DO PEOPLE SELECTIVELY INTERPRET THEIR SCHWA *VS.* SYLLABIC CONSONANT PERCEPTION ON THE BASIS OF THEIR BACKGROUND, EXPERIENCE AND EXPECTATIONS?

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Abstract: *This paper reports a study which intends to find out whether the claim made by Vandeveer, Menefee and Sinclair (2006:7) that "people selectively interpret what they see on the basis of their […] background, experience, […] and expectations" (a cognitive bias known as selective perception) applies to the English syllabic consonant vs. schwa perception and, if so, to what extent. The data in Arboleda (2010) were subjected to further statistical analyses and there was also the acoustic analysis of a sample of speech sounds as well as the answers from three referees to a post-task questionnaire. Our results match Vandeveer et al. (2006) in that the listeners' background, experience (especially, their accent and phonetic experience, respectively) and expectations are related to the perception of this alternation, especially when it is difficult to discern between a syllabic vs. non-syllabic consonant production. A wider sample of referees with different sociolinguistic backgrounds would be useful in order to reach a more consistent conclusion.*

Key words: *Selective perception, cognitive bias, English syllabic consonants, schwa, perceptual-acoustic analysis.*

1. INTRODUCTION

The ubiquitousness of syllabic consonants and the schwa in English speech combined with the controversy around their usage (Cohen, 1957, Álvarez, 1980; Töft, 2002) make them an eligible topic for further exploration. If the production of the syllabic consonant *vs.* schwa alternation is in need of research at discourse level (Gimson, 1970; Monroy, 1980), the case of its perception is even more limited as far as investigation is concerned (van Bergem, 1995; Schaeffer & Eichorn, 2001). In this paper we take Arboleda's study (2010) as a starting point. We explore these results further by examining the individual reactions of three referees so as to study their mental processes behind their choice (a schwa *vs.* a syllabic consonant). Perception, a field in psychology, seems to be linked with cognition and the mind. Our objective is to cast some light into the relationship between the cognitive bias known as *selective perception* and the perception of English potential syllabic consonants. In particular, we intend to find out whether the claim made by Vandeveer, Menefee and Sinclair (2006:7) that "people selectively interpret what they see[1] on the basis of their interest, background, experience, […] attitudes" and expectations (selective perception) applies to the syllabic consonant *vs.* schwa perception and, if so, to what extent it applies and which of the factors above (interest, background, experience, etc) may be related to the perception of syllabic consonants *vs.* schwa.

[1] Vandeveer *et al.* (2006) employ the verb "see" here as an example because perception can be related to the five senses, including sight. Given that in this study we are dealing with another sense, hearing, every time we use this quotation by Vandeveer *et al.* (2006), we will think about "hear", instead of "see".

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2. LITERATURE REVIEW

2.1. Arboleda (2010)

Arboleda (2010) aimed to find out the relationship between factors such as *word position* (within an utterance) or *emphasis* and the usage of English syllabic consonants and the schwa finally in a word at discourse level. For this, she checked the perceptual reactions of a group of listeners, as little research had been undertaken into this issue by resorting to perception (van Bergem, 1995; Schaeffer & Eichorn, 2001). The speakers in this study were 80 BBC non-rhotic English newsreaders -40 males and 40 females. The instruments used were a corpus of written and recorded 1999–2008 English news (BBC Learning English Website, 2009) and two questionnaires: 1) *pre-task*, the basis for Arboleda's choice of listeners and 2) *task*, aimed at the identification of a syllabic consonant/a schwa in 800 words (see Appendix 1). The software Audacity was employed for the recording of material.

The sample of words selected was representative of the different variants of the variables studied (word position and emphasis) (see Appendix 2). Arboleda (2010) listened to the words chosen and wrote down which position they occupied within the utterance and whether they were emphatic or not. After the listeners filled in the task-questionnaire via e-mail, the data obtained from this survey were statistically analysed with the help of SPSS. The statistical procedure used was the contingency table analysis. The study showed that both (1) word position and (2) emphasis were related to the schwa *vs.* syllabic consonant production. In particular (1) a preponderance of the schwa was found in final position (in consonance with Brown, 1991 and Cruttenden, 2001) whereas in medial and initial position (pace Berg, 1998) syllabic consonants were usually produced. (2) A high schwa production was found in emphatic words (in agreement with O'Shaughnessy, 1981).

