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**RJC Cotexte, contexte, situation**

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# Role of context on the perception of syllable composition by French and English listeners as a function of their dominant language

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## 0. INTRODUCTION

- 1 The aim of this paper is to follow a lead that ‘ambisyllabicity’ (Kurylowicz, 1948) is an important part of English phonology, especially for learners of English as a second language (Trammel, 1993/2008). ‘Ambisyllabicity’ implies the syllabification of a consonant as being part of two juxtaposed syllables (therefore being both the coda of a syllable and the onset of the following one) (Bouzon, 2004) “if it occurs immediately after a short vowel [...] that is the nucleus of a stressed vowel” (Yavaş, 2006) and immediately before an unstressed syllable.
- 2 The notion of ‘ambisyllabicity’ is close to that of ‘resyllabification’ (Kahn, 1976; Myers, 1987) except that it concerns an internal rather than an external juncture (Redford et Randall, 2005). I will present here a preliminary perception experiment on syllabic composition and ‘recomposition’ by French and English listeners as a function of the context in which a syllable is presented (isolated vs. in a word). This paper also serves to clarify the specificity of the context in which ambisyllabicity may occur (which is quite restrictive) and to take a look at French and English speakers’ attitude regarding ‘ambisyllabicity’.
- 3 This paper supports some of the assumptions that can be found in the literature, as those of Fallows (1981), Treiman & Danis (1988) and Bouzon (2004) who have provided evidence

for the existence of ‘ambisyllabicity’ through psycholinguistic experiments or phonetic analyses.

## 1. EXTERNAL AND INTERNAL JUNCTURE

- 4 Word syllabification may vary according to context (isolated word vs. word presented in a sentence which often implies some ‘resyllabification’). As an example of external juncture one may have isolated words such as <an> /ən/<sup>1</sup>, <elephant> /elefənt/, <is> /ɪz/, <in> /ɪn/ and <here> /hɪə/, but if we put them together in a sentence we get “an elephant is in here” that we could roughly transcribe as [ənnelefəntɪzɪn hɪə], the repeated sounds ([nɪn, tɪt, or zɪz]) not being considered as 2 separate sounds but as belonging both to the preceding and the following syllable. Similarly, it seems that a syllable’s composition (e.g. CV or CVC) may vary according to its context (isolated syllable vs. syllable presented in a whole word that implies syllabic ‘recomposition’).

## 2. ACOUSTIC SYLLABLE

- 5 Furthermore, as word boundaries do not always correspond to syllable boundaries (external junctures), syllable boundaries may not always match boundaries between two sounds – as in the case of ‘ambisyllabicity’. Besides, even if some automatic speech-to-recognition systems do detect boundaries between sounds, between syllables and between words, the precise location of a syllable’s boundary is not always obvious due to coarticulation (since sounds overlap). This argues in favor of the acoustic existence of the syllable which is viewed here as no less legitimate than the acoustic existence of sounds.

## 3. PERCEPTUAL AND COGNITIVE SYLLABLE

- 6 Even though the so-called “syllable effect” (you can identify a syllable faster in a word which starts by this syllable, /pal-/ being more rapidly identified by French native speakers in French word “palmier” than in French word “palace”) does not necessarily apply to all types of intervocalic consonants nor to all languages (Content et al., 2001), the syllable has a perceptual and cognitive reality (Mehler et al., 1981). Somewhat similarly to the relationship which holds between a phoneme and a sound, I argue that the perceptual and cognitive syllable is not necessarily an exact replica of the acoustic syllable but rather a phonologically based representation, related to the phonotactic rules of the listener’s dominant language (in the case of a monolingual: his/her mother tongue; in the case of a bilingual: his/her preferred and most fluent language). Phonemes and sounds are no easier to identify and to segment than syllables but no linguist would deny their phonological and related physical existence.
- 7 Nevertheless one must readily admit that differences between languages may make it more or less easy to segment utterances into syllables. Leaving apart the fact that some languages are rather “syllable-timed” (like French) or “stress-timed” (like English), which might well be a very important factor though (Albercrombie, 1967), if we compare English to French, the English language has a few more phonemes (more than 45 for English and less than 40 for French, vowels and consonants included, without including ‘triphthongs’<sup>2</sup>

for English) and more complex syllabic structures, which suggests that English has a larger repertoire of syllables than French. I guess we can consider such repertoire as even much larger if one considers the independent storage of stressed and unstressed syllables.

- 8 Lexical access may proceed from any identified phoneme or syllable but, as Cutler and Norris showed (1988), if the search is syllable-initiated it will be easier and faster to access and detect a word.

#### 4. AMBISYLLABILITY: PHONOLOGICAL KNOWLEDGE THAT ENGLISH NATIVE SPEAKERS HAVE

- 9 According to Eimas (1999) and his analysis of Cutler et al. and Pallier et al.'s works, "early experience with phonologically different languages and the resulting acoustic-phonetic differences in the speech signal may result in different processing strategies by adult listeners." His argument is presented below.

