# Two kinds of phonology

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# 1 Pure phonology

## 1.1 Spanish

|  | bilabial | labio-dental | dental | alveolar | alveo-palatal | palatal | velar |
|---|---|---|---|---|---|---|---|
| Voiceless stop | p |  |  | t |  |  | k |
| Voiced stop | b |  |  | d |  |  | g |
| Voiceless affricate |  |  |  |  | tʃ |  |  |
| Voiceless fricative |  | f | θ | s | (ʃ) |  | x |
| Voiced fricative | β |  | ð |  | (ʒ) |  | ɣ |
| Nasal | m |  |  | n |  | ɲ | ŋ |
| Lateral |  |  |  | l | ʎ |  |  |
| Glide | w |  |  | j |  |  |  |

### 1.1.1 Spanish nasal assimilation

A nasal is homorganic with an immediately following consonant.

| uno | one |  |  |
|---|---|---|---|
| beso | kiss | umbeso | a kiss |
| deðo | finger | undeðo | a finger |
| gato | cat | uŋgato | a cat |
| asko | mess | unasko | a mess |
| tonto | stupid | intelligente | intelligent |
| cambjar | change | supoŋgo | (I) suppose |

### 1.1.2 Spanish aspiration: educated Porteño

An /s/ is "aspirated" (loss of oral gesture) before a consonant. In Chile (and elsewhere) this context is enlarged to include word-final position.

| mas | more |
|---|---|
| mahɣrande | bigger |
| tomár | to take, to drink |
| tomás | you take (2nd sg.) |
| áɣwa | water |
| tomáhmasáɣwa | you take more water |
| moléhta | bothers (3rd. sg. verb present tense |
| bóhke | forest |
| áse | does (3rd. sg. verb present tense form of) *hacer* |

### 1.1.3 Stop/spirant relationship

| bala | ball | undeðo | a finger |
|---|---|---|---|
| beso | kiss | gato | cat |
| suβeso | his/her kiss | uŋgato | a cat |
| umbeso | a kiss | miɣato | my cat |
| elβeso | the kiss | elɣato | the cat |
| darβesos | to give kisses |  |  |
| deðo | finger |  |  |
| eldeðo | the finger |  |  |
| suðeðo | his/her finger |  |  |
| miðeðo | my finger |  |  |

A voiced obstruent is a stop phrase-initially and after a homorganic non-continuant sonorant.

### 1.1.4 Spanish aspiration: Porteno, Chileno

## 1.2 American flapping

Word-internally:

Let's focus first on those words where the *t* is surrounded on both sides by vowels, and let's then divide that group into four, based on the stress of the vowels on either side. Since we may speak of vowels as being either stressed or unstressed, that gives us four groups:

| | Following vowel: | |
|---|---|---|
| | UNSTRESSED | STRESSED |

| Preceding vowel: | | UNSTRESSED | STRESSED | |
|---|---|---|---|---|
| | UNSTRESSED: | any word ending in -ity: *sanity* sani[ɾ]y sani[tʰ]y | *Italian* I[tʰ]alian | (But: *Latin, button, satin, Martin*) |
| | STRESSED : | *Italy, writing* I[ɾ]aly | *Beethoven, rattan,, detail, retail, hotel* ho[tʰ]el | |

When a *t* is word-internal and surrounded by vowels, it must be realized as a flap [ɾ] when the preceding vowel is stressed and the following vowel is unstressed; it may be realized as a flap [ɾ] when the vowels on either side are unstressed; otherwise, it must be realized as a true [t].

We can ask what principle governs the realization of all the other word-internal *t*s. Making sure to avoid compound nouns (which function differently) like *anteater*, we find that no additional flaps come to light: all the flaps that we find occur when the following vowel is unstressed, but the nature of the consonants neighboring the t makes a difference.

- If any consonant immediately follows the *t*, then we cannot have a flap [ɾ]. If the following consonant is an *r*, the *t* and *r* together make a sound not all that different from the sound of *ch*; the sound is certainly not that of a flap, but it's not a true [t] either: words like *trick, troop, Petri, paltry*.

- If an *r* precedes the *t*, the flap is normal, with one special case. The normal cases include words like *artichoke, Sparta, Jakarta, article, artificial, aorta, mortal*, and *furtive*.

*Important, Latin:* In a sequence *t* + unstressed vowel + *n* follows, the *t* will, in the speech of many speakers, be realized as a glottal stop [ʔ]. This is what occurs in such important words as *important* (though many American speakers, such as President Jimmy Carter, from Georgia, have a flap in words like *important*). When a consonant other than *r* follows the *t*, the *t* will normally be glottalized, as in *Atkins, delightful, platform, beatnik, catnip, atmosphere, etc*.

No other cases present us with clearcut flaps. When a consonant other than *r* follows the *t*, the *t* will normally be glottalized, as in *Atkins, delightful, platform, beatnik, catnip, atmosphere*, etc.

When a consonant other than *r* precedes, such as an *l* or an *n*, as in *altitude* or *cantaloupe*, we generally get a [tʰ], though in casual speech, it is true that the combination of *lt*, and even more of *nt*, is produced so quickly that it is not possible to distinguish it from a rapid flap.

