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Kizzi Edensor

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1. Introduction

1 In English foreign language teaching, two main pronunciation models are commonly used: Received Pronunciation (RP) and General American (GA). These models have been criticised and they are often said to be difficult for foreigners to perceive and acquire (Jenkins, 1998). Other researchers have suggested that other accents are easier to understand. Abercrombie argued for Scottish English as a better model for learners than RP due to its rhoticity, greater contrasts and therefore higher intelligibility. Researches working in the fields of sociolinguistic and speech perception have provided large amounts of evidence to support the notion that linguistic variation between talkers due to regional and ethnic differences is real and robust and is an important property of spoken language (Clopper & Pisoni, 2005). Research using non-natives usually focuses on the perception of their accent by natives. We know less about what non-native listeners know about English regional accents. It seems especially important to investigate non-native learners as they are likely to encounter unfamiliar varieties of English wherever they go and as Wells (1982) informs us, it is in England that the variation of accents is at its greatest.

2 Several different approaches have been used in studying variability in speech perception and spoken language processing. The traditional approach to the study of speech perception and spoken language processing has been to ignore phonetic variability (ex: within speaker variability, cross-speaker variability, segment realisation variability as well as numerous others). Variation in speech was treated as a source of noise and phonetic differences between talkers were treated as an undesirable set of attributes that needed to be reduced or eliminated in order to reveal the true underlying linguistic properties of the message. A different approach is to recognise that these sources of variability are natural consequences of language variation and investigate how variation

and variability are processed in speech perception. This alternative adopts the notion that variation in speech matters and that listeners can and do encode details of the indexical properties of the speech signal as a routine part of the normal speech perception process (Pisoni, 2007). Dialect variation is clearly one of the indexical properties that is perceived and encoded in everyday language situations and its impact on speech perception deserves further investigation.

3 A variable of sentence length was added as it is not unreasonable to suppose that the longer the utterance, the more accent-related information is revealed to the listener, the easier adaptation becomes. What effect does this have on comprehension?

4 The aim of this study is to find out how French learners of English deal with different English accents and if they understand them.

1.2. Perception and Comprehension

5 In order to get a better understanding of the process of non-native speech perception and the impact of different sources of variability, we need to learn more about how these utterances are perceived and encoded. There are several reasons as to why non-native listeners would have difficulties when confronted with different sources of variation. First, non-native listeners typically have less experience with and exposure to the variation in the target language. Second, they are likely to be less sensitive to the variation in a second language than native speakers, particularly with respect to phonetic variation within a single phonological category. However, Bradlow & Pisoni (1999) found that non-native listeners were not more susceptible to speaker variability effects in a word recognition task than native listeners. Bradlow & Bent (2003) reported that non-native listeners perform better than native listeners on speech intelligibility tasks involving non-native speech samples.

6 Even so, non-natives may encounter difficulties when confronted with strongly accented speech. Nygaard & Queen (2002) have shown that accented speech is significantly less intelligible than speech produced by talkers from one's own dialect or accent group.

7 Other studies have used transcription to test non-native listeners' comprehension of foreign or regional accents. Fraser-Gupta (2005) tested listeners in Singapore and Britain using transcription. The results were very good for familiar accents (British listening to British and Singaporean listening to Singaporean). But when it came to coping with unfamiliar accents, some hearers were more skilled than others. The author even suggests that the results showed that the Singaporean accent might be 'clearer' than the British one.

8 Hanson & Ikeno (2007) results showed that overall transcription accuracy is affected by the listeners' nativeness to the language. They used three different accents from the IViE (Intonational Variation in English) corpus, Belfast, Cambridge and Cardiff.