"Whereas monolingual speakers of French, which is a syllable-timed language, segment speech into syllabic representations that are presumably used for lexical access and recognition (Cutler et al., 1986; Pallier et al., 1993), a study with bilingual French and British-English speakers (Cutler et al., 1992) showed that listeners whose dominant language was French showed clear evidence of syllabification, but only for French materials and not significant for British-English materials. Listeners whose dominant language was British English, a stress-timed language that is also marked by ambisyllability, showed no evidence of syllabification for English or French materials, as was true for monolingual speakers of British English (Cutler et al., 1986). To accommodate these results, Cutler et al. (1992) argued that different segmentation strategies fall into two classes: restricted because they depend on language specific phonological processes (and their acoustic-phonetic consequences) for development, and unrestricted because they are available to all language users, most likely even after having acquired a restricted strategy. [...] Cutler et al. (1992) have argued that the acquired restricted syllabic-segmentation procedure is optional. It can be "switched off" when its use may prove to be inefficient. This is, they contended, what presumably occurred when French-dominant bilinguals were processing British-English materials: after long exposure to British English, they learned that a syllabic segmentation is, with sufficient frequency, inefficient. Monolingual French speakers, in not having the long exposure to English, have not learned to inhibit a syllabic-segmentation strategy with English words, and thus attempt to syllabify English, and do so relatively efficiently."

[Eimas, P. D., 1999, "Segmental and syllabic categories", JASA, Vol.105, N°3, 1901-1911]

- 10 As a matter of fact, French speakers – be they monolinguals or French learners of English as a second language – are not readily aware of "ambisyllability" and thus lack native-like English naturalness when producing English utterances.

#### 5. THE CONTEXT IN WHICH AMBISYLLABILITY APPEARS

- 11 Ambisyllability, which implies the belonging of a consonant to two juxtaposed syllables usually in a same word<sup>3</sup>, regularly appears in English in the context [CVCV] where the

first vowel is short and stressed and the second vowel is unstressed (Yavaş, 2006; Ryst, 2008). Actually, ambisyllabicity seems to be hardly found after a phonologically and phonetically stressed long vowel (monophthong as in <leader> or diphthong as in <later>), nor after an unstressed syllable nor between two stressed vowels (e.g. in two syllable words with a separable stressed prefix as <rewrite> and in some two syllable compound words as <bye-bye>).

- 12 According to the results of a preliminary experiment presented in this paper, if processing of isolated syllables is similar for French or English native speakers, auditory perception of syllabic structure in the context of whole words seems to depend on the phonotactic rules of the dominant language. Thus, when hearing the English word “city”, a “French-dominant” listener would generally perceive it as being syllabified <ci-ty> (as in French word “cité”) whereas an English-dominant listener would rather choose between one of the two other options: <cit-y> or <cit-ty>.

## 6. A PRELIMINARY AUDITORY PERCEPTION EXPERIMENT

### 6.1. AIM OF THE STUDY

- 13 The aim of this preliminary experiment is to test, with a limited number of subjects, if the experimental method (namely “gating”) could validate our hypotheses. The aim was also to define which hypotheses such an experiment could answer to. The main goal is to check the syllabic segmentation strategies listeners tend to use and what it could tell us about the perception mechanisms of French and English listeners, as a function of their dominant language. Moreover segmentation processing in bilinguals is also investigated in this paper, with special stress on language dominance rather than on their mother tongue.

### 6.2. METHOD

- 14 Gating (Grosjean, 1980)<sup>4</sup> consists in presenting a spoken language stimulus in segments of increasing duration, starting at the beginning of the stimulus: “The first segment [or gate] is normally very short (e.g. 20-30 msec) and the last one corresponds to the entire stimulus” (Grosjean, 1996). This paradigm entails any linguistic stimulus of interest (sound, syllable, word, phrase, sentence) and gates can correspond to time intervals or to linguistic units. The gating experiments presented here entailed sounds, syllables and words; they took place partly in Paris (France) in June-July 2008 and partly in Washington D.C. (United States of America) in July 2009. The 1st step entitled «gating » proper (step 1b) was preceded by a short training session (step 1a). This experiment also included a step of auditory perception and transcription of syllables presented individually (step 2) and a step with a forced choice among different specific syllabic cuttings relying on audio recordings of English native speakers (step 3).

#### 6.2.1. PARTICIPANTS

- 15 The pilot perception experiment presented here (Ryst, 2009) was conducted on a sample of 16 listeners (12 participants in France and 4 in the US).

- 16 The initial pilot experiment did not include any French-English bilingual participant having lived more than ten years in an English speaking country, which explains why I had to add participants directly found in an English-speaking country.
- 17 Among these 16 participants, 13 are women and 3 are men, including three French native speakers with a low level of English exposure - from 0 to 12 months (FR ESL beg.), three French native speakers with a higher level of English exposure - from 1 to 8 years in an English speaking country (FR ESL adv.), three French-English bilinguals who have been living more than ten years in the USA but with a high level of French exposure (FR-EN French-dominant), a French-English bilingual who has been living more than 15 years in the USA and who is English-dominant (FR-EN English-dominant), three English native speakers with less than ten years of exposure to a French speaking country - from 2 weeks to 10 years (EN FSL English-dominant), three English-French bilinguals who are native English speakers and who have been living more than 10 years in France - from 10 to 40 years (EN-FR French-dominant). For the French native speakers, their French accent is either Parisian (for all monolinguals) or Auvergnat (for two of the bilingual speakers).
- 18 None of the 16 participants considered in this paper were informed about 'ambisyllabicity' before the experiment (I excluded here all deviant participants, either because they were informed about ambisyllabicity before the experiment (2), because they were strongly considering themselves English-dominant even though they clearly appeared to be French-dominant (1), or because they were QuebecFrench-dominant (1). These purposely excluded participants raised hope for other interesting leads that will not be discussed here.