## 1.3 French

| Height | ‖ | Vowel | example | Vowel | example | Vowel | example |
|---|---|---|---|---|---|---|---|
| | ‖ | Front unrounded | | Front rounded | | Back | |
| High | ‖ | i | vie | y | du | u | tout |
| Mid: tense | ‖ | e | blé | ø | peu | o | mot |
| Mid: lax | ‖ | ɛ | tête | œ | peur | ɔ | donne |
| Low: | ‖ | | | | | a | plat |

There is a length contrast in Canadian French for the vowels *E* and *a*.

### 1.3.1 French nasal vowels

| Height | ‖ | Vowel | example | Vowel | example | Vowel | example |
|---|---|---|---|---|---|---|---|
| | ‖ | Front unrounded | | Front rounded | | Back | |
| Mid: lax | ‖ | ɛ̃ | plein | œ̃ | brun* | ɔ̃ | bon |
| Low: | ‖ | | | | | ã | dans |

### 1.3.2 French glides

| | |
|---|---|
| j | yeux, paille, pied |
| w | oui, Ouagadougou |
| ɥ | huile, lui |

### 1.3.3 French consonants

|                     | labial | alveolar | alveo-palatal | palatal | velar | uvular | laryngeal |
|---------------------|--------|----------|---------------|---------|-------|--------|-----------|
| Voiceless stop      | p      | t        |               |         | k     |        |           |
| Voiced stop         | b      | d        |               |         | g     |        |           |
| Voiceless fricative | f      | s        | ʃ             |         |       |        |           |
| Voiced fricative    | v      | z        | ʒ             |         |       | ʁ      |           |
| Nasal               | m      | n        |               | ɲ       | ŋ     |        |           |
| Liquid              |        | l        |               |         |       |        |           |
| Glide               | w      |          |               | j ɥ     |       |        |           |

### 1.3.4 Some Canadian phenomena

This is from "Le statut des consonnes de liaison : l'apport de données du français laurentien," Marie-Hélène Côté. I have translated a few sentences.

1. Affrication: la réalisation affriquée [ts ʣ] des occlusives alvéo-dentales [t d] devant voyelle ou glissante antérieure fermée [i y j ɥ ].

   - *tu dis* [tsy ʣi]
   - *diamant* [ʣjamã ]
   - *tuile* [tsɥɪl]

   Obligatory word-internally, except in recent borrowings from English (ex.*meeting, building*, pourtant autrement prononcés "à la française "). L'affrication est considérée variable aux frontières de mots, sans que l'on sache toutefois comment se comportent les consonnes de liaison par rapport aux autres consonnes susceptibles d'apparaître dans le même contexte.

2. High vowels are laxed in closed syllable, with an additional phenomenon of leftward harmony, regardless of whether the next word begins with a vowel (which would cause resyllabification).

   - jupe [ʒʏp]
   - route [rʊt]
   - fourchette [fʊrʃɛt]
   - minute [mɪnʏt]

   (a) Laxing occurs before a [stable] final consonant, including a feminine/gender marker:
       *maudite amie*    [moʣɪtami]

   (b) However, initial consonants, proclitics and liaison does not trigger laxing, even when resyllabification to the left is expected:

   |              |                   | tense           | lax               |
   |--------------|-------------------|-----------------|-------------------|
   | Liaison :    | *maudit ami*      | [moʣitami]      | *[moʣɪtami]       |
   | Initiales :  | *maudit tamis*    | [moʣitami]      | *[moʣɪtami]       |
   | Proclitiques | *Jordi t'amuse*   | [ʒɔrʣitamyz]    | *[ʒɔrʣɪtamyz]     |

   #### 1.3.5 More on Quebecois long vowels

   Denis Dumas CJL 1981 26:1. 1-58.

   | bajt      | bête        | bɛ:tsɪz    | bêtise      |
   |-----------|-------------|------------|-------------|
   | pwajl     | poêle       | pwɛ:lɔ̃     | poêlon      |
   | ãpajʃ     | empêche(nt) | ãpɛ:ʃe     | empêcher    |
   | majʁ      | maire       | mɛ:ʁɛs     | mairesse    |
   | fʁãbwajz  | framboise   | fʁãbwɛ:zje | framboisier |
   | najʒ      | neige       | nɛ:ʒa      | neigeait    |
   | paws      | passe(nt)   | pa:saʒ     | passage     |
   | pawl      | pâle        | pa:liʁ     | pâlir       |
   | ʁawʁ      | rare        | ʁa:ʁmã     | rarement    |

   Minimal pairs

   | bɛt  | bette    | bɛ:t  | [bajt]  | bête   |
   |------|----------|-------|---------|--------|
   | fɛt  | fait(e)  | fɛ:t  | [fajt]  | fête   |
   | pʁɛt | pret(e)  | pʁɛ:t | [pʁajt] | prêtre |

# 2 Departure from pure phonology

   i. Word boundaries

  ii. Changing one phoneme to another: neutralization—versus allophony. Flapping, vowel-Shortening in English, Spanish aspiration. Classic case of neutralization: vowel harmony.

 iii. Negative exceptions, and eliminating exceptions. KiHunde Plateau rule.

 iv. Phonetic naturalness and un-.

  v. Conditioning by morphosyntactic feature.

 vi. Positive exceptions: conditioning morpheme-by-morpheme. Spanish mid-vowel diphthongization.

 vii. Underlying contrasts without local surface contrast: Yokuts

viii. Derived contexts only. Good cases?