2.2. Perception and cognition

Perception, a field in psychology, is the process of gaining understanding and awareness. In order to perceive, we make use of our senses and the Psyche (our imagination and intellect) (Fish, 2009). Therefore, perception seems to be related to cognition and the mind (Bybee, 2010). A cognitive bias is the tendency a human being has to arrive at some conclusions on the basis of his/her cognition, not reality itself. Selective perception is one of these cognitive biases. Vandeveer, Menefee and Sinclair (2006) consider that the listeners' experience and background may be related to the length of the sound – that is, *how long* the sound appears *to* the listeners' *ears*. These scholars refer to this as selective perception: "people selectively interpret what they see on the basis of their interest, background, experience, […] attitudes" and expectations (Vandeveer *et al.*, 2006:7). In other words, "people's behaviour is based on how they interpret reality, not reality itself" (Vandeveer *et al.*, 2006:2).

3. RESEARCH QUESTIONS

The main objective in this paper is to study three referees' mental processes behind their perception of syllabic consonants *vs.* schwa. In particular, we aim to provide an answer to the following research question and its subquestions:

1. Does Vandeveer, Menefee and Sinclair's claim (2006:7) that "people selectively interpret what they see on the basis of their interest, background, experience, […] attitudes" and expectations apply to the syllabic consonant *vs.* schwa perception?

If so,

a. to what extent does this claim apply to the perception of this phonemic alternation?

b. which of the factors above (interest, background, experience, etc) are related to the perception of syllabic consonants *vs.* schwa?

4. METHODOLOGY

A new questionnaire which the listeners had to answer was used in the present study: the *post-task* questionnaire. It was intended to "ensure the truth value of […] data" (Creswell, 2001:199) and give prompts for this study and possible future research (see Appendix 3 for a sample of questions from the post-task questionnaire). Although the present research is perceptual (i.e. based on what is heard) rather than acoustic, we also intended to cast more light on the results from the listeners' data by means of some acoustic analyses (spectrograms and waveforms) carried out by *SFS* (*Speech Filing System*), a free program for speech research developed by UCL.

The listeners were three British educated females with a reasonable good ear (musically speaking). They differed in their accent and knowledge of phonetics (one of them was naïve about phonetics). These referees were emailed the post-task questionnaire, which they had to complete in about five or ten minutes, depending on the depth of explanation they were willing to provide us with.

5. DATA ANALYSIS

The data from Arboleda (2010) were subjected to further statistical analyses by means of the SPSS package 15.0 for Windows. For a descriptive analysis of data, a contingency table and a bar graph were used. The answers (the frequency and percentage distribution of schwas and syllabic consonants) provided by each of the three listeners to question 1 in the task-questionnaire (see Appendix 1.B.) were examined.

The inferential statistical test employed was the Chi-square procedure. The Chi-square test measured whether there was "a systematic relationship between the two categories" (Dörnyei, 2007: 229), in this case, the listener and the answer. There were no assumptions to be met because it was a non-parametric procedure, which can deal with this type of data: nominal or categorical. The threshold of significance was $\alpha = 0.01$. In order to reply to research question 1 we formulated a null hypothesis which needed to be tested: the two variables involved, that is, listener and answer, were independent. Rejecting the null hypothesis implied accepting some link between these two variables.

After we had the data analysed by means of SPSS, we coded the post-task questionnaire answers provided by the referees. Given that this qualitative information was intended to add and shed light on certain statistical data, it made sense to organise it in view of the statistical analysis. Later on, we performed some acoustic analyses to a sample of speech sounds.

6. RESULTS DISCUSSION

If we look at Figure 1, we observe that there is a tendency (revealed to be marked especially in the case of Listener 2 and Listener 3) for each referee to choose one of the phonemes

when having to decide on a syllabic consonant or a schwa perception (question 1 in the task-questionnaire), which seems to indicate that the listener's, let us say, *particular individual features* are related to the fact that she perceives a schwa or a syllabic consonant. Actually, from the total percentage of syllabic consonants Listener 2 seems to perceive more syllabic consonants than the rest of the listeners (45.5%), which contrasts to the lower percentage found in the other two listeners, especially the third referee (24.9%).