### 6.2.2. EXPERIMENTAL CONDITIONS, PLACES AND INSTRUCTIONS

- 19 In France, all the experiment sessions took place in a quiet room (either at Paris 8 University, at Paris 3 University<sup>5</sup> (see Photo 1)<sup>6</sup>, at the participant's place or at my place). In the USA, the experiments took place in relatively quiet rooms (at the French Embassy's restaurant<sup>7</sup> out of lunch time, in office rooms at OAS<sup>8</sup> or at PHO<sup>9</sup>). The decision about the

location was always made according to the participant's preference (the equipment being mobile, as far as quietness of the place was guaranteed).



Photo 1. A participant getting prepared to listen to the first step of the auditory perception experiment in a quiet room (ILPGA, Paris 3 University, Paris, France).

- 20 A Gating<sup>10</sup> interface (Figures 1 and 2) designed by Roussi Nikolov (see URL reference below) was used at all steps of this pilot perception experiment. In the training part, I used a personalized “gating” cutting (step 1a: 8 segments => 2 words), as in the three steps described thereafter:
- 21 -step1b. “personalized gating” with segments of increasing duration (34 segments);
- 22 -step2. identification of isolated syllables (1st and 2nd syllable presented independently, 18 segments);
- 23 -step3. conscious syllable segmentation task with a forced choice between 3 written possibilities (8 words).
- 24 The material used was limited to a personal 12.1 inches’ laptop (Fujitsu Siemens, Amilo Si 1520), the Gating tool (personalized with specific instructions - Figure 1) and audio headphones.

## Gating Experiment 1

- 25 In this task, spoken English stimuli are presented to you in segments of increasing duration and you are asked each time to propose (that is to write down with great care) the WHOLE segment being presented and to give a confidence rating after each segment.
- 26 Segments may be words or not. Pay special attention to the end of the segment.
- 27 Transcribing a segment may seem difficult: you are only asked to do your best! There are no wrong answers. You can add comments to your transcription if you need to.
- 28 This is a training part so that you could get used to the gating experiment.
- 29 Are you ready? Any questions?



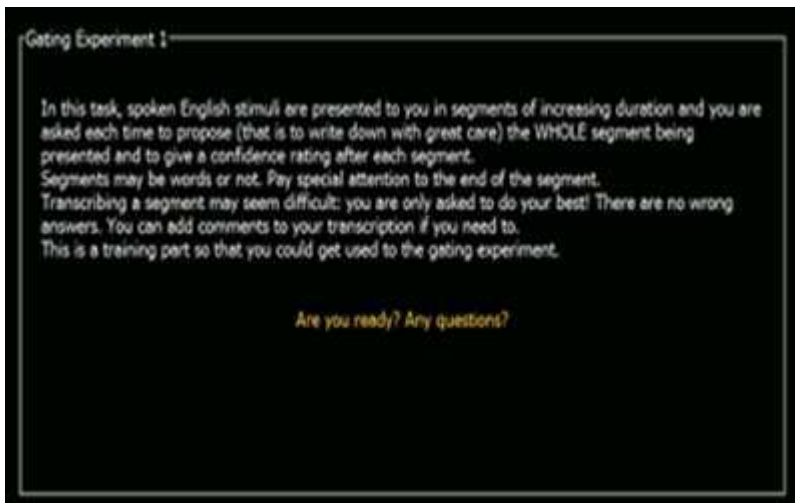


Figure 1. Instructions presented to the listeners just before steps 1a and 1b.

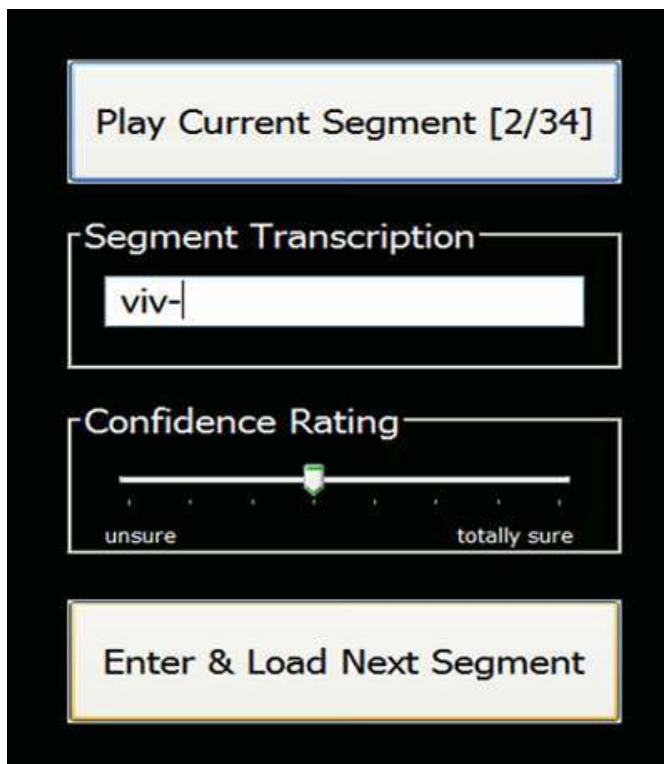


Figure 2. Illustration of a part of the interface of the Gating tool used for this pilot perception experiment.