# 3 Departures from pure phonology: Word boundaries

It was not at all obvious at the time, but the strict Bloomfieldians (like Charles Hockett) disagreed sharply with the Sapirean view on this: The Bloomfieldian line was that no phonological generalization could involve a word-boundary. Sapir, and even more (if it is possible) Zellig Harris, disagreed mightily; phonology absolutely needs to refer to boundaries.

And where are boundaries found? To what extent does knowledge of syntax suffice to determine where phonological word-boundaries are? We still do not know the answer. Sometimes we do not know if there is a word boundary, and sometimes we do not know if a segment precedes or follows it (if it is there!). French illustrates this analytic uncertainty, though careful study has resolved most of the questions.

## 3.1 American flapping (bis) [ɾ]

The sounds of *lettuce* are no different from the sounds of the phrase *let us ...*, as in *let us begin!* If we wanted to mark the sound there, we would have to write *le[ɾ] us begin*.

The word *let*, when said in isolation, can end with either a "non-released" *t*, written [t˺] or a released *t*, written [tʰ].

| | |
|---|---|
| When the *t* of *let* comes at the end of a sentence (or more generally, a phrase): | Then it is pronounced as a glottalized *t* [tˀ]. |
| When *let* is followed by *us*: | Then the *t* is pronounced as a flap [ɾ]. |

    1. Unreleased [t˺]

          *let go*
          *let Mary go*
          *let Paul go*
          *let Tom go*

    2. Flap [ɾ]

          *let a man go free*
          *let a boy go home*
          *let him in the house*
          *let Amy do it*

Generalization 1:

When an English word ends in a *t*, that *t* is realized as a flap [ɾ] when a word immediately follows which begins with a vowel; otherwise the *t* is realized as a glottalized stop [tˀ].

### 3.1.1 Word-initial t:

| | |
|---|---|
| STRESSED: flap is impossible | She took a test (both *t*s followed by a stressed vowel) |
| | She ate ten cookies. |
| | She brought the ten largest cookies. |
| | The tedium can be overwhelming. |

| | |
|---|---|
| UNSTRESSED: flap impossible | True telepathy might be a boon to humanity. |
| | He met with a tenacious opponent in the final round. |
| | I tried to buy a tomato. |
| | I saw Toledo from the air (or, I saw Topeka...) |
| | It's not always easy to construct a topology for a fifteen-dimensional sphere. |

(I'm leaving five words out on purpose for now – the words *to, tonight, today, tomorrow* and *together*; we'll come back to them later. Yes, they would have flaps in them in many of these sentences, unlike all of the other *t*-initial words we are looking at here.)

In none of the phrases do we find a flap, and that hold true regardless of the stress, or lack of it, on the vowels before and after the t. So we have two quite different generalizations:

- Generalization 1: When an English word ends in a *t*, that *t* is realized as a flap [ɾ] when a word immediately follows which begins with a vowel; otherwise the *t* is realized as a glottalized stop [tˀ].

- Generalization 2: When an English word starts with a *t*, that *t* is realized as a true [t], not as a flap [ɾ].

Recall the generalization about word-internal (or as we say, word-medial) /t/?.

| | | Following vowel: | | |
|---|---|---|---|---|
| | | UNSTRESSED | STRESSED | |
| Preceding vowel: | UNSTRESSED: | any word ending in -ity: *sanity* sani[ɾ]y sani[tʰ]y | *Italian* I[tʰ]alian | (But: *Latin, button, satin,* |
| | STRESSED : | *Italy, writing* I[ɾ]aly | *Beethoven, rattan,, detail, retail, hotel* ho[tʰ]el | |

*Martin*)

### 3.1.2 The case of *today...tonight...tomorrow*

Words that begin with a *t* followed by an unstressed vowel, four of the most common words that spring to mind are *to, today, tonight, together*, and *tomorrow* – surely more quickly than *tomato* or, certainly, *Topeka*. And yet these five to-words *to, today, tonight, tomorrow, together* do not follow the generalization that I suggested above for words that beginning with a *t*: the five *to*-words do take a form with an initial flap [ɾ]:

- We're going to fly [ɾ]o Seattle on Monday.
- What are you going to see [ɾ]onight?
- Who will you see [ɾ]omorrow?

One possible analysis, using the notion of the syllable and syllabification:

i. First, all sounds are syllabified inside their own words. A consonant is always part of the same syllable with a vowel that immediately follows it.

ii. In American English, a consonant before an unstressed syllable may resyllabify to the left, to form an ending with the previous syllable. This is obligatory if the syllable on the left is stressed.

iii. After that, a *t* at the end of a word will become part of the first syllable of the next word if the next word begins with a vowel. (Why?) *But it also remains part of its original syllable.*

iv. A *t* that is part of two syllables becomes a flap.

