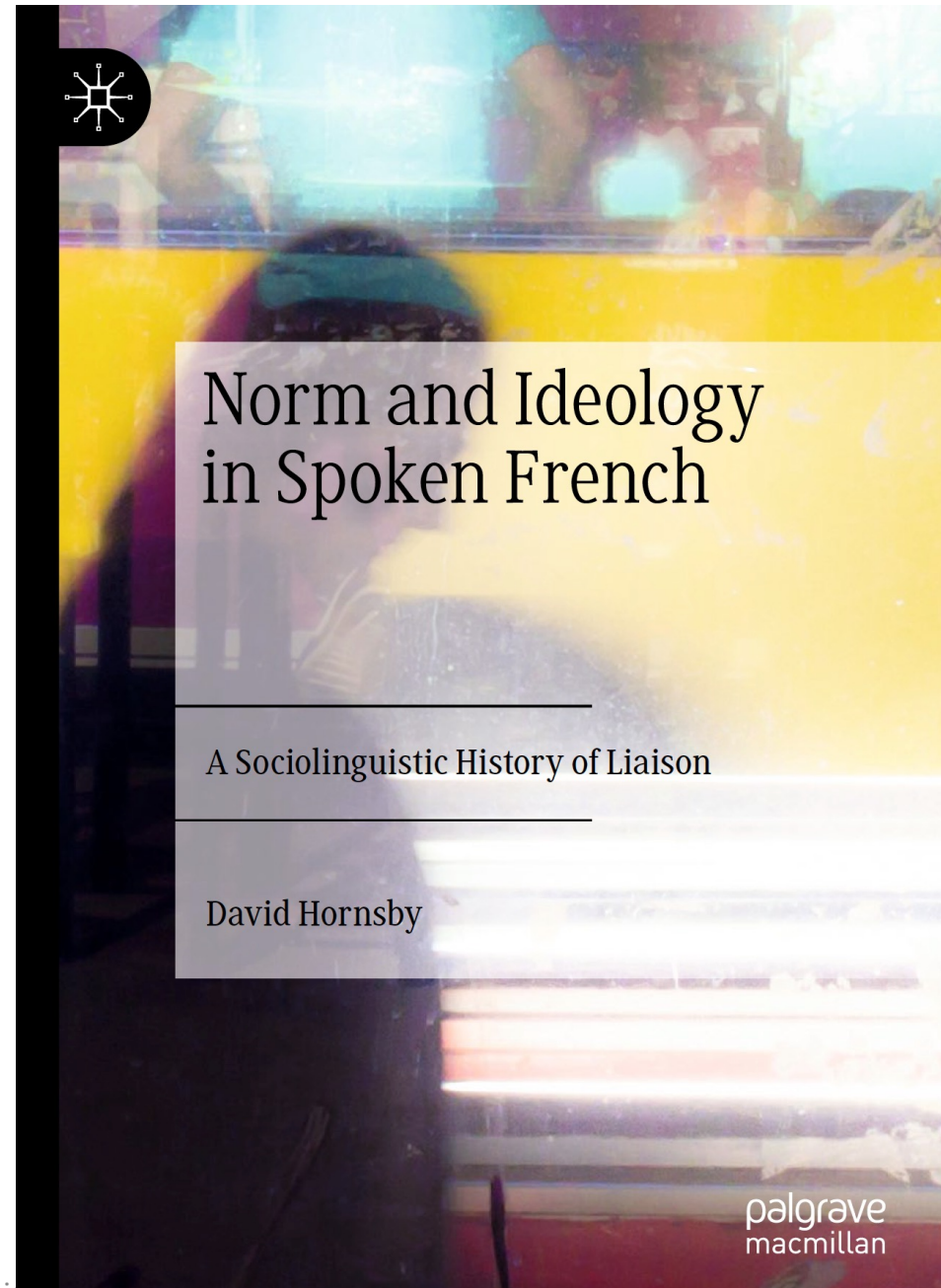


Notes on Liaison

Mostly from:





From David Hornsby,

Norm and Ideology in Spoken French: A Sociolinguistic History of Liaison, 2020:

Liaison is an external sandhi or ‘joining’ phenomenon which involves the pronunciation of a normally silent word-final consonant before a vowel. It bears some similarities, both historically and synchronically, to such English phenomena as ‘linking r’ in non-rhotic dialects (e.g. *a pair /r/ of trousers*) and indefinite article allomorphy (*a pear/an apple*). It is of particular interest in French because of the complex conditions under which it may/may not be realised.

It should first be noted that French final consonants may be stable or unstable, and are not as uncommon as is sometimes supposed: Tranel (1987: 154–55), citing Juilland's *Dictionnaire inverse de la langue française* (1965: 437–56), claims that consonant-final words in fact slightly outnumber those which end in a vowel. Stable consonants fall into two categories, the first of which emerged from the loss of final unstressed or 'mute' e (e-muet) in most varieties of French, including reference French (RF). As Posner observes (1997: 263), this vestigial orthographic final vowel, still realised as schwa [ə] in some meridional French varieties, has been seen historically to 'protect' preceding consonants from the elision which might otherwise have taken place, as can be seen for example in *vase, bonne, ingrate* (compare *vas, bon, ingrat*).

A second stable group comprises word-final consonants which either survived the large-scale erosion which took place between the twelfth and sixteenth centuries or were restored to pronunciation by grammarians at a later date (see Chap. 3), as in *chef, dot* or *tir*.

Unstable consonants are realised either consistently or variably in prevocalic position but not prepausally or before a consonant, for example *les* [lez] *enfants* but *les* [le] *filles* or *mettez-les* [le].

Liaison in French denotes the realisation of these unstable consonants in prevocalic position, and represents a particular case of the wider phenomenon of forward syllabification or enchaînement in French, by which word-final consonants become the onsets of following word-initial ones (e.g. *chef impressionnant*), which affects both stable and unstable final consonants.