### 6.2.3. STIMULI AND PROCEDURE

- 30 The corpus used was composed of nine words and 2 non-words (oral recordings, native speakers of RP and GA English<sup>11</sup>), their place of articulation (bilabial, alveolar), their manner of articulation (plosive, fricative, liquid) and voicing (voiced, voiceless) properties are described below with their phonological or wide phonetic transcription of the Cambridge Advanced Learner's Dictionary.

/b/ (bilabial/plosive/voiced): « rabbit » /'ræb.ɪt/<sup>12</sup> (US).

/t/ (alveolar/plosive/voiceless): « city » /'sɪt.i/ (UK).

/ɾ/ (flap/alveolar/plosive/voiced): « city » /'sɪɾ.i/ (US), « latter » /'lætə.ɹ̩/ (US).

/d/ (alveolar/plosive/voiced): « Madam » /'mæd.əm/ (US).

/v/ (interdental/fricative/voiced): « vivid » /'vɪv.ɪd/ (US).

/s/ (alveolar/fricative/voiceless): \*« gressive », \*« gressively » (created from « progressively » /prə'gres.ɪv.li/, US).

/l/ (alveolar/liquid/voiced): « seller » /'sel.ə/ (US), « ballot » /'bæl.ət/ (US).

/t/ (plosive/alveolar/voiceless): « later » /'leɪ.tə/ (UK) (control item, not ambisyllabic, diphthong stressed vowel ['CVV.CV]).

- 31 The words and non-words were presented in 3 different contexts – 1st step: each word or non-word is presented by segments of increasing duration (as a personalized ‘gating’ method); 2nd step: presentation of isolated syllables one by one; 3rd step: presentation of whole words and non-words. The participants were informed that they had to type a (quick) transcription of what they would hear in the first two parts of the experiment. Then, they would have to choose a specific syllable-cutting for the bisyllabic words presented in the third part.
- 32 The participants all got through exactly the same steps of the experiment and in the same order (step1a: training part + step1b: experiment1 + step2: experiment2 + step3: experiment3); conditions and results are exposed thereafter. Only one did not pass steps 1 and 2 as she did not have enough time for it: only step 3 was completed. I made an exception by including this French-English bilingual speaker as she is the only English dominant participant having French as a mother tongue (French speaking parents, 18 years old, last 16 years spent living in the USA).
- 33 All the words used are stressed on the first syllable and have an intervocalic consonant (stop, lateral or fricative) just between a stressed syllable and a following unstressed syllable. They all come from experimental recordings of English native speakers (RP or GA) who have been instructed to read at 3 different speed rates each word of a same list of words from 1 to 4 syllables, not necessarily stressed on the 1st syllable. The instructions insisted on the importance of the naturalness of the reading. The words chosen for the experiment are those read at a normal speed rate.
- 34 Non-words of steps 2 and 3 have been created on the basis of the existing word “progressively” (a word of more than two syllables, stressed on the second syllable /prə'gresɪvli/): that word was truncated in order to create a bisyllabic word stressed on the second syllable (\*gressive /'gresɪv/) and the only trisyllabic non-word of the experiment (\*gressively /'gresɪvli/).
- 35 The presence of non-words in this type of experiment is important to avoid a lexical effect bias (e.g. presenting a word such as “progressive” by mere increasing segments would not inform us much about whether the intervocalic consonant /s/ has been well perceived or not ('VC transition) since it is the only consonantal sound that is liable to appear after /prə'gre/- : “progression”, “progressive”, “progressively”. This would rather entail a classical lexical effect, an effect frequently showing up in the field of experimental psycholinguistics. As far as words are concerned, I tried to reduce prediction possibilities for the consonant appearing just after the stressed vowel. I also told listeners that they would hear non-words: such a remark was intended to reduce guessing attempts on the part of the listeners (who were instructed to transcribe what they heard without predicting what would come next). Though, it is obvious that the simple use of the gating method encourages the listeners to do so, especially native English speakers. If they felt they really needed it, the listeners were allowed to type both what they heard and their prediction.

- 36 The corpus contains the intervocalic consonants both circled and underlined in the figure below. They are classified here by their manner of articulation (lines) and their place of articulation (columns).

	Bilabial	Labiodental	Dental	Alveolar	Postalveolar	Retroflex	Palatal	Velar	Uvular	Pharyngeal	Glottal
Plosive	<u>p</u> <u>b</u>			<u>t</u> <u>d</u>		ʈ ɖ	c ɟ	k ɡ	q ɢ		ʔ
Nasal	<u>m</u>	ɱ		<u>n</u>		ɳ	ɲ	ŋ	ɴ		
Trill	ʙ			ɾ					ʀ		
Tap or Flap		ɸ		ɾ		ɽ					
Fricative	ɸ β	f v	θ ð	s z	ʃ ʒ	ʂ ʐ	ç ʝ	x ɣ	χ ʁ	ħ ʕ	h ɦ
Lateral fricative				ɬ ɮ							
Approximant		ʋ		ɹ		ɻ	j	ɰ			
Lateral approximant				l		ɭ	ʎ	ʟ			

Figure 1. Consonants of the International Phonetic Alphabet (cf. Phonology Assistant): English consonants are circled. Consonants to appear more frequently in a context privileging ambisyllabicity and used for the corpus of this experiment are both circled and underlined.