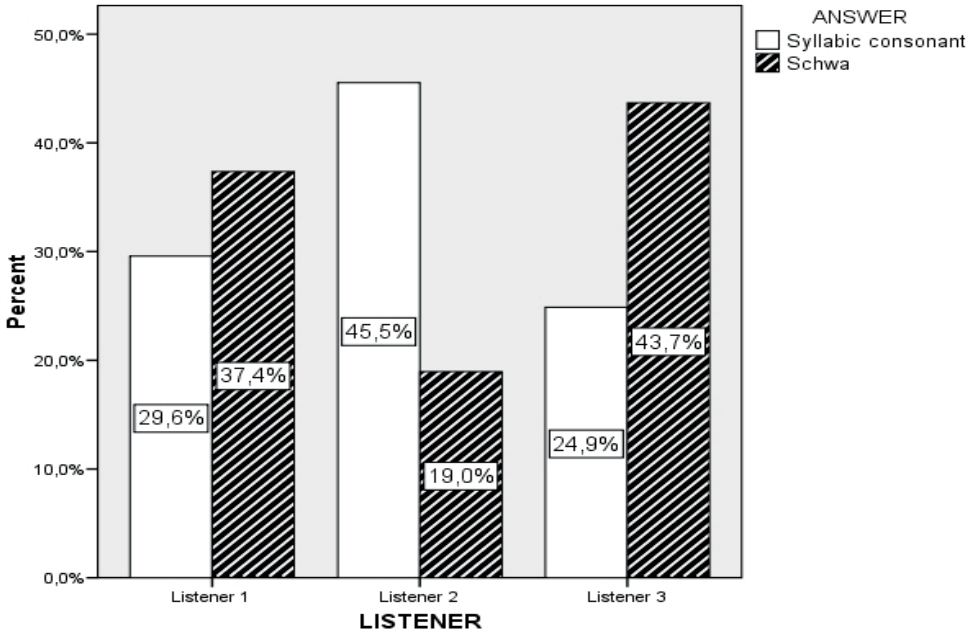

Figure 1. Syllabic consonant and schwa answers provided by each listener (percentage distribution).

According to Table 1, Listeners 1 and 3 perceive a larger number of schwas than expected under the assumption of acceptance of the null hypothesis of independence, especially Listener 3 (46.1 and 111.5 more schwas, respectively). In contrast, Listener 2 perceives fewer schwas than expected (157.6 fewer schwas). Therefore, Listener 2 seems to be the referee whose answers are more different from those expected. The actual frequency distribution of the answers provided by each listener is reflected in Table 1 as well. The Chi-square test reveals that there is a statistically significant relationship between the two variables studied: listener and answer (χ^2 (2)= 198.88; p<0.01). Therefore, who the listener is and the type of answer she provides (schwa or syllabic consonant) are linked. The null hypothesis of variable independence is rejected.

Table 1. Syllabic consonant and schwa answers by each listener (frequency distributions). Observed count, expected count and unstandardised residual

		ANSWER		
LISTENER		Syllabic consonant	Schwa	Total
Listener 1	Count	384	408	792
	Expected Count	430,1	361,9	792
	Residual	-46,1	46,1	
Listener 2	Count	591	207	798
	Expected Count	433,4	364,6	798
	Residual	157,6	-157,6	
Listener 3	Count	323	477	800
	Expected Count	434,5	365,5	800
	Residual	-111,5	111,5	
Total	Count	1298	1092	2390
	Expected Count	1298	1092	2390

Regarding the factors which may be related to the schwa *vs.* syllabic consonant perception, it seems possible that Listener 2 often perceives a syllabic consonant because, as revealed in the pre- and post-task questionnaire (see Appendices 1 and 3, respectively), she speaks RP with some regional features, extensively employing syllabic consonants, including syllabic /m/. In addition, this referee has a mouth injury, which makes weak vowels come easily to her. We consider that all these features in her speech make her more *prone* to perceiving a syllabic consonant rather than a schwa when listening to other people's speech. As for Listener 3, the other referee whose tendency towards a given answer (schwa or syllabic consonant) is more marked, we may again think about *accent* as a possible reason for this tendency towards schwa on her part, as in the case of Listener 2, but the point is that, although Listener 3 shares accent characteristics with Listener 1, the proportion of schwa answers is lower for the latter, which makes us suggest the tendency towards schwa may rather be a resource Listener 3 exploits. All the listeners encounter difficulty in trying to identify a syllabic *vs.* non-syllabic consonant, as acknowledged by them in the post-task questionnaire, because these phonemes are very short and not always clear, added to the fact that the referees are usually unaware of what they actually pronounce in real-life speech (see Appendix 3). However, the difficulty is even greater in the case of Listener 3 since she is not acquainted with phonetics. It is possible that she might think it is more likely and less risky to say that something is there, larger or smaller (i.e. a schwa), rather than there is no vowel at all (i.e. a syllabic consonant). Therefore, our results match Vandeveer *et al.* (2006) in that the listeners' background, experience (especially, their accent and phonetic experience, respectively) and expectations (selective perception) are linked to their perception of schwa *vs.* syllabic consonants. These results give further support to the idea that "people's behaviour is based on how they interpret reality, not reality itself" (Vandeveer *et al.*, 2006:2).