Liaison occurs non-variably in some contexts (e.g. *ils*-[z]-*ont*; *mon*-[n]-*ami*), and variably in others (e.g. *trop*-[p]/∅-*aimable*; *les trains*-[z]/∅-*arrivent*).

So Question #1:

Is this phonology or allomorphy?

Historically, liaison consonants represent vestigial realisations of word-final segments which have been lost in all but prevocalic environments.

Liaison is blocked for a small, unproductive group of lexemes known inappropriately (for aspiration of orthographical h is no longer involved) as the *h-aspiré* set, consisting of fifth to eighth century CE Germanic borrowings which retained initial /h/. This consonant was later lost, leaving what amounts to an inaudible barrier to elision and liaison, setting this group apart from other orthographically h-initial lexemes, which follow the pattern of vowel-initial lexemes in these two respects.

<i>h</i>-initial	<i>h-aspiré</i> initial
l'homme	le hibou
l'haleine	la hache
les [lez] hirondelles	les [Ø] hiboux
cet hélicoptère	ce [Ø] héros

Liaison in contemporary French is traditionally seen to affect 6 consonants: /z/, /t/, /n/, , /p/, and /k/.

Table 2.2 Canonical RF liaison consonants

Liaison consonant	Examples	Liaison context
/z/	bons [z] amis soldats [z] américains les [z] enfants	plural adjective + noun plural noun + adjective plural determiner + noun
/t/	veut [t] -il? grand [t] homme ils arrivent [t] à l'heure	verb + clitic adjective + noun verb + complement
/n/	un/mon [n] accueil bien [n] aimable	article/possessive adjective + noun adverb + adjective
/ʁ/	léger [ʁ] accent aimer [ʁ] un enfant	adjective + noun infinitive + complement
/p/	beaucoup [p] aimé trop [p] aimable	adverb + complement
/k/-/g/	<i>long</i> [k/g] <i>été</i> sang [k/g] impur	adjective + noun set expression

Liaison in contemporary French with /p/ is essentially limited to two adverbs *beaucoup* and *trop*, while liaison with /g/ is listed as a possibility only with *long* by Tranel (1987: 174) as an alternative to the canonical /k/ in this context, which is seen as archaic.

Tranel (1987: 174) recommends /k/ only in the context of *sang impur* in the French national anthem *la Marseillaise*, but notes that even here it is unnatural for most speakers as liaison after singular nouns is generally very rare in modern French.

Voiceless /k/ has traditionally been preferred here in prescriptive works, recalling the position in Old French where, as in Germanic, final oral stops were devoiced (hence *grand [t] homme* in spite of a general tendency for masculine adjectives in liaison to correspond to the feminine form (here *grande*)). Devoicing affects the stops /d/ and /g/, but not /b/, which generally occurs either before mute e (see above) or in recent borrowings with a stable final consonant (*club, toubib*). No liaison occurs after final –mb sequences (e.g. *plomb*).

Conversely, voiceless fricatives such as /s/ became voiced intervocalically, hence [z] not [s] in liaison contexts, giving potentially three forms: zero, voiced and voiceless consonant.

This pattern can still be observed for the numerals *six* and *dix*, and until recently also for *neuf*, where [v] is heard prevocally. Linking with /v/ however represents a case of enchaînement rather than liaison, because the final consonant is now stable.

j'en ai six/dix/neuf	[sis] [dis] [nœf]
six/dix/neuf personnes	[si] [di] ([nœ])
six/dix/neuf ans	[siz] [diz] [nœv]

Encrevé (1988) – *un phénomène sociolinguistique inversé*:

Toutes les données connues et toute observation directe indiquent, en effet, que ce sont les locuteurs du français les plus scolarisés qui présentent le plus large système de variation sur la liaison. La partition traditionnelle entre liaisons obligatoires, facultatives et interdites, reprise à juste titre par tous les phonologues modernes, témoigne bien que, pour la liaison, même les tenants les plus stricts de l'homogénéité du bon usage n'ont pas pu renvoyer la variation à la ténèbre de la performance ou de l'agrammaticalité [...] la liaison oblige au contraire à chercher dans le « standard » la variation.

[S]ome liaisons are categorically made by all French native speakers, while others are variably realised. In a third set of environments, a final orthographical consonant is never realised in prevocalic position (e.g. after *et*).

While these essential facts about liaison have been known at least since the seventeenth century, this tripartite model of what came to be known as *liaisons obligatoires*, *facultatives* and *interdites* respectively was first set out fully and explicitly in the mid-twentieth century by Pierre Delattre, in three articles published in *French Review* (Delattre 1947; 1955; 1956).

Delattre's model remains influential more than seventy years after its initial elaboration, underpinning many later descriptive and prescriptive approaches.

While the obligatoires and interdites sections mirror the familiar *Dites... ne dites pas* columns of contemporary prescriptive works, most of Delattre's three articles are devoted to the more complex—and sociolinguistically more interesting—question of the determinants of *liaisons facultatives*, where the link consonant may or may not be realized.

Delattre (1947) outlines 10 *tendances générales* for his *facultative* category. These include warnings against (2) making liaisons across sense groups (*Le petit/attend sa maman*), or generally with /n/ after nasal vowels (6), except with a small set of adjectives, for example *mon, ancien* (6 and 7), where denasalisation of the vowel is also recommended. Short words (5) favour liaison, as do plurals rather than singulars (4) and transitions generally from grammatical or functional elements to lexemes with full semantic content (3) (*nous arrivons; les amis*).

From Pierre Delattre, “La Liaison en Français, Tendances et Classification”, 1947:

LA LIAISON EN FRANÇAIS, TENDANCES ET CLASSIFICATION

PIERRE DELATTRE

University of Pennsylvania



DEFINITION. La liaison est la survivance de quelques enchaînements consonnes finales de l'ancien français. A une époque antérieure, consonnes finales que l'on écrivait étaient prononcées (ah! le bel âge!).

Aujourd'hui, ces consonnes graphiques sont en grande majorité dans les mots isolés; mais dans la chaîne parlée, on les prononce quand l'union du mot à consonne finale avec le mot à initiale vocalique a été assez forte pour conserver, à travers les siècles, l'enchaînement ancien.