9 The non-natives correctly transcribed 48% of what they heard, and the Cardiff accent was the most comprehensible.

1.3. Listening and response times

10 Research that has used sentence length or different lengths of exposure as a variable have observed different results. Floccia, C. *et al.* (2006) tested French natives listening to

regional French accents. Listeners were faster to process familiar accent sentences than unfamiliar ones. They found no accent affect on short sentences whereas the longer sentences had a very strong effect. These results suggest that unfamiliar regional accents elicit a cost in word recognition, possibly reflecting a normalising process, emerging mainly after long utterances.

11 While studying foreign accent adaptation, Munro & Derwing (1995) indicated that processing costs should eventually fall back to baseline processing after exposure to the accent has been sufficient to allow for complete adaptation. These findings confirmed the existence of a two-stage normalisation process with initial disruption of comprehension followed by a rapid adaptation. Clark & Garrett (2004) found that the processing of a foreign accent returns to baseline performance after only 2 to 4 sentences but that full accent adaptation is not always assured.

12 It has been noted that using more than one speaker can give poorer results or slower reaction times. Summerfield and Haggard (1973)[1] found that word recognition reaction times were slower in mixed-talker lists than in single-talker lists. Verbrugge *et al.* (1976) found that vowel identification was more accurate in single-talker lists (9.5% errors) than in mixed-talker lists (17% errors). Kakehi (1992) described experiments done earlier by Kato & Kakehi (1988) that investigated listener adaptation to talker voice. They found a very interesting effect of adaptation (as indicated by increased syllable recognition accuracy in noise) over the course of five successive stimuli. Accuracy increased monotonically from 70% correct on the first stimulus produced by a talker, to 76% correct on the fifth stimulus. After the fifth stimulus, no further increase in recognition accuracy was observed.

2. Experiment

13 This experiment aimed to measure the subjects comprehension of the regional varieties.

2.1. Stimulus

14 The IViE (Intonational Variation in English) corpus was used for this experiment.

15 The accents are Cambridge, London (Jamaican bilinguals), Liverpool, Leeds, Bradford (Punjabi bilinguals), Cardiff (Welsh bilinguals), Newcastle, Belfast and Malahide. The speakers were recorded in schools and were aged 16. We selected the read passage of the Cinderella story so that we would have the same sentences read by different speakers, in order to facilitate comparison in our results.

16 We used syllables to decide how to cut the sentences up into short (4-9 syllables), medium (10-14 syllables) and long (15-24 syllables) lengths. We tried as much as possible to respect natural pauses in order to segment the sentences, this was not always possible but most of the speakers paused at the same places in the text. This variable was introduced to investigate whether accent adaptation is sensitive to signal length – the more information the subjects get on the accent characteristics the more adapted to the accent they will be.

17 All of the sentences were harmonised so that the volume was between 60 and 75 decibels, so that the volume would be sufficiently loud but not too loud to be uncomfortable to

listen to, we did not want volume to be a variable and create large differences between speakers and accents.

2.2. Method

18 It has been noted that using more than one speaker can give poorer results (Summerfield & Haggard, 1973; Verbrugge *et al.*, 1976; Kato & Kakehi, 1988). Therefore a single speaker per accent was chosen for this test (this choice was made after several tests, which helped in choosing the most typical speaker for each region). The listeners never heard the same speaker/accent one after the other and they all heard the 27 utterances (3 per accent and three different lengths) in the same order. They were asked to write down orthographically what they heard and they had the possibility to listen to each utterance a maximum of four times. Previous studies have shown that the length of the utterance is a key factor in perception tasks. The longer sentences help subjects to adapt and store information for future reference. Other studies have suggested that the length of the sentence does not influence the subjects ability to adapt. But does our adaptation mechanism only work for our own native language? Are French people able to adapt to these regional accents and understand them?

19 This test was done using Lancelot (available in Perceval) to enable the listeners to go at their own rhythm. The sentences were specifically chosen to try and reflect the most common vocalic and consonantal differences in each accent. For example, the different realisations of /r/, /θ/, / ŏ/ and *-ing*, /Iŋg/ versus /Iŋ/ and the different pronunciations of /æ/ versus /a/, /ɑ:/ versus /a:/, /ʊ/ versus /ʌ/, *etc.*

20 Twenty-one French students enrolled in their second year at university and majoring in English did this experiment. The average age was 20.8 and the average years of studying English was 9.1.