Word-final *t* becomes a flap before a vowel by Principle 3.
Word-internal *t* becomes a flap in *Italy* by Principle 2, but not in *Italian*.
Word-initial *t* cannot become a flap, except in the case of the morpheme *to−*.

## 3.2 Spanish s-aspiration (bis)

In Chile (and other places), the right hand environment is expanded to include word-final position. So we find *mas alto* [mahalto]. An h between vowels is possible only if it is in word-final position.

## 3.3 German ich-laut, ach-laut

| | bilabial | labio-dental | alveolar | post-alveolar | palatal | velar | uvular | glottal |
|---|---|---|---|---|---|---|---|---|
| plosive | p b | | t d | | | k g | | ʔ |
| affricate | | pf | ts | tʃ dʒ | nasal | m | n | ŋ |
| fricative | | f v | s z | ʃ ʒ | ç | x | ʁ | h |
| approximant | | | | | j | | | |
| lateral approx | | | l | | | | | |

| | | front | | | | central | | back | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | -round | | +round | | | | | |
| | | short | long | short | long | short | long | short | long |
| high | tense | i | iː | y | yː | | | u | uː |
| | lax | ɪ | | ʏ | | | | ʊ | |
| mid | tense | e | eː | ø | øː | | | o | oː |
| | lax | ɛ | ɛː | œ | ə | | | ɔ | |
| open | | | | | | a | aː | | |

In the American context, the classic paper is Moulton Modern German Juncture, p. 214, 1947. He noted in his first pass:

> p. 214: The voiceless spirants [ç] and [x] are in complementary distribution with each other; [x] occurs only after central and back vowels and semivowels: [bʌx] 'brook', [na:x] 'towards', [nɔx] 'still', [ho:x] 'high', [bɣʊx]'breach', [bu:x] 'book',[ʔʌwx] 'also'; [ç] occurs only after front vowels and semivowels, and after consonants: [mɪç] 'me' [p'ɛç] 'hard luck', [k'ɣi:çt] 'crawls', [ne:çst] 'next', [hø:çst] 'highest', [ɣʌjç] 'rich',[ʔɔjç] 'you', [ʔɛlç] 'elk', [mœnç] 'monk', [dʊɣç] 'through'. We may therefore analyze [ç] and [x] as allophones of a single phoneme /x/.

Looking at more data (p. 218), Moulton noted that

> In utterances of only one syllable, /x/ occurs only after vowels, or after vowel plus /l n r/. In utterances of more than one syllable, we find /x/ occurring initially before vowels, where it shows its palatal allophone [ç]: /ˈxi:na:/ 'China', /xeˈmi:/ 'chemistry'. The complementary distribution fo [x] and [ç] remains uinchanged, hwoever: [x] occurs after central and back vowels and semivowels, [ç] in all other positions.

And on page 223, he wrote:

> There are, however, cases where [ç] also occurs after central and back vowels and semivowels, and the distinction between [x] and [ç] is meaningfully distinctive. Examples (with [ç] written in): /ˈku:xen/ 'cake' but /ˈku:çen/ 'little cow'(given as a nursery word); /ˈʃta:xen/ 'stung' but /maˈma:çen/ 'little mama'; /ˈbrauxen/ 'need', but /ˈfrauçen/ 'dog's mistress'. The above examples illustrate unstressed [x] and [ç]; examples of stressed [x] and [ç] are: /raˈxi:tis/ 'rickets', /maˈxandel/ 'juniper brandy'; but /da:ˌçi:na:(zoˈgro:sˌist)/ 'since China is so large' /voˈçe:miker(ˌarbaiten)/ 'where chemists (work).
>
> . . . If we accept a segmental phoneme of open juncture, we can amend this statement to read: /x/ appears as [x] after central and back vowels and semivowels, but as [ç ]after all other segmental phonemes (including, of course /+/). [More about realization of /+/ omitted here.]

[See also Orrin Robinson, Whose German?, passim.]

We find two sounds corresponding to the spelling *ch*. One of them is a palatal fricative, [ç], as in the word *ich*, which means I, and the other is a velar fricative, [x], as in the word *Mach*. Most of the occurrences of these sounds occur after the first vowel of the word; here are some typical examples:

a. Bu[x]   book    Bü[ç]er   books
b. Lo[x]   hole    Lö[ç]er   holes
c. Ba[x]   brook   Bä[ç]e    brooks
d. Bau[x]  belly   Bäu[ç ]   bellies
e. i[ç]    I
f. bre[ç]en   break
g. Lei[ç]e    body (corpse?)
h. man[ç]     many
i. Dol[ç]     dagger
j. dur[ç]     through

The examples in a-g suggest a simple generalization, and it does indeed hold for a very large proportion of the data: [ç] appears after a front vowel, and [x] appears after a back vowel. The examples in i-j illustrate another fact, which is that when we consider words where the ch appears after the first vowel and a consonant—we might say, in the environment $C_0VS\_$, where $S$ can be n,l, or r—then we always find [ç]. It is not only tempting, it is nearly right, to say:

In German, the phoneme /x/ surfaces as [x] immediately after a back vowel, and as [ç] elsewhere.

a. Frau[ç]en    mistress (of an animal)
b. Häus[ç]en    little house
c. Kuh[ç]en    little cow

## 3.4   French: Analysis, Marie-Hélène Côté

Again, this is from "Le statut des consonnes de liaison : l'apport de données du français laurentien," Marie-Hélène Côté. I have translated a few sentences.