De là, le premier principe, qui pourrait suffire à résoudre tous les cas de liaison, de non-liaison ou de possibilité de liaison: *la liaison se fait dans la mesure où l'usage a consacré l'extrême étroitesse d'union de deux mots ou classes de mots:*

Ils entrent, mais: les gens/entrent.

Un petit habit, mais: un habit/étroit.

Dans l'enseignement des débutants, on peut s'en tenir à ce seul principe. Alors il suffit d'habituer les élèves à juger du degré d'union. S'ils font la liaison après *et*, on ne leur dit pas que *et* offre une exception et ne se lie jamais au mot suivant, on leur fait plutôt entendre que *et*, en réunissant deux groupes de mots, ne s'unit régulièrement ni à l'un ni à l'autre; on compare *et il* à *est-il* du point de vue de l'extrême étroitesse d'union: impossible de faire une pause dans *est-il grand*, mais on peut en faire une dans *et il vient*.

1. La liaison dépend du style. Elle se fait d'autant moins que le style est plus familier. On peut distinguer au moins quatre styles:

1. La conversation familière.
2. La conversation soignée.
3. La conférence.
4. La récitation des vers.

Dans la conversation familière, on ne fait pas ou presque pas de liaisons facultatives:

Des hommes/illustres/ont/attendu.

Dans la conversation soignée, on en fait une petite proportion:

Des hommes/illustres/ont attendu.

Dans la conférence, on en fait beaucoup:

Des hommes illustres/ont attendu.

Dans la récitation des vers on les fait toutes ou presque:

Des hommes illustres ont attendu.

2. Entre deux groupes de sens, la liaison est rare. Ce n'est que dans la récitation des vers qu'elle s'entend sans produire un effet étrange:

. . . Nos roses dans l'enclos ont été ravagées. . .

. . . Chantez, oiseaux! ruisseaux, coulez! croissez, feuillages! . . .

. . . Vous êtes, ô vallon, la retraite suprême. . .

. . . Toutes les passions s'éloignent avec l'âge. . .

(Hugo, Tristesse d'Olympio)

. . . Tous les preux étaient morts, mais aucun n'avait fui. . .

. . . Le soldat, en riant, parlait à la bergère. . .

(Vigny, Le cor)

Dans la conversation, la liaison ne se fait jamais entre deux groupes de sens. Comparez les deux exemples ci-dessous:

Le petit enfant.

Le petit/attend sa maman.

3. La liaison se fait surtout en passant d'un mot moins important à un mot plus important:

Nous arrivons. Les amis. Deux élèves. En entrant.

Une seule exception à ce principe: le pronom personnel après le verbe.

Est-il? A-t-il? Sont-ils? Entrent-ils? Allez-y.

4. La liaison se fait davantage au pluriel qu'au singulier. Elle peut servir à les distinguer l'un de l'autre: il y a tendance (pas obligation) à marquer le pluriel par une liaison en [z] et le singulier par l'absence de liaison.

Des soldats espagnols; un soldat/espagnol.

Des maisons à vendre; une maison/à vendre.

Les lilas et les roses; le lilas/et la rose.

5. La liaison se fait d'autant plus que le premier des deux mots est plus court:

*En un jour; depuis un jour.
Très utile; extrêmement utile.*

6. L'n des voyelles nasales résiste à la liaison facultative. Comparez deux à deux les exemples ci-dessous: dans les phrases de gauche la liaison est soit facultative, soit interdite dans le style de conversation mais possible dans un style plus soutenu; dans les phrases de droite la liaison est absolument impossible, quel que soit le style.

Avons-nous envoyé ça? a-t-on/envoyé ça?

Placez-vous en bas; placez-en/en bas.

Un repos/agréable; un chemin/agréable.

Un profit/énorme; un ballon/énorme.

Un temps/affreux; un plan/absurde.

Prêt à partir; bon/à voir.

Grand à ravir; vain/à souhait.

Affreux à voir; vilain/à faire peur.

Plusieurs arrivent; chacun/arrive.

Deux à deux; un/à un.

Après les nasales, donc, toute liaison qui n'est pas obligatoire est interdite. Les liaisons obligatoires se font après: *un, en, on, mon, ton, son, bien, rien* et les adjectifs qualificatifs en nasales.

7. Les adjectifs en nasales se dénasalisent dans la liaison avec le nom qui suit. La liaison est alors semblable à l'enchaînement du féminin correspondant.

<i>Un bon élève.</i>	<i>Une bonne élève.</i>
<i>Un ancien ami.</i>	<i>Une ancienne amie.</i>
<i>Un vilain habit.</i>	<i>Une vilaine affaire.</i>
<i>Un certain effet.</i>	<i>Une certaine espèce.</i>
<i>Au moyen âge.</i>	<i>Sa moyenne est bonne.</i>
<i>En plein hiver.</i>	<i>En pleine action.</i>
<i>Au prochain arrêt.</i>	<i>A la prochaine avenue.</i>
<i>Un vain effort.</i>	<i>Une vaine entreprise.</i>
<i>Le divin enfant.</i>	<i>La divine enfant.</i>
<i>Un humain intérêt.</i>	<i>Une humaine attitude.</i>
<i>Un lointain avenir.</i>	<i>Une lointaine association.</i>
<i>Un soudain effet.</i>	<i>Une soudaine affaire.</i>
<i>Un hautain aspect.</i>	<i>Une hautaine attitude.</i>
<i>Un souverain effet.</i>	<i>Une souveraine influence.</i>

8. Les seules consonnes passibles de lier sont: *s, z, x, t, d, n, r, p, g.*

Des amis amusants. Parlez-en chez elle. L'heureux homme.

Un petit homme lit un essai. Un grand homme prend un objet.

Pour arriver au premier étage. Vous êtes trop aimable.

Vous avez beaucoup aidé. Un long usage.