21 The French students in this study had very little awareness or information on the different accents in Britain, some wrote that they didn't even know that they existed. After having studied English for about 10 years they have had no preparation to help them understand the main differences between different accents.

22 The sentences used were the following, they appear in the same order that they were heard:

1. But he held on to the slipper. – Cambridge, short sentence.
2. Lily and Rosa thought this was divine – Bradford, medium length sentence.
3. Cinders was so glad that she failed to remember her fairy godmother's warning. – Leeds, long sentence.
4. They wanted hairbrushes, hairpins and hair spray – Belfast, medium sentence.
5. Do you have any other girls? the Prince asked Cinders' mother – London, long sentence.
6. They dreamed of wedding bells – Liverpool, short sentence.
7. In the Royal Palace, everyone was amazed by the radiant girl in the beautiful ballgown – Newcastle, long sentence.
8. It was her fairy godmother – Cardiff, short sentence.
9. Prince William and Cinders danced for hours – Malahide, medium sentence.
10. But the slipper was always too small – Leeds, short sentence.
11. Cinders went, and found a splendid pumpkin which the fairy changed into a dazzling carriage – Bradford, long sentence.
12. Suddenly, a voice said: 'Why are you crying, my dear' – Cardiff, medium sentence.

13. But then Cinders tried on the glass slipper, and it fitted perfectly – Belfast, long sentence.
14. A ballgown, a robe and jewels appeared – London, medium sentence.
15. 'Oh dear!' she sighed – Newcastle, short sentence.
16. When the Royal travellers arrived at Cinders' home – Liverpool, medium sentence.
17. And her face was dirty – Malahide, short sentence.
18. 'It's you, my darling isn't it?' he yelled. 'Will you marry me' – Cambridge, long sentence.
19. 'I don't even know her name,' he sighed – Belfast, short sentence.
20. The Prince looked carefully at the girl's face, and he recognised her – Liverpool, long sentence.
21. Poor Cinders had to wear all their old hand-me-downs – Newcastle, medium sentence.
22. After the ball, the Prince was resolved to find the beauty who had stolen his heart – Cardiff, long sentence.
23. 'You look wonderful', her fairy godmother said, smiling – Cambridge, medium sentence.
24. Then the girl looked at her old rags – Bradford, short sentence.
25. And may I have the honour of this dance – Leeds, medium sentence.
26. The glass slipper was his only clue – London, short sentence.
27. They spent all their time buying new clothes and going to parties – Malahide, long sentence.

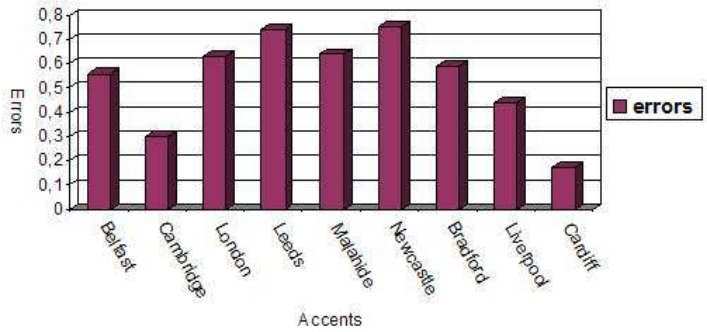
3. Results

23 After analysing the results, it seems quite difficult to talk about comprehension for all of the accents. It appears that the listeners did not always understand very much of what they wrote, instead we believe that they recognised certain words and either missed out or guessed the others. It would appear that most of the French subjects found it difficult to capture the meaning of the utterances and sometimes only managed to correctly recognise a few words. Therefore we chose a word recognition coding system which seemed more appropriate as it was very difficult due to the amount of errors, to score their comprehension.