- Consonne de liaison: *le petit ami*
- Consonne finale stable: *la petite amie*
- Consonne initiale stable: *le petit tamis*
- Consonne proclitique: *le petit t'amuse*

i. Consonnes finales : Les CL sont des consonnes finales du Mot$_1$
 A. Truncation : Les CL sont des consonnes stables qui chutent dans des contextes de non liaison
 /døz/ /ami/

 B. Suppletion : Les CL sont des consonnes stables appartenant à des allomorphes distincts /dø, døz/ /ami/

 C. Analyse autosegmental : Les CL sont flottantes par rapport au squelette ou à la syllabe, avec une représentation distincte de celle des consonnes stables /dø(z)/ /ami/

ii. epenthetic consonants : Les CL sont insérées par épenthèse
/dø/ /ami/

iii. Initial consonants : Les CL sont des consonnes initiales du Mot$_2$
/dø/ /zami/

iv. Morphemic consonants : Les CL correspondent à des morphèmes affixaux
 A. Prefixal analysis : Les CL sont des préfixes du Mot$_2$
 /dø/ /z+ami/

 B. Suffixal analysis : Les CL sont des suffixes du Mot$_1$ /dø+z/ /ami/

v. CONSONNES INTEGREES A DES : Les CL font partie de constructions plus larges que le mot et (partiellement) lexicalisées
/døz ami/

### 3.4.1   Liaison and word-boundary phenomena

i. Affrication: la réalisation affriquée [ts dz] des occlusives alvéo-dentales [t d] devant voyelle ou glissante antérieure fermée [i y j ɥ ].
- *tu dis* [tsy dzi]
- *diamant* [dzjamã ]
- *tuile* [tsɥɪl]

Obligatory word-internally, except in recent borrowings from English (ex.*meeting, building,* pourtant autrement prononcés "à la française "). L'affrication est considérée variable aux frontières de mots, sans que l'on sache toutefois comment se comportent les consonnes de liaison par rapport aux autres consonnes susceptibles d'apparaître dans le même contexte.

ii. High vowels are laxed in closed syllable, with an additional phenomenon of leftward harmony, regardless of whether the next word begins with a vowel (which would cause resyllabification).
- jupe [ʒʏp]
- route [rʊt]
- fourchette [fʊrʃɛt]
- minute [mɪnʏt]

iii. ɛ  tends to open to [a] or [æ] in two contexts: en finale absolue de mot et devant la séquence [r]+consonne. Sociolinguistically marked, on the way out. Si les prononciations ci-dessous sont familières et relativement fréquentes, les jugements sur l'ouvertude des [ɛ] dans des contextes lexicaux moins habituels sont plus difficiles à recueillir.

- épais [epæ]
- ferme [færm]
- merci [mærsi]

Based on native speaker judgments: Les données présentées dans les sections suivantes sont basées sur les jugements de locuteurs natifs (dont les miens). Il ne s'agit ni d'une étude de corpus ni d'un recueil systématique et il serait souhaitable que ces étapes viennent compléter à l'avenir les données actuelles. Je note cependant que les jugements sur les données ci-dessous sont d'une stabilité remarquable et ne présentent pas de variation inter-locuteurs appréciable.

### 3.4.2 Liaison and vocalic phenomena

(a) Laxing occurs before a stable final consonant, including a feminine/gender marker:

*maudite amie*  [moʤɪtami] damned friend (fem.)

(b) However, initial consonants, proclitics and liaison does not trigger laxing, even when resyllabification to the left is expected:

|  |  | tense | lax |  |
|---|---|---|---|---|
| Liaison : | *maudit ami* | [moʤitami] | *[moʤɪtami] | damned friend (masc.) |
| Initiales : | *maudit tamis* | [moʤitami] | *[moʤɪtami] | damned sieve (masc.) |
| Proclitiques | *Jordi t'amuse* | [ʒɔrʤitamyz] | *[ʒɔrʤɪtamyz] | J. amuses you. |

La phrase *Jordi te parle* pourrait ainsi être syllabée [ʒɔr.ʤit.parl] ; c'est du moins la syllabation régulièrement suggérée dans les analyses de la distribution du schwa.

*Jordi te parle* [ʒɔrʤitparl] *[ʒɔrʤɪtparl] Jordi speaks to you.

The failure to find laxing indicates either that the clitic does not resyllabify leftward into the coda, or else that laxing is sensitive to lexical, not syllabic structure. [JG: Or there is an organization of rules that includes the possibility that a laxing is a word-level rule, and is not fed by phrase-level resyllabication. ]

Reighard (1986) argüe en fait que le relâchement est lexicalisé, comme l'illustrent des paires (quasi-)minimales commes *cheap/chip* [tʃip]/ [tʃɪp] *Pise* [piz]/*quiz* [kwɪz].