Pour *p* et *g*, la liaison est limitée aux mots: *trop, beaucoup* et *long*. “Sang impur” ne ferait naturellement jamais la liaison dans le style de conversation: on dirait [sã ěpyr], et non [sãkĕpyr] comme dans la *Marseillaise*.

9. Certaines consonnes subissent des changements dans la liaison. La tendance générale de ces changements peut s'exprimer ainsi: les fricatives se voisent et les occlusives se dévoisent.

Fricatives: *gros homme, heureux homme, neuf heures.*

Occlusives: *prend-il, grand homme, sang impur.*

Pour *g* il faut noter qu'on entend les deux prononciations [g] et [k] dans la liaison de *long*.

F n'est voisé que dans deux expressions: *neuf ans* et *neuf heures*. Ce sont les seules où il est senti comme liaison. Partout ailleurs, il reste sourd parce qu'il est senti comme enchaînement: *neuf élèves*. En réalité l'*f* de neuf est un cas d'enchaînement plutôt que de liaison: bien qu'on dise [nœ paʒ], on dit [paʒ nœf], et le mot isolé est [nœf] et non [nœ]. (Rappelons que la prononciation [nœ paʒ] est une survivance de la prononciation courante du XVI^e siècle, où toutes les consonnes finales tombaient devant une autre consonne. Il nous en reste des témoins dans: *béjaune* (*bec jaune*), *chef-d'oeuvre*, *cerf-volant*, et dans les numéraux 5, 6, 7, 8, 9, 10: *cinq pages, six pages, sept pages, huit pages, neuf pages, dix pages* [sɛ̃paʒ, sipaʒ, sɛpaʒ, ɥipaʒ, nœpaʒ, dipaʒ].)

Dans l'enchaînement, normalement, la consonne ne change pas de nature: *neuf élèves*. Comparez les exemples suivants:

Grand ami [grātami]; *grande amie* [grādami].

A tous égards [atuzegar]; *ils sont tous ici* [ilsõtusisi].

Dix albums [dizalbòm]; *j'en ai dix à vendre* [ʒānedisavādr].

Six et *dix* ne sont sentis comme liaison que devant le nom, l'adjectif et le pronom: *dix amis, dix aimables amis, six autres*.

10. La liaison contribue parfois à faire sentir ou à renforcer des oppositions de sens. Comparez les exemples suivants:

Un marchand de draps anglais. Un marchand de drap/anglais.
Une fabrique d'armes anglaises. Une fabrique d'armes/anglaise.
Un savant aveugle. Un savant/aveugle.
Est-il? Et/il. . .
Coupez-vous-en dix. Coupez-vous/en dix.
Les auteurs. Les/hauteurs.
Les uns. Les/Huns.
Un être. Un/hêtre.
En eau. En/haut

From Pierre Delattre, “Le Facteurs de la Liaison Facultative en Français”, 1955:

Dressons une liste de quelques types de séquences syntaxiques et évaluons leurs unions sur une échelle allant de 10 pour la plus forte à 1 pour la plus faible.

- 10: Entre le déterminatif et le nom: *des enfants*
- 10: Entre l’adjectif et le nom: *de beaux enfants*
- 10: Entre le pronom personnel et le verbe: *ils ont*
- 10: Entre le verbe et le pronom personnel: *ont-ils*
- 9: Entre l’adverbe et le modifié: *tellement aimable*
- 8: Entre la préposition et son complément: *pendant un jour*
- 7: Entre l’auxiliaire et le participe passé: *vous avez aidé*
- 6: Entre l’auxiliaire et l’infinitif: *vous allez aider*
- 5: Entre le nom et l’adjectif: *des enfants intelligents*
- 4: Entre le verbe et son complément: *il désirait un cadeau*
- 3: Entre le pronom et le verbe: *les miens attendront*
- 2: Entre le nom et le verbe: *les enfants attendront*
- 1: Entre la conjonction et ce qui suit: *pourtant il était là*
- 1: Entre la conjonction et ce qui précède: *il sortait et ne rentrait plus.*

Delattre lists three potentially important interactions between syntax and prosodic factors. The first of these is length: generally the longer the linked element, the weaker the syntactic bond and therefore the lower the likelihood of liaison. This is particularly true for subject-verb sequences: thus *les plus petits des enfants attendront* is less likely to show liaison than *les enfants attendront*; a longer second element (e.g. *les enfants attendront longtemps leurs parents*) would similarly tend to inhibit liaison. The importance of the first element in particular is recognised notably in the PFC project, which employs separate codings for mono- and pluri-syllabic words.

The second factor is intonation—a declarative, falling intonation favours liaison while a rising, interrogative one blocks it.

Finally, *accent d'insistance* on the first syllable may be accompanied either by lengthening the first vowel (e.g. *C'est IMpossible*) with liaison omitted, or by using liaison without enchaînement .

[sɛt#ɛ̃pɔsibl].

Four additional factors, argues Delattre, are purely phonetic and not affected by considerations of style or syntactic bonding:

- a. Vowel+Consonant sequences (VC) (e.g. *des noms amusants*) liaise more readily than Consonant+Consonant (CC) sequences (*des contes amusants*)
- b. Similarly, CC sequences allow liaison more readily than CCC ones (e.g. *des actes historiques*)
- c. Liaison is possibly also favoured where the vowels are similar (e.g. *vous avez été*) and disfavoured where they are not (e.g. *tu as été*)

While Delattre was ahead of his time in attempting to quantify syntactic cohesion as a key determinant of liaison frequency, his measure seems rather makeshift and the basis for determining the coefficients is less than clear: why are Auxiliary + Infinitive sequences assigned as score of 6, for example, while Pronoun + Verb sequences score 3?

The measure is also confusing in that it mixes syntactic and non-syntactic criteria. Delattre suggests, for example, that for Noun + Adjective sequences the bonding coefficient of 5 reduces to 1 when the noun is singular, while in the case of Determiner + Noun sequences the coefficient falls from 10 to 0 when *h-aspiré* nouns are involved, in spite of the fact that in neither case is the essential syntactic relationship between the conjoined elements affected.