### 6.3. A THREE STEP EXPERIMENT

#### 6.3.1. STEP 1: PERSONALIZED GATING

- 37 Different segmentation durations were chosen in this part of the experiment. As a non-standard but personalized “gating” experiment, that procedure permits to progressively reveal the word and non-word elements as follows: the word is segmented according to strategic cutting points, from the beginning to the end of the word, in order to discover whether listeners get to perceive the intervocalic consonant before its complete acoustic realization (during the [VC] transition which precedes or during the first part of the consonant which is said to be “ambisyllabic”). Figure 2 shows an example of a word and its segments of increasing duration (four segments presented for the word “city” in RP). The segments were extracted one by one with Speech Analyzer thanks to the functions “Copy selection” and “Paste as a new file”. “Gating” is here “personalized” as increasing duration of the segments is not fixed. Thus, for the word “city”, the four “segments” are [‘sɪ] + [‘sɪt̚] + [‘sɪt̚] + [‘sɪt̚.t̚] presented successively in step 1. The task of the listeners was to transcribe what they heard after having listened to each “segment” or gate.

38

39

40 /‘sɪti/ => [‘sɪ-] [‘sɪt̚-] [‘sɪt̚.t̚-] [‘sɪt̚.t̚]

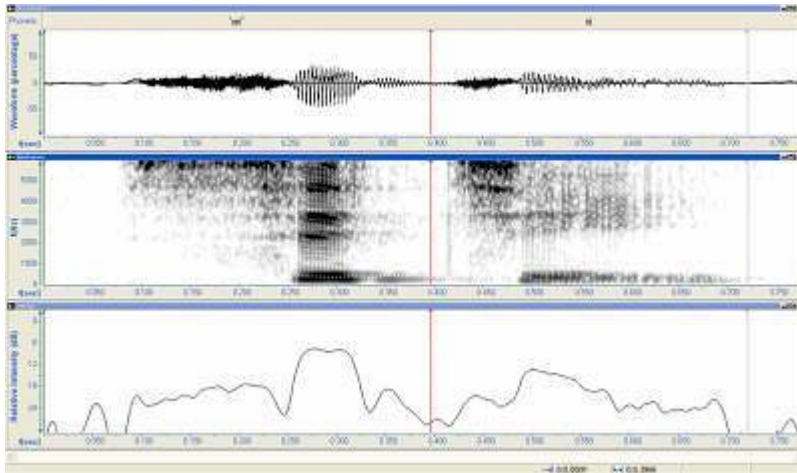


Figure 2. Example of four gates for of the word “city” (RP): four successive segments materialized here as four successively incremented black frames.

- 41 Each element (word or non-word) was presented by segments of increasing duration (see the four incremented black frames), the last segment being the whole word or non-word.

### 6.3.2. STEP 2: IDENTIFICATION OF ISOLATED SYLLABLES

- 42 In the identification task of isolated syllables (step 2), the listeners had the same task as in step 1b (listen to each segment and give a transcription of what they have heard), except that the segments were presented differently, namely on a syllabic basis: 1st syllable (S1) + 2nd syllable (S2).
- 43 For steps 1a, 1b and 2, the corpus is exclusively composed of aural data: no orthographic or phonetic transcription is given to the listeners, not even as an example. Only the third and last step includes three written choices of syllable segmentation under a pseudo-orthographic form.

### 6.3.3. STEP 3: SYLLABLE SEGMENTATION CHOICE

- 44 In step 3, the listeners’ task was to listen to entire words and to choose one of the three syllabic segmentations proposed, the one that best reflected what they had heard.
- 45 For example, for the word “city” (whole word presented), they had to choose one of the three following answers (Answer A - or - Answer B - or - Answer C.):
- 46 A. Cit-y
- 47 B. Cit-ty
- 48 C. Ci-ty

## 6.4. RESULTS AND INTERPRETATION

- 49 The first two steps of this auditory experiment helped to check if the listeners hear the same thing (include or not the intervocalic consonant to their transcriptions and if they include the same type of intervocalic consonant) when they listen to independent ‘syllables’ (parts of the words which can be interpreted as plausible ‘acoustic’ syllables). The results of steps 1 and 2 shows they do hear similar syllabic composition (CV or CVC for the 1st syllable, CV or V for the second syllable) when isolated syllables were

presented, no matter what first or dominant language the participants may have (Figure 5), they usually heard a consonant at the end of the first syllable and might even still hear one at the beginning of the second syllable.