24 The different ways of scoring a transcription (Buck, 1995; Fraser-Gupta, 2005) seemed far too harsh to be adapted to this test and would have led to negative scores, which would have been unhelpful in examining how non-natives deal with different accents. One point was scored for every word correctly transcribed, compounds and contractions were classed as two words. The students' transcripts were coded by using a correct word recognition rate, counting the number of words correctly transcribed, giving a total out of 260 words. There was no penalty for the insertion of words nor for spelling mistakes, even though it was sometimes hard to tell what was a simple spelling mistake and what was a misperception. On average, the participants listened to each utterance 3.6 times out of 4.

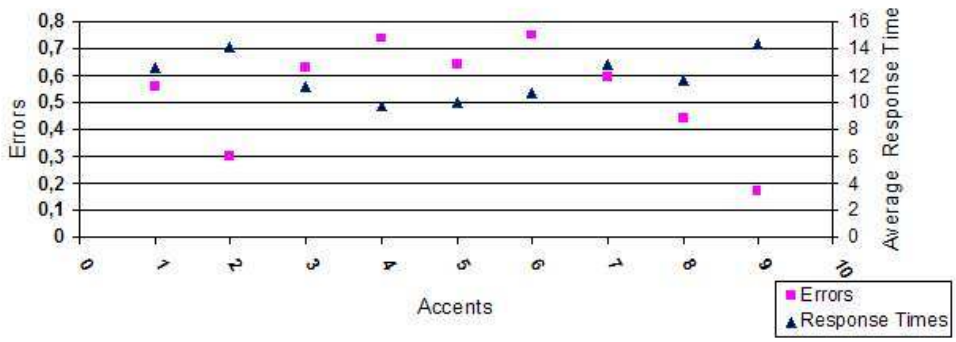
image

Figure 1. Proportion of errors per accent



25 The first results concerning this experiment clearly show that the proportion of errors made were the lowest in the Cardiff accent (0.17) and in the Cambridge accent (0.3). The first sentence in the test was a short Cambridge utterance so this could explain why Cambridge was less understood than Cardiff. The accents from Liverpool and Belfast caused slightly more difficulties and the remaining accents (Bradford, Malahide, London) got quite high proportions of errors. Leeds and Newcastle were at the highest end of the scale.

Figure 2. Proportion of errors and average response time for each accent

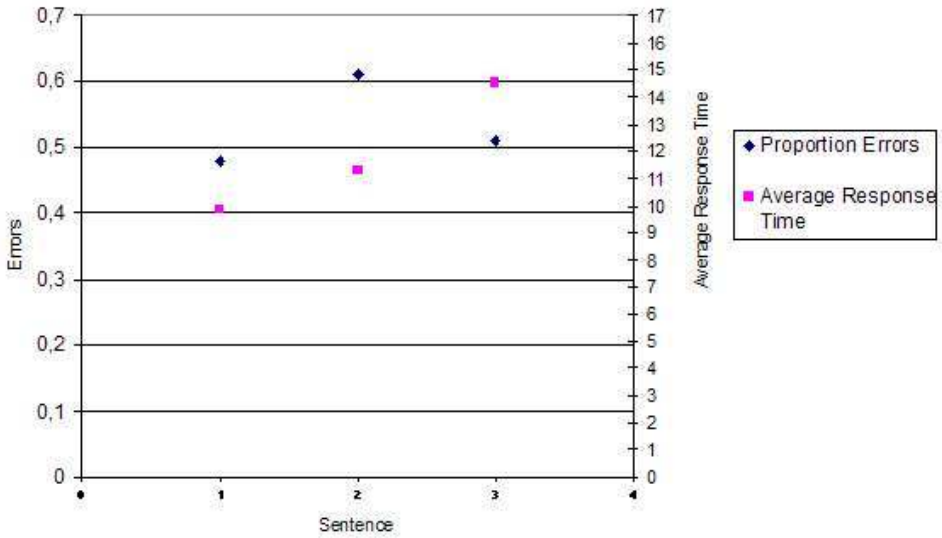


26 In figure 2 the row of numbers correspond each to an accent; 1 stands for the Belfast accent, 2 is the Cambridge accent, 3: London, 4: Leeds, 5: Malahide, 6: Newcastle, 7: Bradford, 8: Liverpool and 9 is Cardiff.