Delattre's schema therefore appears to fall awkwardly between a measure of internal syntactic cohesion on the one hand and a general rule of thumb for determining liaison probabilities on the other.

Delattre's rather rough and ready measure of cohesion reflects the fact that, while there is general agreement that the rhythmic group or in Grammont's (1914: 130) terms *le mot phonologique* is the domain of liaison, the notion of internal cohesion on which it depends proves surprisingly elusive.

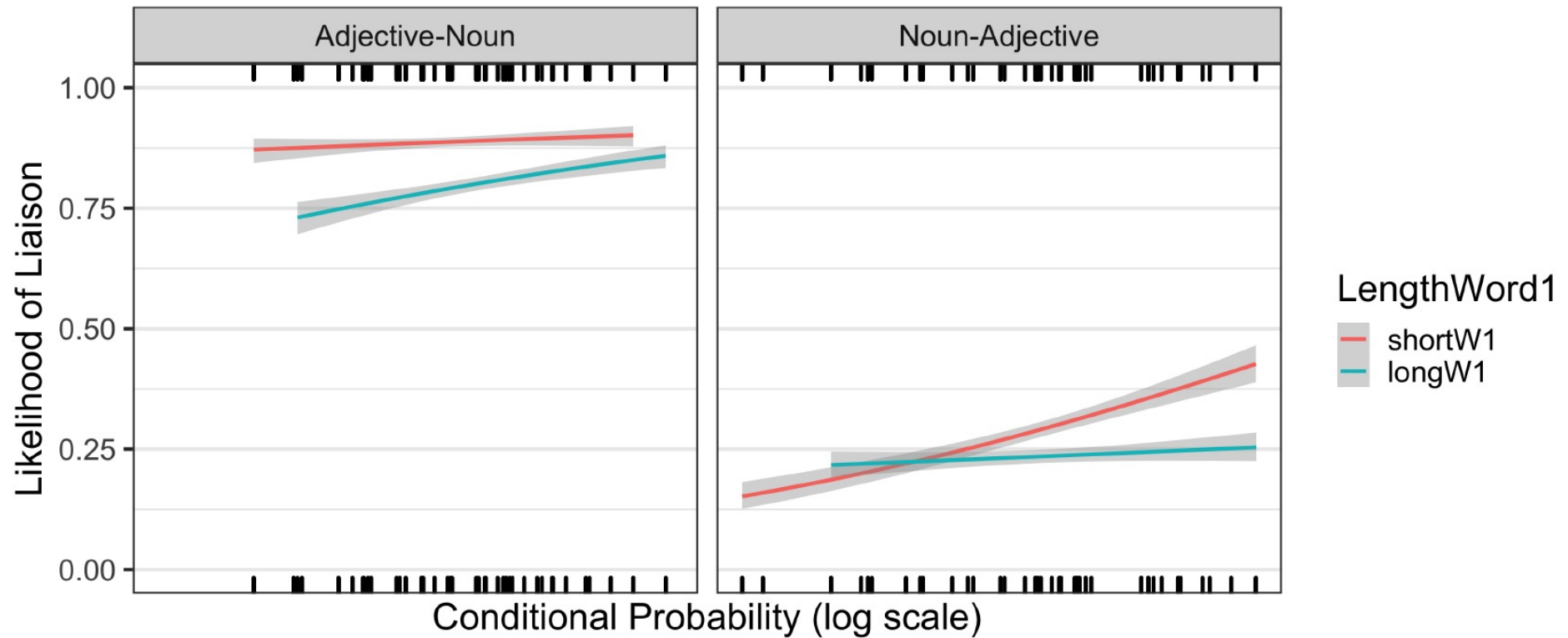
For Bybee (2005), syntactic cohesion is linked not to grammatical categories per se as Delattre assumes but to frequency of co-occurrence. Liaisons which in her terms are 'établies', which we can interpret as meaning obligatory, are those which historically have occurred frequently enough to be easily memorable, irrespective of grammatical category. [...]

Liaisons are more likely to persist, she argues, in high-frequency contexts, for the same reason as very common irregular verb forms are generally maintained. Thus, in sequences of the form Det + Noun + Adj non-liaison is more common than liaison, because vowel-initial adjectives in this schema constitute a minority and the default selection is for the liaison consonant not to be realised. Note that it is frequency of co-occurrence of different elements, rather than the frequency of individual linking words which is important.

Data from the PFC lend support to Bybee's frequency-based model. Liaison proves more frequent with *être* than with other verbs, but is considerably more common after *est* than after *était*, both of which show higher incidence of liaison than *étais*. Similarly, liaison with the prenominal adjective *grand* proves not to be invariable as one might expect of a prenominal adjective, showing a much higher incidence in the semi-lexicalized sequence *grand honneur* than in the less commonly occurring *grand émoi* (Durand et al. 2011: 116).

From Michael Wagner et al., “Liaison and the Locality of Production Planning”, LabPhon17(2020):

Fig 1: Conditional Probability, Length of Word1, Syntax



From Oriana Kilbourn-Ceron, "Predictability modulates pronunciation variants through speech planning effects: A case study on coronal stop realizations." *Laboratory Phonology* (2020):