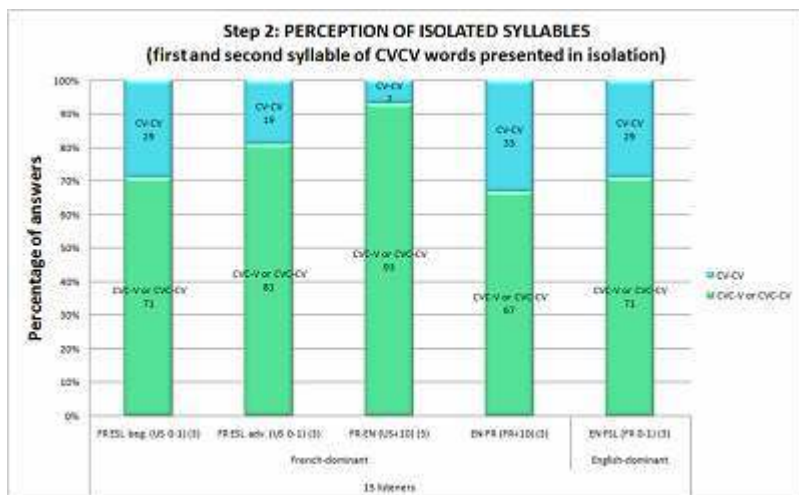


Figure 5. AUDITORY PERCEPTION OF ISOLATED SYLLABLES. Global results for step 2 of the auditory experiment. Syllables considered independently (isolated syllables). More ‘ambisyllabic’ answers (CVC- then -V or -CV) than CV-CV answers (CV- then -CV) for all participants.

50 The results of the third step, illustrated in the histogram below (Figure 6), show the listeners diverging attitudes concerning syllable segmentation when they are told to choose between three possibilities (and not just strictly two: ‘[intervocalic consonant] in the first or in the second syllable?’). Answers A (‘intervocalic consonant belongs to the first syllable’ – S1) and B (‘intervocalic consonant belongs to both syllables’ – S1+S2) were considered as ‘ambisyllabic’ as a consonant in the first syllable followed by a vowel tend to be coarticulated with the following syllable. Answers C (‘intervocalic consonant belongs to the second syllable’ – S2) were considered as non-ambisyllabic cuttings, just as French CVCV words /CV.CV/.

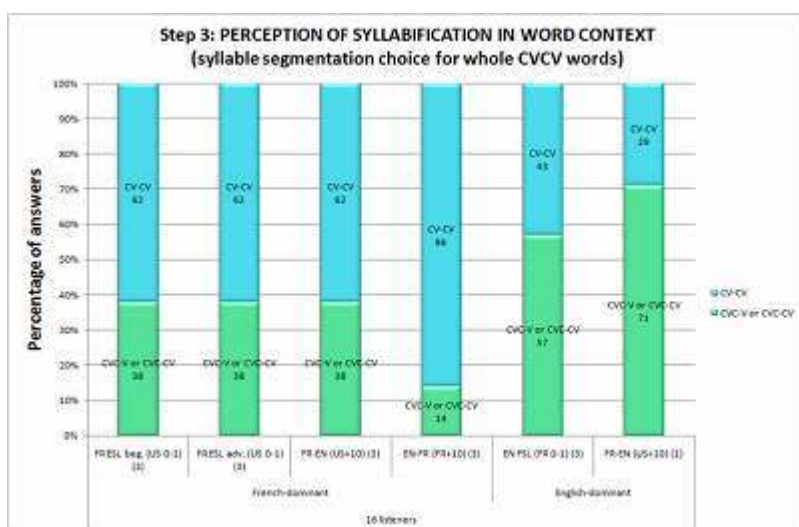


Figure 6. AUDITORY PERCEPTION OF SYLLABLES PRESENTED IN THEIR WORD CONTEXT. Global results for the 3rd step of the auditory experiment. More ‘ambisyllabic’ answers (answers A and B: CVC-V or CVC-CV) for the four English-dominant participants. More CV-CV answers (answers C: CV-CV) for the twelve French-dominant participants.

- 51 The results globally show that French native speakers (first three columns) are less likely – unless they have become English-dominant (see last column entitled ‘FR-EN (US+10)’ - to accept that a consonant may simultaneously belong to the first and the second syllable (‘ambisyllabicity’) than English native speakers (fifth column) – unless they have been living more than ten years in a French speaking country and have become French-dominant (see fourth column entitled ‘EN-FR (FR+10)’).

## 6.5. DISCUSSION: THE EFFECT OF CONTEXT AND PHONOTACTIC RULES

- 52 Auditory perception of isolated syllables (CV or CVC) is not a function of the participants’ dominant language. Nevertheless, when whole words are presented, phonological perception of syllables’ composition seems to depend both on context and on the phonotactic rules which apply in their dominant language. Therefore, French native speakers do perceive the same acoustic object as English native speakers when an isolated syllable (extracted from a word) is presented to them, whereas the composition of this same syllable may be perceived differently when the whole bisyllabic word is presented to them. Such a result implies that French learners of English as a second language (‘French profile’) would, after a bottom-up analysis of an English aural utterance, apply a specific ‘inside-word resyllabification’ (top-down process) according to the phonotactic rules of French. When hearing an English word such as “city”, a French native speaker learner of English (French-dominant / French profile) would generally perceive it as being syllabified <ci-ty> (as the French word “cité” <ci-té>); whereas an English speaker (English-dominant / English profile) would rather choose between two other options: <cit-y> or <cit-ty>.
- 53 An English-French bilingual who has been living more than ten years in a French speaking country and daily exposed to French could switch to a ‘French profile’ and syllabify or segment “city” as <ci-ty>. Clearly there is some congruence between being English-dominant and the aptitude to perceive ambisyllabicity. I believe a French-English bilingual who has been living more than ten years in an English speaking country and daily exposed to English (both at work and at home for example) may be able to switch to an ‘English profile’. In this experiment, I could not witness such switching probably because almost all participants were still using French more than English at home and at work, thus using English as a non-dominant language.
- 54 A possible phonological representation of ambisyllabicity in English and phonological representations of no ambisyllabicity in French and in English are presented below<sup>13</sup>:

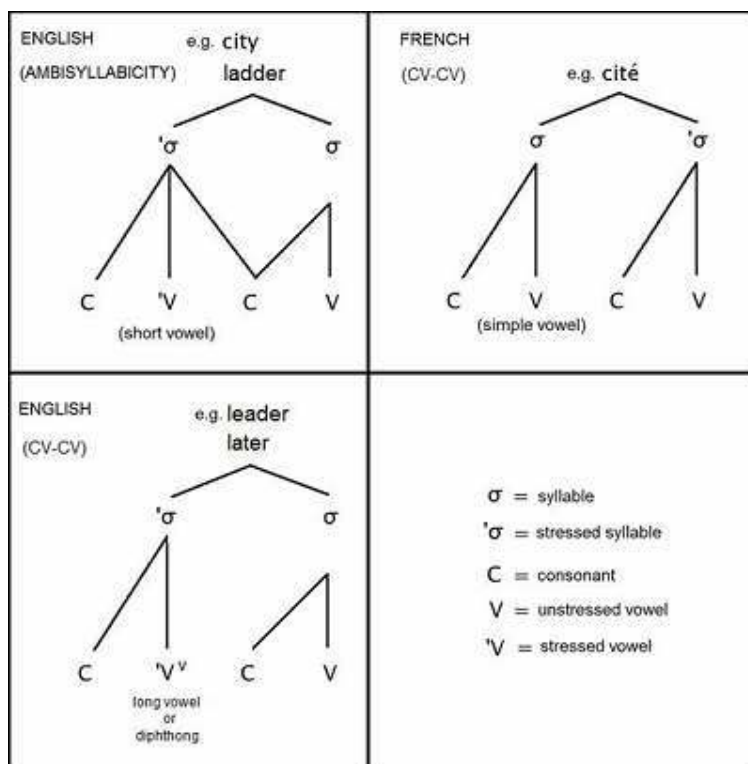


Figure 7. Possible phonological representations of the segmentation of French and English bisyllabic words according to the context: stress pattern (here English words are stressed on their first syllable) and vocalic environment (here two situations with three types of vowel are presented for English).

- 55 In the context which favors or allows ambisyllabicity (figure 7, see phonological representation of words “city” and “ladder”), the intervocalic consonant belongs both to the precedent stressed syllable (S1 = 'σ) and to the following unstressed syllable (S2 = σ).
- 56 In all other cases in English, as in French (figure 7, see phonological representations of words “cité”, “leader” and “later”): the intervocalic consonant belongs to the second syllable (S2 = σ).
- 57 Thanks to the analysis of the results of this perception experiment, I can suggest that the dominant language (profile) of a listener is a factor permitting (or not) the listener to adopt the appropriate type of segmentation. It also helps us to understand more about the way English and French manage syllabic segmentations.

## 7. CONCLUSIONS

### 7.1. INTRODUCING 'AMBISYLLABICITY' IN ENGLISH LANGUAGE CLASSES?

- 58 One can argue that being conscious of ‘ambisyllabicity’ might not help French learners of English to produce more natural utterances, since the more one consciously thinks about one’s pronunciation, the less the result might sound natural. Still, the results of such experiments may help teachers of English to understand why and how French learners of English use such ‘strict’ syllabification, thus segmenting all English words into cv.cv.cv... segments as if they were speaking French. These teachers might also try - hopefully with some success - to make their adult students conscious of such segmentation processes in

English: this might well be a stimulating challenge in the teaching of English as a foreign language, particularly to students whose mother tongue is syllable-timed. Might 'ambisyllabicity' get some space in the teaching of English rhythm one day?

## 7.2. BILINGUALS AND SEGMENTAL STRATEGIES

- 59 One cannot rule out the possibility for adult learners to change their speaking habits into more natural speech in both languages – that is to say include ambisyllabicity for English in the right cases while avoiding ambisyllabicity for French (as if they acquired the ability to adapt segmental strategies to the appropriate language) just because they were exposed for a long time to the second language. Even if we assume the dominant language of a bilingual may switch to another one (across time and life experiences), we have to include the possibility that one could lose the capacity of segmenting his/her first language “properly” once he/she has integrated the segmental strategy of the second language.

## 7.3. FURTHER RESEARCH IN PROGRESS

- 60 A new auditory experiment, implying a larger number of monolingual and bilingual participants and more linguistic items, is presently in progress.