(c) The facts regarding the lowering of [ɛ] go in the same direction as those regarding laxing (final stable Cs behave differently). Les données relatives à l'ouverture de [ɛ] vont dans le même sens que celles sur le relâchement, en ce que les consonnes finales stables sont celles qui se démarquent par leur comportement. Lowering is impossible before a final consonant, but variable in the other three cases. L'ouverture est impossible devant une consonne finale, mais elle est variable devant les trois autres catégories de consonnes :

| Finales : | *parfaite insulte* | [parfɛtẽsʏlt] | *[parfætẽsʏlt] |
|---|---|---|---|
| Initiales : | *mauvais traitement* | [movætrɛtmã ] | [movɛtrɛtmã ] |
|  | *parfait touriste* | [parfæturɪs] | [parfɛturɪs] |
| Proclitiques : | *Gervais t'invite* | [ʒærvætẽvɪt] | [ʒɛrvɛtẽvɪt] |
|  | *Buffet t'insulte* | [byfætẽsʏlt] | [byfɛtẽsʏlt] |
| Liaison: | *mauvais endroit* | [movæzã drwa] | [movɛzã drwa] |
|  | *parfait imbécile* | [parfætẽbesɪl] | [parfɛtẽbesɪl] |

Walker (1980, 1984b) exclut l'ouverture de [ɛ] devant les consonnes de liaison. Mes propres jugements sur ces données et ceux de locuteurs laurentiens interrogés indiquent que l'ouverture est possible, avec un contraste entre, par exemple, *parfaite insulte* (sans ouverture) et *parfait imbécile* (ouverture possible). Il faut toutefois noter qu'il est difficile de placer des consonnes de liaison après un [ɛ] final dans des contextes de liaison naturels. La liaison après *était, serait, dès* et *après*, par exemple, est au mieux très marquée en français laurentien spontané. Mais, dans la mesure où on peut envisager la liaison, l'ouverture du [ɛ] final ne paraît pas exclue.

Laxing and lowering thus indicate that liaison consonants act more like initial Cs (no laxing, possible opening of vowel). But with adjectives like *plein*, which always have a nasal vowel [ẽ] in a non-liaison context, while in liaison context allow either the nasal vowel or its corresponding oral vowel [ɛ]. But le [ɛ] de *plein* ne peut s'ouvrir de la même façon que celui de *mauvais* ou *parfait* ci-haut.

*plein été* [plɛnete] [plẽnete] *[plænete]

The [n] liaison C behaves like a fixed final consonant, unlike the [z] of liaison in *mauvais* or the [t] de liaison de *parfait*. This supports the analysis supplétive des formes de liaison avec les adjectifs prénominaux qui impliquent un changement de voyelle entre la forme de liaison et la forme de non liaison, analyse motivée au départ par des faits tout à fait distincts de ceux présentés ici (Tranel, 1990 ; Côté, 2005 ; voir aussi Morin, 1986). *Plein* serait lexicalisé /plẽ plɛn/, avec une consonne finale fixe. Cela explique l'absence d'ouverture de [ɛ] en contexte de liaison puisque la voyelle n'est pas finale de mot. Pour les adjectifs " normaux ", seule la forme de non liaison est lexicalisée (ex. *mauvais* /movɛ/), ce qui permet l'ouverture de la voyelle finale, si l'on considère que les consonnes de liaison ne sont pas des consonnes finales.

Le contraste entre *plein* et *parfait / mauvais* pose problème pour les analyses dans lesquelles les consonnes de liaison des adjectifs sont lexicalisées comme consonnes finales stables (dans une forme de liaison supplétive ou non). Si les formes de liaison de *plein* et parfait ont la même structure, il est difficile d'expliquer que l'ouverture du [ɛ] ne soit possible que dans un cas. Cela concerne notamment l'analyse récente de Plénat (2008), même si celle-ci résout d'autres difficultés déjà avancées pour les consonnes de liaison conçues comme consonnes finales stables.

### 3.4.3 Liaison and consonantal phenomena

Initial Cs are strongly affricated, as we see: Consonnes initiales sont donc forcément affriquées, comme le montrent les exemples suivants :

(a) *grand Tibet* [grã ʦibɛ]

(b) *il est divin* [jeʤivẽ]

Affrication is variable for other Cs (L'affrication est variable pour toutes les autres catégories de consonnes ):

3. Finales: *trente idées* [trã tide] [trã ʦide]

4. Proclitiques :

- *Jean t'imite (bien)* [ʒã timɪt] [ʒã ʦimɪt]
- *quand t'imites Papa* [kã timɪt] [kã ʦimɪt]
- *champ d'images* [ʃã dimaʒ] [ʃã ʤimaʒ]
- *grand iguane* [grã tigwan] [grã ʦigwan]
- *il est immense* [jetimã s] [jeʦimã s]

5. Liaison :

Liaison consonants do not behave here like initial consonants—consequences for analysis of vowel effects. Note that even proclitic consonants do not affricate obligatorily (despite their attachment to the next word), suggesting that affication is partially lexicalized?? But we can go further in the comparison of liaison consonants and the proclitic Cs and final Cs. Canadian speakers agree that affrication is more probable with proclitics than with liaison Cs, and less probable with stable final Cs. The pronunciation without affrication of *Jean t'imite* is possible but marked.