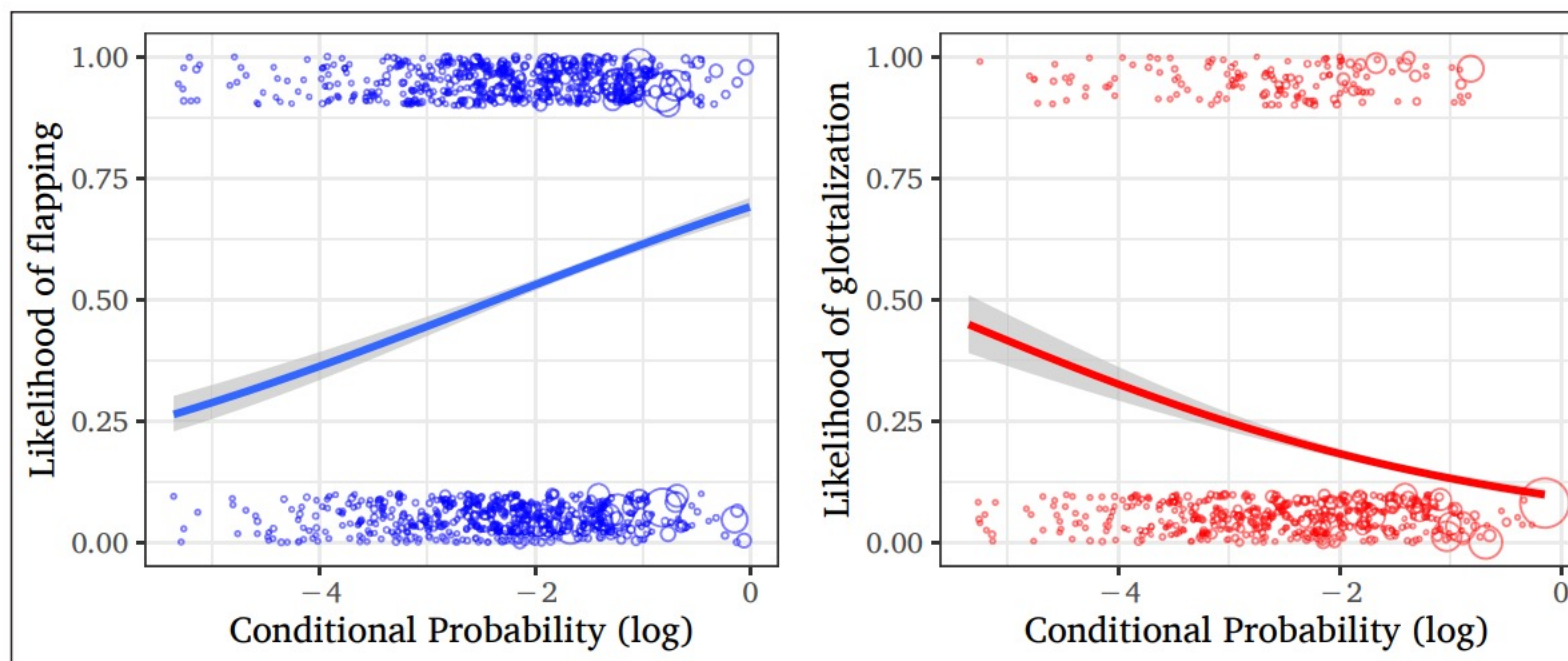


Figure 3: Relationship between Conditional Probability (of trigger word given target word) and proportion of tokens transcribed as flaps [dx] (blue, left panel) or glottal stops [tq] (red, right panel) in the Buckeye corpus. Solid lines and shading are linear smooths (GLM, logit-link) with 95% confidence intervals. Bubbles show density of observations, with size reflecting the number of observations at a given value on the x-axis.

In the absence of reliable empirical data, theoretical edifices have often been built on prescriptive models of French speech. Selkirk's highly influential (1972) work used Fouché's (1959) pronunciation manual as its source while Schane drew, inter alia, on Grevisse's *Bon Usage*.

Inordinate attention was often paid to examples divorced from actual usage: Durand et al. (2011: 116) cite for example the case of *sot aigle*, a sequence whose frequency in natural speech they describe as 'proche de zéro'.

Refinements to existing models have been made, and in some cases their theoretical bases called into question, as more empirical findings, most notably from the *Phonologie du Français Contemporain* project, have become available.

A particular focus of debate has been the status of the liaison consonant.

Here generative treatments have generally started from the assumption of an underlying consonant in the phonological representation of the link word W1, which is subject to deletion under specified conditions. This interpretation has advantages beyond presentational elegance, neatly capturing synchronic and diachronic regularities in the data. [...]

But for all its attractions, the notion of an underlying final consonant seems counter-intuitive from a synchronic point of view in that it takes realisation of the liaison consonant as the default and specifies a set of conditions under which it is blocked, in the face of abundant evidence both that French copes perfectly well with hiatus at word boundaries and that in many cases of variable liaison it is non-liaison which is the default or unmarked form.

Epenthetic approaches reject underlying final consonants in favour of insertion rules in liaison environments, while analyses based on suppletion posit separate long and short forms of W1 stored in the mental lexicon, to be realised in the surface under the appropriate rhythmic, syntactic, morphological and stylistic conditions. In both models the liaison consonant would have to be learned on a construction by construction basis [...]

High-frequency constructions are mastered first, and the full range of obligatory liaisons have generally been learned by age 3–5. Variable liaison is acquired later, generally by age 6–8, and shows much greater developmental variability, with children from socially advantaged homes learning at a significantly faster rate than their disadvantaged peers.

Rebecca Posner (1997: 265) has described liaison in modern French as ‘an uneasy half-way house between the regular enchaînement of the sixteenth century and a foreseeable complete disappearance of Old French word-final consonants’, the normative complexities of which continue to present, in Bruneau’s words (1927: 53), ‘un véritable casse-tête’ for native speakers.

As we shall see in Chap. 4, these complexities owe much to resistance by grammarians from the sixteenth century onwards to change from below in the direction of final-consonant deletion. Our task in this chapter, however, is to consider the causes and consequences of the changes affecting word-final consonants through which this ‘half-way house’ came about, and to determine how and why the liaison consonants came to be retained in modern standard French.

Two things about liaison remain unclear:

1. Is it insertion, epenthesis, or suppletion?
2. What theory/theories is/are behind Delattre's echelle of juncture strength?

Similar questions come up in many other contexts.

Some slides from my recent ICPG2020 talk....

Across the decades, some linguistic theories have postulated between 0 and 4 levels of prosodic phrasing, where “prosodic phrasing” refers to a non-recursive and intrinsically phonological kind of structure.