Now we will examine the extent to which selective perception applies to the syllabic consonant *vs.* schwa perception. If we remember Arboleda (2010), she found that schwa perception prevailed when the word was emphatic (in agreement with O'Shaughnessy, 1981) or final in an utterance (Brown, 1991; Cruttenden, 2001). Therefore, she concluded that emphasis and final position are often related to unanimous agreement on the schwa, mainly when the final consonant is /n/, which allows us to make some generalisations. Nevertheless, in many cases there were dissimilar answers from the referees. We will continue exploring what may be behind these dissimilar answers because the listeners' *particular individual features* may hide other factors. Thus, we will display some spectrograms so as to cast more light into this lack of concordance. We will pay attention to those spectrograms focusing on words which have a stressed vowel + fricative +weak vowel (syllabic consonant or schwa) +final /n/, cases in which there is often disagreement as to whether there is a syllabic or non-syllabic consonant production.

If we look at the spectrograms and waveforms displayed of these two words: *sedition* and *coalition*, uttered by two different speakers, Females 5 and 11, respectively, we realise they both occur in this position: final followed by a comma/colon (c1) and they are both produced by RP females speaking at a normal tempo. Nevertheless, despite having some features in common, their pronunciation differs. In the word *sedition*, if we look at the part in which the potential syllabic consonant or schwa is placed, the formants are more intense, the waveform is wider and there is a slightly longer duration than in the case of the word *coalition* (see Figures 2 and 3). All the listeners agree in assigning the value of the schwa in the last part of *sedition*, whereas in *coalition*, because the production is not as clear, Listener 2 does not concur with the other listeners in relation to the schwa and, as we previously highlighted, she decides on the presence of a syllabic consonant, the phoneme she is particularly *prone* to. As the own referees acknowledge in our post-task questionnaire, sometimes it is hard to decide on whether they perceive a schwa or a syllabic consonant.

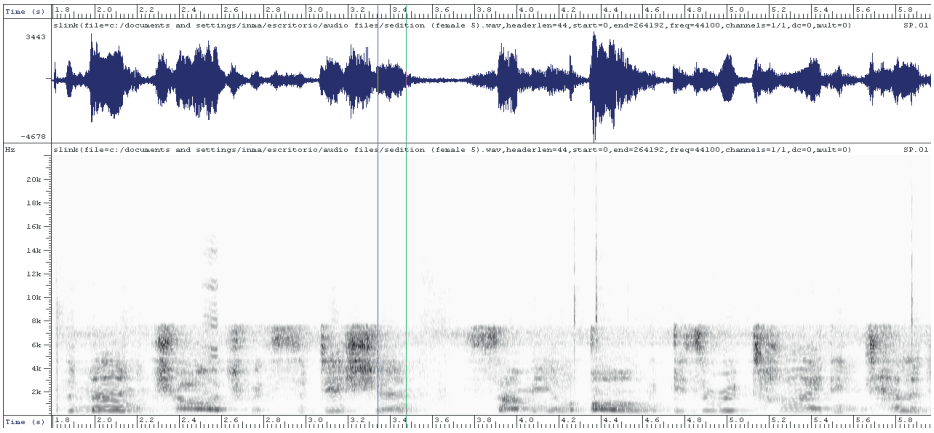

Figure 2. Spectrogram and waveform from Female 5's speech in which the word *sedition* can be traced.