On peut cependant aller plus loin dans la comparaison entre les consonnes de liaison et les consonnes proclitiques et finales. Les locuteurs laurentiens s'entendent sur le fait que l'affrication est plus probable avec les proclitiques qu'avec les consonnes de liaison, et moins probable avec les consonnes finales. La prononciation sans affrication de *Jean t'imite* est perçue comme possible mais marquée, ce qui n'est pas le cas pour les consonnes de liaison et les consonnes finales.

D'autre part, une construction avec dislocation à droite, fréquente en français laurentien, nous permet de comparer plus directement les consonnes de liaison et les consonnes finales. Cette construction est également explorée par Tranel (1990), Côté (2005) et Plénat (2008). Dans les deux phrases suivantes, l'affrication paraît plus naturelle dans la première, où l'élément disloqué est précédé d'une consonne de liaison, que dans la seconde, qui implique une consonne finale stable. La pause devant l'élément extraposé est optionnelle. S'il y a pause, elle intervient après la consonne finale fixe (auquel cas il n'y a pas d'affrication) mais avant la consonne de liaison (ce qui permet l'affrication). Le fait qu'une pause puisse intervenir entre la consonne de liaison et le Mot₁ peut être interprété comme problématique pour les analyses qui font des consonnes de liaison des éléments lexicaux du Mot₁ ; mais voir Plénat (2008) pour une réponse possible à cette objection.

1. *j'en ai un grand, iguane* [ʒã neœ̃ grã tigwan] [ʒã neœ̃ grã ʦigwan]

2. *j'en ai dix-sept, iguanes* [ʒã nedisɛtigwan] [ʒã nedisɛʦigwan]

Il est raisonnable de penser que l'affrication dépend du degré de proximité ou d'association entre la consonne cible et la voyelle suivante, du point de vue lexical, prosodique ou syntaxique. Lorsque les deux segments sont soudés lexicalement, l'affrication est catégorique, et plus la frontière qui les sépare est forte, plus l'affrication est difficile. Si l'affrication est moins fréquente avec les consonnes de liaison qu'avec les proclitiques, cela suggère que les consonnes de liaison sont moins fortement soudées au mot suivant que les consonnes clitiques. Cela fournit un argument contre les analyses des consonnes de liaison comme des préfixes du Mot₂. Si l'on suppose que les préfixes sont encore plus dépendants du mot auquel ils se rattachent que les proclitiques, on s'attendrait à ce que des consonnes préfixales s'affriquent davantage, ce qui n'est pas le cas des consonnes de liaison. Le lien lexico-phonologique entre la consonne de liaison et le mot suivant est cependant plus fort que celui qui unit les consonnes finales fixes au mot suivant, ce qui n'a rien de surprenant dans la mesure où la présence des consonnes de liaison exige celle d'un Mot₂, alors que les consonnes finales fixes sont le plus souvent indépendantes du mot suivant. Il est pourtant un contexte de liaison où l'affrication d'un [t] de liaison est catégorique. Il s'agit des constructions avec inversion du sujet pronominal, comme dans l'exemple suivant :
*doit-il* "must he" [dwaʦɪl] *[dwatɪl]

Liaison consonants behave like fixed initial consonants in front of post-verbal enclitics, a conclusion which seems all the stronger since this kind of subject inversion, practically non-existent in spoken French and found only in formal speech, should (one would expect) prefer the lack of affrication. Judgments, however, are clear and unanimous that affrication is obligatory. Ils constituent un solide argument pour la lexicalisation des consonnes " de liaison " à l'initiale des enclitiques, tel que proposé par Morin (1979a, b, 1986) et Côté (2005). Les pronoms postverbaux *y, en, il(s), elle(s)* et *on* sont donc lexicalisés /zi, zã , tɪl, tɛl, t ɔ/, les pronoms objet apparaissant dans les constructions impératives avec la consonne [z] (ex. *vas-y, manges-en*), les sujets dans les constructions avec inversion impliquant la consonne de 3 e personne [t].

1. Les consonnes de liaison précédant les pronoms enclitiques sont des consonnes initiales.

2. Les consonnes de liaison qui accompagnent les adjectifs du type bon et plein, qui présentent une voyelle nasale dans les contextes de non liaison et une voyelle orale dans les contextes de liaison, sont des consonnes finales.

3. D'autres consonnes de liaison, notamment celles de adjectifs prénominaux qui ne présentent pas d'alternance vocalique, partagent à la fois des propriétés des consonnes initiales et finales.

Les consonnes de liaison de ce dernier type ne correspondent simplement ni à des consonnes finales ni à des consonnes initiales. Cela rejoint la conclusion de Walker (1980 : 220), pour qui les consonnes de liaison " function neither as syllable-final [...] nor as syllable-initial ". Ces consonnes de liaison ne semblent pas non plus pouvoir être assimilées à des préfixes du Mot$_2$, puisque la frontière qui les sépare du mot suivant apparaît plus forte que celle qui sépare les pronoms proclitiques. Ces résultats sont a priori compatibles avec des analyses de type épenthétique ou constructionniste, dans lesquelles les consonnes de liaison n'appartiennent ni au Mot$_1$ ni au Mot$_2$. Cela rendrait compte de leur comportement hétérogène par rapport aux processus segmentaux, qui répondent à des contraintes variées. Mais ces approches sont toujours en attente de formalisations suffisamment détaillées.