Is this a well-defined question with a clear answer? In my 1975 dissertation, I wrote

'Intonational phrasing'. . . is often discussed in terms of the location of ' commas ' ' pauses' 'intonation breaks ', etc., although not all examples lend themselves very easily to such treatment... We... lack a general theory of what 'intonation breaks' are. . . [Should intonation breaks] be viewed simply as a kind of marker inserted into phonological strings, as the 'comma' notation implies, or are they instead the various constituent boundaries of some sort of intonational constituent structure?

That passage was quoted in Ladd’s 1986 *Phonology Yearbook* paper, “[Intonational phrasing: the case for recursive prosodic structure](#),” which (as the subtitle indicates) argues that prosodic structure should be fully recursive.

And there have been several iterations of the idea that it's useful to think of inter-word junctures of many different types and/or strengths, rather than a simple hierarchy of simple phrase types.

The first example I ever encountered was (unpublished) work in the 1970s by Noriko Umeda, who was then wrestling with the problem of how to assign boundary types and strengths in text-to-speech synthesis. She asked naïve native speakers to mark boundaries in read passages – and unsurprisingly, she found that inter-annotator consistency was extremely low.

However, if she took the judgments of 100 annotators, divided them randomly into two groups of 50, and assigned to each inter-word juncture the percentages of annotators who put a boundary there, then the correlation between the two groups' percentages was excellent – 0.95 or better.

Similar work has recently been documented by Jennifer Cole et al., “Crowd-sourcing prosodic annotation”, *Computer Speech & Language* (2017) -- though that work can be interpreted as a way to approximate the “strict layers” that current canonical ToBI notation should give.

In fact, the original “break index” idea in ToBI (“Tones and Break Indices”) was a reflection of Umeda’s discovery, or at least my memory of it.

When the BU Radio Corpus was being created, Patti Price asked me for suggestions about prosodic annotation techniques. I observed that everyone agrees that English has some intonational features that are tropic to stress, and others that are tropic to junctures – and that one simple approach to phrasal annotation would be to assign a juncture strength to each inter-word boundary.

It was only later that the “break index” notation was assimilated to strict-layer theories of intonational phrasing.

But a more general (and perhaps multi-dimensional) notion of “prosodic juncture strength” clearly underlies intuitions about the role of prosody in *wanna*-contraction.

And it’s clear that human speech does involve inter-word junctures of variable strength and type, as a matter of phonetic fact.

We can see the symptoms in many aspects of articulatory and acoustic dynamics, as well as in experiments on speech perception.

Crucially, this junctural thicket is not simply the phonological residue of syntax.

It’s tied up with semantics, discourse, frequency and recency, “audience design”, and so on.

The role of frequency and predictability

In lenition and lexicalization phenomena like *wanna*-contraction, there are clear effects of formality, frequency/recency/redundancy, precision of articulation, and dialect/variety/micro-syntactic variation.

Consider this figure from [Kilbourn-Caron et al. \(2020\)](#), based on the treatment of word-final /t/ (at the end of the "target word") followed by a vowel-initial word (the "trigger word"):

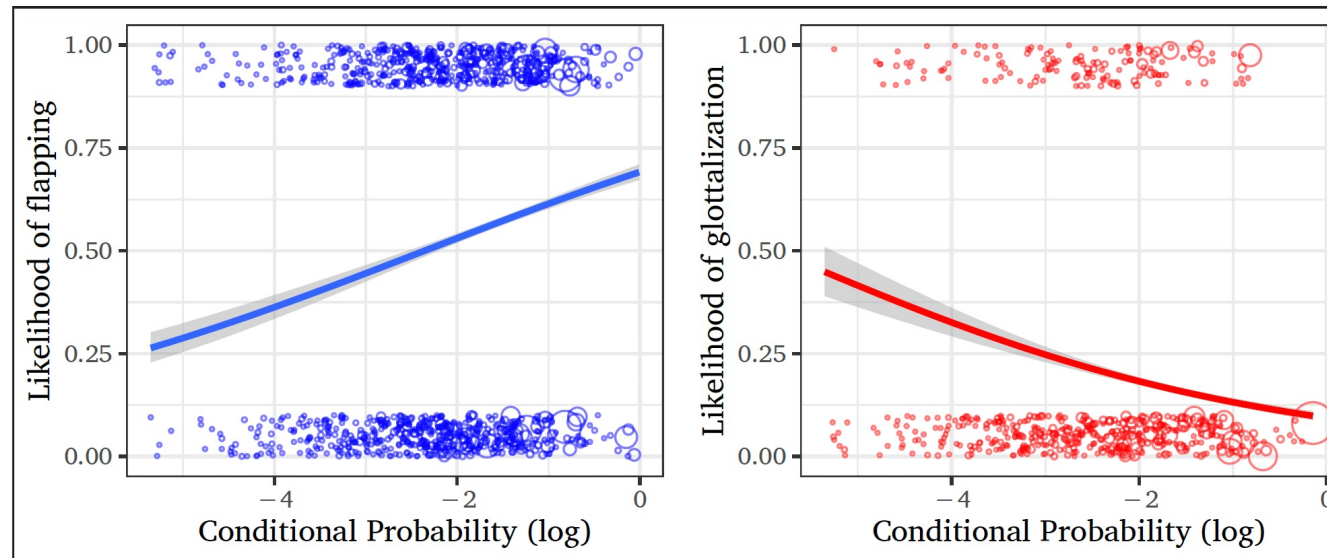


Figure 3: Relationship between Conditional Probability (of trigger word given target word) and proportion of tokens transcribed as flaps [dx] (blue, left panel) or glottal stops [tq] (red, right panel) in the Buckeye corpus. Solid lines and shading are linear smooths (GLM, logit-link) with 95% confidence intervals. Bubbles show density of observations, with size reflecting the number of observations at a given value on the x-axis.