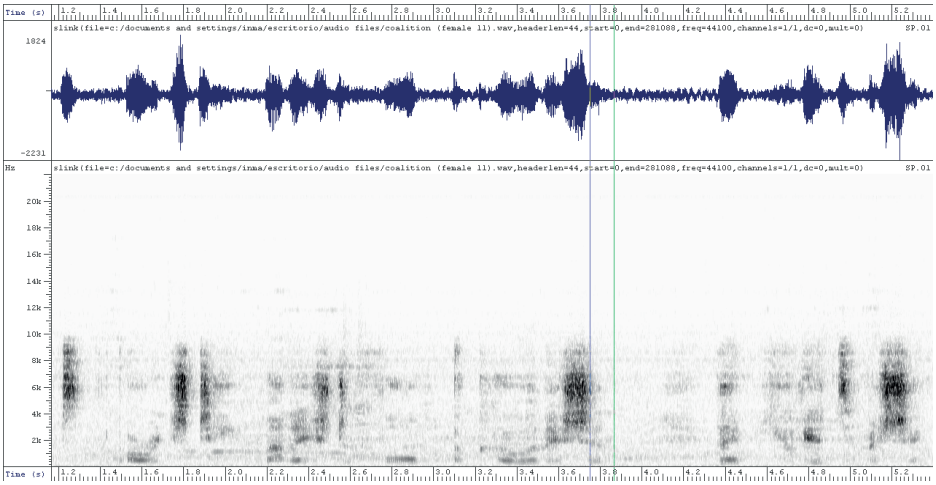

Figure 3. Spectrogram and waveform from Female 11's speech in which the word *coalition* can be traced.

Although it is often hard to decide on a syllabic consonant or a schwa in certain phonemic contexts, for example, those in which there is a stressed vowel + fricative +weak vowel (syllabic consonant or schwa) +final /n/, it can be seen it is always possible for speakers to produce these phonemes clearly. Van Bergem (1993) maintains that the speaker may not always produce a phoneme neatly. Thus, the speaker's actual production of the word seems to be very important. We contribute to Vandeveer *et al.*'s claim (2006:7) that "people selectively interpret what they see on the basis of their interest, background, experience, […] attitudes" and expectations by adding that, although the tendency towards a syllabic consonant and a schwa is clear especially in Listener 2 and Listener 3, respectively, in general terms, selective perception becomes even more evident in cases where it is difficult to discern between a syllabic *vs.* non-syllabic consonant production.

7. CONCLUSIONS

The perception of English syllabic consonants *vs.* schwa is found to be linked with cognition and the mind. After examining the mental processes behind the referees' choice of syllabic consonants *vs.* schwa, we can conclude that our results match Vandeveer's claim (2006) in that the listeners' background, experience and expectations are related to perception (selective perception), in this case, that of syllabic *vs.* non-syllabic consonants. Actually, our results reveal that there is a statistically significant relationship between the two variables studied: listener and answer. Therefore, who the listener is and the type of answer she provides (schwa or syllabic consonant) are linked. In particular, the listeners' accent and phonetic experience seem to be involved in the case of Listener 2 and Listener 3, respectively. Listener 2 speaks RP with some regional features, extensively employing syllabic consonants, which make her more *prone* to perceiving them, and Listener 3 is not acquainted with phonetics, so she may consider a schwa as more likely a phoneme to occur.

Arboleda's results (2010) related emphasis and final position to a clear perception of a schwa. These factors are important, and they allow us to make some generalisations but the speaker's actual production of the phoneme plays an important role, which is consistent with van Bergem's claim (1993). It is in cases where it is difficult to discern between a syllabic *vs.* non-syllabic consonant production that selective perception becomes even more evident.

We are aware, though, that a wider sample of referees with different sociolinguistic backgrounds is required in order to reach a more consistent conclusion as to the relationship between selective perception and the perception of English potential syllabic consonants. All these tasks will be carried out by ourselves as this paper belongs to a project which has a broader scope, granted by the Fundación Séneca.

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APPENDICES

APPENDIX 1

A. PRE-TASK QUESTIONNAIRE (THE BASIS FOR THE CHOICE OF LISTENERS IN ARBOLEDA, 2010; IT WAS COMPLETED BY ALL THE POSSIBLE REFEREES)

1. What do you do in life?

2. What accent do you have?

3. Do you have any knowledge of English phonetics? If so, please tell me a bit about your experience in the area.

4. Do you have a good ear for music? And for sounds? Tell me a bit about it.

INFORMATION FROM THE PRE-TASK QUESTIONNAIRE ABOUT THE ACTUAL LISTENERS

AGES: They were young (29, 34 and 23 for Listener 1, Listener 2 and Listener 3, respectively).

