place assimilation, has hardly been found in the data (cf. (3)), the sequence of plosive and nasal consonant is less interlocked in French than in German. Therefore the premature lowering of the velum for the following nasal would be less likely, but, on the other hand, the high raising of the voicing feature in French plosives could be accommodated by a relaxation of velic closure (cf. 5.4).

For the structure 'nasal consonant + voiced plosive', French does not offer any examples, whereas German does, especially in unstressed function words. But it may be expected that French also has nasalization in this context under the same conditions (cf. 5.4).

(3) Assimilation of place of articulation among plosives and nasal consonants has not been attested in the French data examined here, and I hypothesize that a larger database of spontaneous speech recordings will not change this result to any extent. The reason probably is a lack of coarticulatory interlocking of the different articulators (lips, tongue tip, tongue dorsum) due to French syllabification, which tends to attribute the elements in such consonantal clusters separately to the preceding and the

following syllable, reducing articulatory overlap. This tendency would be particularly strong in the contexts that produce the bulk of potential place assimilations, viz. 'plosive/nasal consonant + plosive/nasal consonant' across word boundaries, where [ə] comes and goes according to segmental, rhythmic and stylistic conditions (cf. 2) and thus highlights the distribution of the cluster elements over two syllables, even if the vowel is absent. For German, on the other hand, place assimilation in these contexts is well documented by the data, and may be related to a different type of syllabification in a foot structure.

## 6.2. Consonant and vowel reduction and elision

Reduction and elision include lenition of plosives and fricatives, change of lateral to central articulation, vowel fusion in hiatus and vowel elision.

- (1) All these processes are most frequent in unaccented syllables and particularly in function words. This applies to both languages.
- (2) Lenition of intervocalic voiced stops to approximants, and their deletion are found in both languages and can be explained as a reduction in the extent of articulatory gestures under the principle of economy of effort in casual speech.
- (3) The elision of laterals, especially in high vowel environments, is also a feature of both languages and is related to articulatory constraints in the sequencing of opposed central and lateral tongue strictures (cf. 5.6).
- (4) Vowel fusion in hiatus, like lenition, stems from a leveling of articulatory movements due to reduced effort. Comparing the two languages, this is a typical French feature, because in German, vowel sequences are rare. In French, hiatus conditions are additionally created by lenition, and both processes combine to reduce the number of syllables at the phrase-level.
- (5) Vowel elision outside hiatus follows from the same articulatory principle, but the two languages behave differently. In French, the elision of vowels may create consonant clusters, which are resyllabified in that one consonant gets attached to the preceding syllable, the other to the following one, provided French syllabification allows this. The well-known schwa deletion rules exemplify this tie-up of vowel elision with syllabification, and deletion of other vowels in French follows the same principle.

Another aspect of this is the fact that laterals or [ʎ] in word-final [lə] or [ʎə] syllables do not become syllabic when schwa is dropped, but that the consonant is either devoiced phrase-final, or the whole syllable is deleted, since it could not otherwise be resyllabified. Syllables may, however, contain voiceless vowel resonances, as a prefinal stage in the deletion process, for example in [p<sup>h</sup>sk<sup>h</sup>ʃpã] "parcequejepense" and [p<sup>h</sup>sk<sup>h</sup>ʃkrwa] "parcequejecrois", which are still trisyllabic and thus conform to French syllabification. In German, on the other hand, schwa, or vowels reduced to schwa in unaccented function words, are regularly elided, irrespective of syllabification rules, and surrounding sonorants become syllabic.

Another difference between the two languages in the area of vowel reduction is that although the change of vowels to schwa in unaccented syllables does occur in French, it is not so frequent and is restricted to function words. The weaker tendency to centralize vowels reduces the fluctuation of vowel duration. The combination of this feature with the syllabification patterns, which also block articulator overlap and assimilation, may be partly responsible for the impression of syllable timing in French. The deletion of vowels will not interfere with this syllable timing if elision only occurs when resyllabification into syllable-final and syllable-initial consonant clusters is possible. These aspects of vowel and syllable deletion will have to be investigated with a great deal more spontaneous speech data, not only through auditory evaluation but also by acoustic analysis, at the same time paying particular attention to phonetic residues of segmental reduction.

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