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## NOTES

1. If you cannot read some of the phonetic symbols, please download the font named "Doulos SIL" ([http://scripts.sil.org/cms/scripts/page.php?site\\_id=nrsi&id=DoulosSIL\\_download](http://scripts.sil.org/cms/scripts/page.php?site_id=nrsi&id=DoulosSIL_download)) or simply convert these transcriptions into "Lucida Sans Unicode" font.
2. There is a debate on whether 'triphthongs' would really exist in English (triphthongs or diphthongs+schwa?). Some models of syllable segmentation imply a syllable boundary just before the schwa. Since IPA associates one symbol to one phoneme, a syllable boundary should not appear inside a vowel. But one also could hypothesize that there might be a specific context for either a triphthong or a diphthong+schwa to occur.
3. Rubach (1996) argues that the "ambisyllabicity rule" could also be applied across word boundaries but I would then call it "sandhi" and this type of context is not worked out in this paper. What will be called context here is the word (syllable next to another syllable in a word).
4. Grosjean (1980) invented a new experimental paradigm named "gating". This paradigm was presented in great detail in Grosjean (1996) in a special issue of *Language and Cognitive Processes* devoted to spoken word recognition paradigms.

5. Département d'Etudes des Pays Anglophones (DEPA), Université Paris 8.
6. Institut de Linguistique et Phonétique Générales et Appliquées (ILPGA), Université Paris 3.
7. French Embassy in Washington D.C., USA.
8. Organization of American States (OAS), Washington D.C., USA.
9. PanAmerican Health Organization (PHO), Washington D.C., USA.
10. This "Gating" interface tool, created by Roussi Nikolov for the LAPS research team - 'Linguistique Anglaise PSycholinguistique' (EA 1569)- in Paris 8 University, is freely downloadable on the following URL: <http://web.uni-plovdiv.bg/rousni/GATING.ZIP>.
11. Native speakers of English volunteered to read lists of words in the purpose of acoustic analyses. The recordings were made directly on a laptop computer in different quiet places using the software Speech Analyzer 3.0 from SIL (Summer Institute of Linguistics) and a small microphone. The quality of the recordings was checked to insure sufficient and not saturated volume and no bothering noise. Among the analyzed files, a few words had physical and/or perceptive clues of some sort of 'ambisyllabicity' ['CVC<sup>1</sup>.CV] and were chosen to integrate the corpus of a first perception experiment. All the words were digitized at 22050 Hz before being saved as separate WAV files.
12. Like a lot of English dictionaries including a 'phonetic' transcription, the CALD uses the symbol /r/ (usually used in IPA for the Spanish rolled <r>) for the IPA liquid /ɹ/, probably by convenience. In the same way, the CALD uses the symbol /e/ for the first vowel of the word « letter » while this vowel is finally closer to /ɛ/ of the IPA. As English has no rolled /r/ (except in the Scottish variety) and no closed vowel /e/, there can be no confusion in the transcription of English words.
13. This phonological representation only takes into account a few phonetic aspects of ambisyllabicity (e.g. it does not take into account the longer duration of final syllables in French in comparison to English).

## RÉSUMÉS

Des travaux expérimentaux sur le français et l'anglais ont déjà apporté de nombreuses réponses à propos de la façon dont pourrait fonctionner l'ambisyllabité et la syllabation. Même si leurs conclusions se contredisent souvent les unes les autres, celles-ci fournissent un bon point de départ pour l'étude de l'ambisyllabité en anglais et la comparaison des stratégies de syllabation adoptées par les locuteurs anglophones et francophones natifs, même si celles-ci peuvent être étoffées, par exemple en apportant plus de précisions concernant la perception de la composition de la syllabe par les locuteurs-auditeurs bilingues. Des études ont suggéré que la perception de la syllabation dépend des caractéristiques de la langue première (L1, langue maternelle) des auditeurs. Ici, je suggère qu'il est plus fiable de considérer l'influence de la "langue dominante" (la langue dominante d'un bilingue pouvant alterner de la L1 à la L2 après une forte et longue exposition à la L2). Via une expérience pilote de perception auditive en 3 étapes, le présent article cherche à comparer la perception de la syllabe selon qu'elle est présentée isolément ou en contexte de mot entier, que les auditeurs sont francophones ou anglophones natifs monolingues, bilingues français-anglais ou bilingues anglais-français.

Experimental studies on English and French have already given numerous answers about how ambisyllabicity and syllabification may work. Even if their conclusions are often contradictory,

they provide a better understanding of ambisyllabicity in English and of the differing syllabification strategies between English and French native speakers; in the way bilingual speakers perceive syllabicity. Earlier studies suggest that perception of syllabification depends on the characteristics of the first language (L1, mother-tongue) of the hearers. In the present paper I would like to suggest that the “dominant language” is a more reliable criterion (since a bilingual’s dominant language may switch from L1 to L2 when strongly exposed to the L2 for a long period of time). Thanks to a 3-step pilot auditory perception experiment, the study attempts to evaluate the perception of a syllable as a function of its context (as an isolated syllable or inside an entire word), and of the hearers (French or English native monolingual speakers, French-English bilinguals or English-French bilinguals).

## INDEX

**Keywords** : ambisyllabicity, dominant language, Isolated syllable, perception, phonology, segmentation strategies, syllable in context

**Mots-clés** : ambisyllabicit , langue dominante, perception, phonologie, strat gies de segmentation, syllabe en contexte, Syllabe isol e

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