ACCENTS: On the one hand, Listener 1 and Listener 3 were born in Scotland (their origins were related to rhotic speech) but their accent was very soft, since they had lived in England for a long time. In particular, Listener 1 used RP so often (she taught RP) that she spoke it as a native speaker. On the other hand, Listener 2 was raised in England, near Birmingham, but had lived in London for a long time. In general, she spoke RP and she did not have a regional accent, but she had some regional features, such as the use of the glottal stop or syllabic /m/. It is also worth noting that Listener 2 had a jaw injury which meant she could not open her mouth, so weak vowels came easily to her.

GOOD EAR: They all played or had played musical instruments and were very good at singing. Listener 3 has had extensive musical experience: she played the flute at school and used to perform as a jazz and soul singer. Listener 2 also played the flute and sang for pleasure. Listener 1 sang as well, and again not as a professional. She could be described as having an adaptable ear and willingness to try new things when speaking and singing. She liked picking up the characteristics of people's voices and repeating melodies when singing. Actually, her friends often said "Why don't you sing in your own voice?" Her gift for music was praised by one of her music teachers: "You have music in your head."

KNOWLEDGE OF PHONETICS: Whereas Listener 1 and Listener 2 had a considerable knowledge of phonetics, Listener 3 had no knowledge at all. Actually, Listener 1 was a teacher of voice, speech and accent, and most of her work involved teaching RP to non-native speakers of English. She passed the UCL IPA examination in summer 2008. Listener 2 gave Introduction to Phonology training sessions to trainees on the foundation Trinity TEFL course for six years, and she obtained a distinction in the phonology interview of the Trinity Diploma, during which she had to identify consonants, diphthongs, vowels –both stressed and unstressed – connected speech, intonation, etc. Both these two listeners were very good at detecting different sounds. In contrast, Listener 3 was not linked with phonetics/phonology work; she was a student of French, Spanish and international relations.

B. TASK QUESTIONNAIRE

1. Which one do you hear in the last syllable of each word: a syllabic consonant or a schwa?

    a. Syllabic consonant

    b. Schwa

APPENDIX 2

VARIABLES

-ORIGINAL (BEFORE GROUPING)

- W. POSIT. (Word position)

    a. Mid position
        a1) +stressed
        a2) +unstressed
    b. Initial position
        b1) after full stop
            b1A) +stressed
            b1B) +unstressed
        b2) after comma or colon
            b2A) +stressed
            b2B) +unstressed
    c. Final position
        c1) followed by a comma (,) or colon (;)
        c2) followed by AND/ OR/ BUT
            c2A) in compound sentences (in coordination)
            c2B) between phrases
        c3) followed by a full stop (.)
- EMPHASIS (Word emphasis)

    a. emphatic
    b. unemphatic

-GROUPED (DUE TO THE LOW FREQUENCY OF OCCURRENCE IN CERTAIN CATEGORIES OF THE VARIABLES)

- W. POSIT.

    b1A + b1B + b2A
    c2A + c2B

APPENDIX 3

PART OF THE POST-TASK QUESTIONNAIRE

QUESTIONS ADDRESSED TO LISTENER 1:

- DIFFICULTY IN THE PERCEPTION OF THESE WORDS

1. Do you find it difficult to perceive the difference between the schwa and syllabic consonants in the documents I am sending you? Please provide some comments about this.

   Yes, sometimes it is difficult to hear the difference. If it isn't obvious, which could be in up to a quarter of the cases, I listen to the word repeatedly and make up my mind from there. If I even hear the tiniest of schwa sounds, I write schwa, based purely on what I hear. Sometimes, though, depending on the sounds around it, it may be almost impossible for there to be no schwa due to the articulatory movement – if I hear a moment of phonation after one consonant has finished and before the next one is fully articulated I consider it to be schwa plus consonant. I did mention in one of the first speakers I did for you that I would have considered a syllabic consonant to be impossible in a particular word (I can't remember which one now), but now I just write what I hear and don't think too much about what's 'possible'. It is hard, but I find it gets easier with practice. I actually quite enjoy it now and find the listening quite therapeutic!! If a consonant is truly syllabic it's usually quite obvious, to my ear, but I am the first to admit others may hear differently.