27 These results show the relationship between the amount of errors made and the average time the listeners took to listen and try to make sense of what they heard. The general tendency shows that the less errors there were, the larger the distance between the two variables was and the longer the listeners took in between each time they listened to the utterance. This is quite a strange result to find and it would suggest that listeners were able to work out the meaning of the sentence but that this took longer in order to recognise the most correct amount of words. One would have expected the opposite results. It would have been expected that when the response time was longest this was where they had the most difficulty in extracting words from the enunciation.

28 These results show that the two accents (Cardiff and Cambridge) that were the least difficult to comprehend also took the most time to understand. Bradford, Liverpool and Belfast also have slightly longer response times compared to the amount of errors, but still have quite high proportions of errors. The other accents all have a higher proportion of errors for a shorter listening time. It is possible that the difference between these two groups is that the listeners sensed that if they took their time for the accents with the least amount of errors they would be capable of retrieving more meaning, whereas for the rest of the accents the phonological difference were so great that the listeners soon gave up and moved on to the next sentence.

Figure 3. Average Response Time and Proportion of Errors per Sentence Length



In figure 3 the row of numbers correspond each to sentence type; 1 stands for the short sentences, 2 is for medium sentences, and 3 is for long sentences.

29 The results show that the response times gradually increased with the length of sentence. In regards to the errors made, the short and the long sentences have roughly about the same amount of errors. For the short sentences this could suggest that regional accents cause less disruption in the processing system. For the longer sentences, it is possible that the context in the sentence helped the listeners but also that the more input they received the easier it was to adapt to the accent and recover words. The most errors were made in the medium sentences. This could suggest an adaptation process that increases or is disrupted before returning to baseline level, or in this case, below baseline comprehension.

30 The results suggest that the medium lengthened sentences were more difficult to understand than the longer sentences, the error rate decreases but does not descend to the same level as for the short sentences, suggesting that adaptation is not complete.

4. Discussion

31 The listeners never heard the same speaker one after the other (apart, of course the fact that they could listen to the same sentence up to four times, by the same speaker), perhaps if the different sentences had been grouped together by accent, the listener would have had better responses as it would have enabled the listeners even more time to adapt to the speaker and accent. The fact that the story was also in a random order meant that there was less possibility of listeners being able to use clues from the context, even though they did eventually realise what the story was. It is likely that the change in accent from one sentence to another disrupted the adaptation process. This could be possible as Clark & Garrett (2004) found that the processing of a foreign accent returns to baseline performance after only 2-4 sentences but they also found that full accent adaptation isn't always assured.

32 In this experiment, we are dealing with degree of skill of the listener, some listeners are more able to perceive unfamiliar varieties. Other factors have to be taken into account; the fact that some listeners probably rely on the context, and guesswork or deduction is likely to be involved. In most accents the listeners were not always able to do this although some listeners did say that they were able to use the context to retrieve problematic words. What is highly interesting is that the majority of the French listeners misperceived the same segments and proposed the same orthographic transcription, which is in itself a very interesting result. The question that is extremely difficult to answer is whether the same mistakes would have been made with standard English. In other words, do the errors reflect general French misunderstandings and misperceptions or are they directly linked to the accents? It is likely that half reflect general French problems and half are due to the accents. We are currently undertaking other experiments in order to determine this.