Or these figures from [Yuan & Liberman 2015](#), dealing with the reduction of plosive consonants in Mandarin:

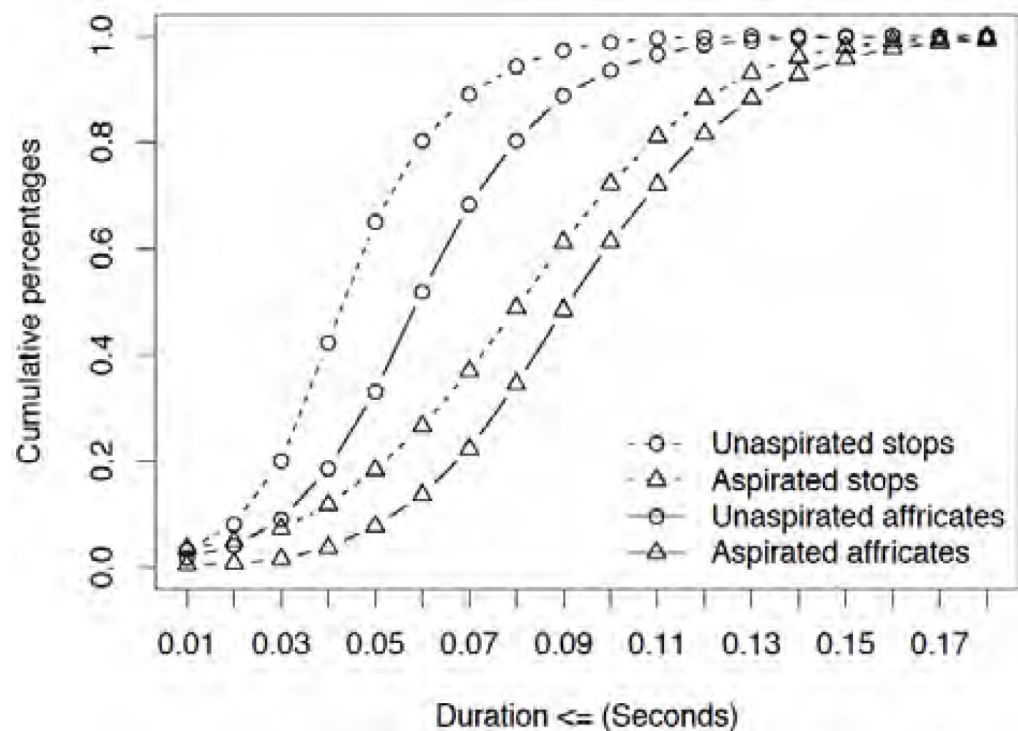


Figure 6: Duration distributions of the four types of plosives and affricates.

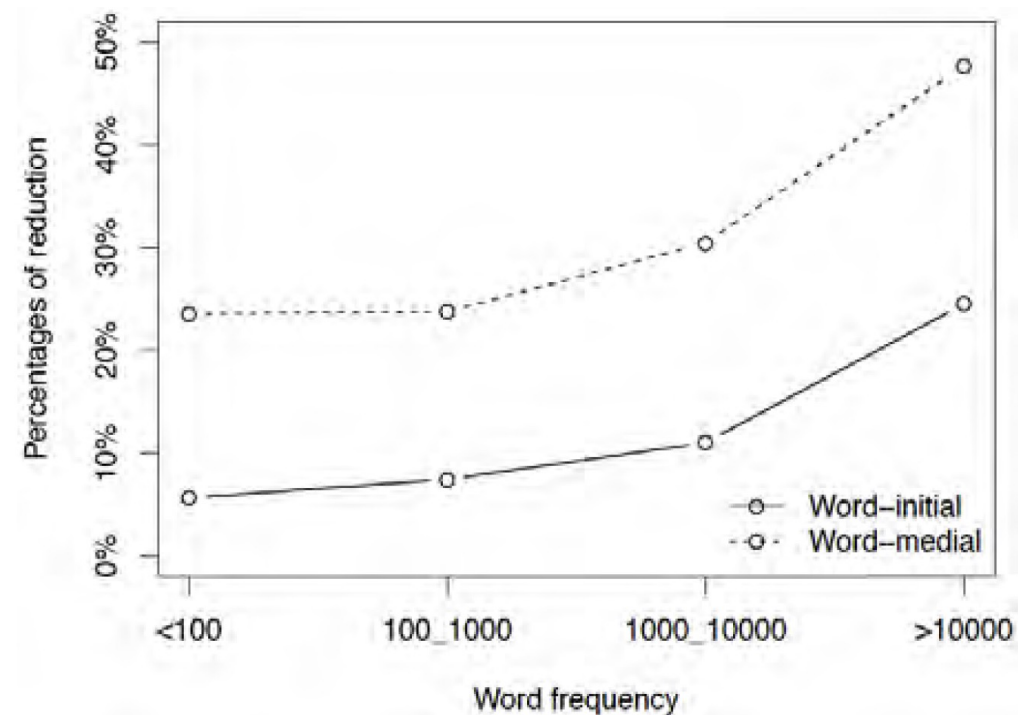


Figure 7: Effects of word boundary and word frequency on the reduction rates of plosives and affricates.

"For every consonant type we use the duration corresponding to its ~20% cumulative percentage as the threshold of reduction: 30 ms for unaspirated stops, 40 ms for unaspirated affricates, 50 ms for aspirated stops, and 60 ms for aspirated affricates."

And for an example of gradient junctural strength
modulating a completely different type of allophonic variation,
see Sproat & Fujimura, "[Allophonic variation in English /l/](#)", 1993,
or Yuan & Liberman, "[/l/ Variation in American English: A Corpus Approach](#)", 2011,

which looked at measures of /l/ "darkness" (= velarity) in five contexts

1. #LV1 (pre-stress word-initial onset)
2. V1L#C (post-stress word-final code)
3. V1L#V0 (coda or ambisyllabic)
4. V1LV0 (onset, code, or ambisyllabic)
5. V0LV1 (intervocalic word-medial onset)

...and found predictably gradient velarity,
rather than evidence for two qualitatively distinct "clear" and "dark" allophones.