   I'm as sure as I can be about my answers, bearing in mind that it's all depending on my subjective ear. I do understand other people may hear the same thing differently. One tool I use is that I think about when I teach the production of syllabic consonants to acting students (often desirable in a more conservative RP, in certain contexts) and I ask myself about the recordings – would I accept this pronunciation as a syllabic consonant or not if I heard it like this from an acting student? If not, then it's schwa, even if it's tiny. I also give my answer on the basis – if I had to say one or the other, which one is it most like?

ADDRESSED TO LISTENER 2:

- AWARENESS OF THE PRODUCTION OF SYLLABIC CONSONANTS AND THE SCHWA IN EVERYDAY SPEECH

1. a) Are you aware that you pronounce a schwa or a syllabic consonant in the words you utter in everyday speech?

   No, I don´t think I was aware of it until I studied it. I was aware that it was easy to be lazy in English, pronouncing some sounds differently in continuous speech in order to speak more quickly, but I hadn't been aware of syllabic consonant/schwa before.

   b) Do you think people realise what they are pronouncing?

   No! Unless their attention is drawn to it.

- AFTER ANALYSING A SPECTROGRAM… L-VOCALISATION?

2. Do you notice something special in the case of the words *local* or *approval* in Female 11 (Helen Fawkes)'s speech?

   "local": I didn't hear an L at the end; it sounds like she curled the tip of her tongue up slightly to make the L but by the time it had reached its position it had been assimilated to the position of the following T. It sounds voiced though, albeit very slightly.

"approval": again, it's voiced, but the tongue doesn't reach its final destination to make the full L sound, the air is blocked by a closing in the throat, perhaps similar to a glottal stop? It sounds like a feature of a regional variation in pronunciation. London?

- INTERESTING ASPECT IN HER DATA: THE USE OF SYLLABIC /M/- HER SPEECH AND HER PERCEPTION OF OTHERS

3. a) Do you think that syllabic /m/ is usually found in your speech?

Yes, to a certain extent, especially as I have a tendency to use the glottal stop and usually use a syllabic consonant on an m (bottom = /bɒtm/).

b) Do you consider it is usual for you to hear a syllabic /m/ in English? Do you think people often pronounce it? Or do you consider it is less common than /n/ or /l/?

Hm, less or more common? maybe the syllabic /m/ is less common in RP, but I think it depends more on how quickly the speaker tends to speak as to whether the onset of vocalisation comes out as a vowel or the vocalisation of the syllabic consonant, and also, I think it's to do with what the preceding consonant's value is, the manner and place it is articulated etc (e.g. taking a quick look, syllabic /n/ for example seems to be most employed following alveolar, plosive, fricative consonants?)

QUESTIONS ADDRESSED TO LISTENER 3:

- DIFFICULTY IN THE PERCEPTION OF THESE WORDS

1. Do you find it difficult to perceive the difference between the schwa and syllabic consonants in the documents I am sending you?

Yes.

- AWARENESS OF THE PRODUCTION OF SYLLABIC CONSONANTS AND SCHWA IN EVERYDAY SPEECH

2. Are you aware that you are pronouncing a schwa or a syllabic consonant in the words you utter in everyday speech?

No.

3. Do you think people realise what they are pronouncing?

No.

- INTERESTING ASPECTS IN HER DATA: HER PERCEPTION OF SCHWA IN WORDS ENDING IN *TION*

4. Have you experienced any *special* difficulty in having to choose syllabic or schwa in words ending in *tion*?

Yes.

5. AFTER ANALYSING A SPECTROGRAM … L-VOCALISATION?

a. Can you hear anything special in the words *local* or *approval* in the speech of Female 11 (Helen Fawkes)

I do not know what you are referring to

Have you perceived l-vocalisation?

I don't understand what 'l-vocalisation' means.

I *mean that the /l/ sounded a bit like a vowel. I aim to know whether that happen*s in that particular case, but if you cannot notice it, just tell me.

I have just listened to the excerpt again and I think you are right about the l-vocalisation. I also remembered that this was the only other person that I thought could possibly be foreign, but in the end I think that it was because her pronunciation was so good of Ukrainian words –- I think she is British but speaks very good Ukrainian perhaps.

b. Have you noticed l-vocalisation in other cases, not just in Female 11? Or do you think it was a special feature of this person's speech?

I think this is a relatively normal feature of English speech.