33 The cultural references in the passage may also have impeded comprehension, for example, the fact that the speakers used the term *Cinders* and not *Cinderella*, it is possible that the latter would have caused less difficulties. Proper nouns are renowned to be more difficult to perceive, especially unfamiliar ones.

34 The most understood accents were, we believe the most comprehensible accents – Cardiff and Cambridge. In general, the subjects had no experience of Welsh English nor with Liverpool English (which also showed quite good scores) but were still able to understand them quite well.

35 The Leeds accent possibly had low results due to the speakers' very "layed-back" way of speaking or drawl. Fraser-Gupta explains that if intelligibility lay in the degree of clarity in a speaker one would not expect to find any high scores for a less clear accent.

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36 Sentence length caused different tendencies and it would appear that different forms of adaptation took place; processing can be improved if the utterance is sufficiently long and return to near baseline level which corresponds to the level of errors in the short sentences. There are also signs of disruption in processing in the medium sentences as

they had the highest proportion of errors. This would concur with the findings of Clark & Garrett (2004).

37 To explain the reason why there was such a difference between response times Munro & Derwing (1995) suggest that *"increased processing time may also result from a lack of comprehension or misperception of lexical items which might necessitate special top-down processing. Even though the speaker's message may be understood, the listener may have to work harder to decode it".*

38 Further research is needed to try to explain why adaptation is sometimes not possible and to investigate the influence that other variables had on the results. For example, what role does the choice of lexicon play, would the duration of the utterances, or grouping the utterances by accent have affected the results? It would be necessary to do the tests perhaps with a more controlled speech signal.

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NOTES

1. Quoted in Pisoni, D.B.; Remez, R.E. (eds), 2007, *The Handbook of Speech Perception*, Malden: Blackwell Publ., p. 371.

ABSTRACTS

French comprehension of British regional varieties: what do response times tell us?
The goal of this study is to contribute to the understanding of non-native listener's perceptual comprehension of British regional accents. The read passage of the IViE corpus (Intonational Variation in English) was used for these experiments with a total of nine varieties from Cambridge, London (Jamaican), Liverpool, Leeds, Bradford (Punjabi), Cardiff, Newcastle, Belfast and Malahide. The subjects included 21 second-year French students majoring in English. The objective of the experiment was to measure the subject's comprehension of regional varieties. The subjects were asked to write down orthographically what they heard and could listen to each sentence a maximum of four times. Are French people able to adapt to these regional accents and understand them? Does our adaptation mechanism only work for our own native language?
The results of the comprehension task showed that the accents that were the most easily understood were Cardiff and Cambridge (the latter being the closest to Received Pronunciation, taught at University). Response times showed an unexpected pattern where they increased as the proportion of errors decreased.

Cet article porte sur la compréhension des accents régionaux britanniques chez les Français. L'objectif est de voir comment se comportent les auditeurs français face à des accents dont ils ont peu l'habitude. Nous avons effectué une expérience de compréhension sur les étudiants de deuxième année de LLCE (Langue, Littérature, Civilisation étrangère) et de LEA (Langues Étrangères Appliquées). Il existe peu d'études qui analysent la compréhension d'accents régionaux chez les non-natifs. Les étudiants ont écouté vingt-sept phrases, trois phrases par le même locuteur pour chaque accent. Ils pouvaient écouter chaque phrase jusqu'à quatre fois et devaient transcrire orthographiquement ce qu'ils pensaient entendre. En ce qui concerne cette expérience, les accents les plus facilement compris étaient ceux de Cambridge (l'accent qui ressemble le plus à celui de la Received Pronunciation) et de Cardiff. Nous voulons savoir quel est le coût cognitif de ces accents régionaux. Le temps de réponse est-il un indicateur de la compréhension ou de la non-compréhension des phrases ?

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Mots-clés: temps de réponse, compréhension, perception, non-natifs, accents régionaux
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AUTHOR

KIZZI EDENSOR

Crisco- Université de Caen Basse Normandie
kizzi.edensor@unicaen.fr