## 3.5  Zuni

Stanley Newman: Zuni grammar, 1965.
"In a word of more than one syllable, the final -V or -Vʔis zeroed before another word beginning in h or ʔ....frequently the second consonant of a cluster is itself zeroed before a zeroed -V or -Vʔ."

Review by Irvine Davis, IJAL 1966. Davis writes, "This means that one kind of reduction that occurs at word boundaries is of the type:

$-CV_1$ or $CʔV_1 + ʔV_2 > $ -$CʔV_2 \approx -CV_2$-

"What Newman has failed to note is the fact that this reduction results in the occurrence of presumed allophones of the velar stop in environments in which they ought not to occur."

| /k/ | [k] | _{o,u} |
| | [k$^y$] | elsewhere |

| | | | |
|---|---|---|---|
| ɬanakʔo + ʔa·k$^y$a | > | ɬanak a·k$^y$a | the fox went away |
| susk$^y$i + ʔa·k$^y$a | > | susk$^y$a·k$^y$a | the coyote went away |
| ɬanakʔo + ʔelaʔk$^y$a | > | ɬanak elaʔk$^y$a | the fox stood up |
| susk$^y$i + ʔelaʔk$^y$a | > | susk$^y$elaʔk$^y$a | the coyote stood up |
| ɬanakʔo + ʔok$^w$ik$^y$a | > | ɬanak ok$^w$ik$^y$a | the fox woke up |
| susk$^y$i + ʔok$^w$ik$^y$a | > | susk$^y$ok$^w$ik$^y$a | the coyote woke up |

Davis: "These facts...indicate that k and k$^y$ are emerging as phonemically distinct entities in Zuni." (84).

Zuni: Newman responds

"I would not be willing to go so far as to introduce a new phonemic distinction in order to accomodate these reduction phenomena... The system works in such a way that...the final vowel...determines the allophonic character of the preceding k phoneme, regardless of whether the vowel is actualized or zeroed by reduction. I am aware that a reduced vowel is 'not there' and, in a conventional treatment, should be ignored. But reduced vowels in Zuni invariably determine the palatal or velar articulation of the preceding k; and, if this is the case, it seems reasonable to describe the phonology in these terms rather than to seek a descriptive circumlocution...."

"Admittedly, the solution is not ideal. It is based upon the theory that 'silent vowels' exert an environmental influence. But it offers the simplest explanation of the phenomena, and it works.

To Davis's solution there are...the following objections:

(1) It adds an unnecessary phoneme to the inventory.

(2) It assumes that a phonemic description should apply to allophonic phenomena between words as well as within words. (188)."

# 4  Neutralization versus allophony.

Flapping, vowel-Shortening in English, Spanish aspiration.

# 5 Negative exceptions, and eliminating exceptions.

## 5.1 American English: low front tensing

*Sam and sang*

First the pure phonology. An incomplete description, first:

| Phoneme | Phone | Context |
|---------|-------|---------|
| /æ/ | [eᵊ] | _{m,n} |
|  | [æ] | elsewhere |

| Phoneme | Phone | Examples | | | | |
|---------|-------|----------|-------|-----|-----|-------|
| /æ/ | [æ] | cap | [k–p] | [eᵊ] | Sam | [s–m] |
|  |  | cat | [k–t] |  | tan | [t–n] |
|  |  | pack | [p–k] |  | Nam | [n–m] |
|  |  | nap | [n–p] |  | Nan | [n–n] |
|  |  | Nat | [n–t] |  | dam | [d–m] |
|  |  | knack | [n–k] |  | Dan | [d–n] |
|  |  | gap | [g–p] |  | cab | [k–b] |
|  |  | bat | [b–t] |  | bad | [b–d] |
|  |  | back | [b–k] |  | bag | [b–g] |
|  |  | half | [h–f] |  | half | [h–f] |
|  |  | calf | [k–f] |  | calf | [k–f] |
|  |  | have | [h–v] |  |  |  |
|  |  |  |  |  | math | [m–θ] |
|  |  |  |  |  | bath | [b–θ] |
|  |  |  |  |  | mass | [m–s] |
|  |  |  |  |  | jazz | [ǰ–z] |
|  |  |  |  |  | cash | [k–ʃ] |
|  |  | bang | [b–ŋ] |  |  |  |
|  |  | sang | [s–ŋ] |  |  |  |
|  |  | gang | [g–ŋ] |  |  |  |
| /æ/ | [æ] | can | [k–n] | [eᵊ] | can't | [k–nt] |
|  |  |  |  |  | (tin) can | [k–n] |
|  |  | have | [h–v] |  | cad | [t–n] |
|  |  | has | [h–z] |  |  |  |

## 5.2 KiHunde Plateau rule

# 6 Phonetic naturalness

Spanish S-aspiration.

# 7 Conditioning by morphosyntactic feature

# 8 Positive exceptions: conditioning morpheme-by-morpheme

Spanish mid-vowel diphthongization.

# 9 Underlying contrasts without local surface contrast

Yokuts

# 10 Derived contexts only

. Good cases?

# 11 Layers of phonology (morphophonology)