Accent intelligibility across native and non-native accent pairings: investigating links with electrophysiological measures of word recognition

Louise Marie Stringer

A dissertation submitted in partial fulfilment of the requirements for the degree of Master of Philosophy

UCL Division of Psychology and Language Sciences,
Department of Speech, Hearing and Phonetic Sciences

2015

Declaration

I, Louise Marie Stringer confirm that the work presented in this thesis is my own. Where information has been derived from other sources, I confirm that this has been indicated in the thesis.

Acknowledgements

Firstly, I would like to thank my principal supervisor Paul Iverson. I am very grateful for all his help and support throughout this degree, and for his patience with me while I struggled to get to grips with the many things I had to learn from scratch. I'm also very grateful for his understanding through all my personal problems and helping me to take the best course of action to get through them.

I would also like to thank my secondary supervisor Valerie Hazan for her support and encouragement. Her help while I was developing the new sentence recognition materials was especially useful. I'm also indebted to María Luisa García Lecumberri, my supervisor at the University of the Basque Country for her extensive advice and assistance. Her expertise in testing non-native speakers was very helpful in planning my research, and I'm also very grateful for all her efforts in organising my research trips to Vitoria and recruiting participants.

A large part of my research involved travelling to record speakers or carry out testing. I'd like to thank Rachel Smith at the University of Glasgow for organising recording sessions and contacting speakers for me (and also the PhD students who patiently waited while I took up their testing booth!). Edurne Petrirena at the University at the Basque Country was also wonderful, organising ethics approval, room bookings, recruiting participants and answering my many, many questions about equipment. A huge thank you has to go to María Luisa and Martin Cooke as well for their amazing hospitality during my stays in Vitoria (especially all the delicious food!), and also to Máté Tóth for taking time out of his own busy schedule to show me around.

Thanks also must go to the many people at UCL and further afield who have also offered me invaluable advice and given me interesting things to think about. Thank you to Stuart Rosen, Andy Faulkner, Jyrki Tuomianen, Mark Huckvale, Odette Scharenbourg, Cassie Mayo, Gustav Henter and all the others.

I also owe a lot of thanks to the many people who have helped me to learn how to just about function on my own in my experiments; Steve Nevard for his amazing technical support, especially while trying to figure out how to get our equipment to

work in Spain (and also for not laughing at some of my more stupid questions!), Emma Brint for pretty much teaching me how to run EEG experiments, Mel Pinet for sharing her recording expertise (and all the cake), Mauricio Figueroa for all his coding help, and Tim Schoof for bailing me out of a stats hole or two. Thank you also to Alex Leff for his suggestions regarding the analysis of the EEG data.

Thanks must also go to all the participants who filled in long and dull questionnaires, sat through excruciatingly long recording sessions or endured being covered in electrodes in experimental sessions. For many participants this meant long hours of concentrating in a second language, almost completely without complaint. Thanks guys! I'd also like to thank Anne-Marie Richardson and Fiona Wiebusch and her lovely RMIT team for their help in recruiting participants.

I'm also very grateful to have such a lovely group of people to work with everyday. Thank you to all the SHaPS PhD students for your friendship (and all the biscuit goodies!), and also to my INSPIRE buddies. I'll miss you guys!

On a more personal note, there are many people who helped me to limp through all my issues to manage to get to this point. Thanks to my wonderful friends Dean Jarvis, Danica Lesser, Rachel Donovan and Nathan Rayner for putting up with my seemingly endless moaning, indecisiveness and general grumpiness and still being lovely to me. I wish I could see you all more often! Thank you also to Emma Brint and Cassie Mayo for picking me up when I fell to pieces, you were both a massive help, thank you. Thank you also to Nadine for keeping me (just about sane) with our Princess Lou sessions, Cennydd and Anna for all the lovely roasts and chats, Miss Sophie for Bristolian adventures, and Rasmus for distracting me from my panic while I finished off this thesis. And finally, mum, dad and Hayley, thank you so much! You're absolutely wonderful and I'm sorry for not listening to you sooner.

Abstract

The intelligibility of accented speech in noise depends on the interaction of the accents of the talker and the listener. However, it is not yet clear how this influence arises. Accent familiarity is commonly proposed to be a major contributor to accent intelligibility, but recent evidence suggests that the similarity between talker and listener accents may also be able to account for accent intelligibility across talker-listener pairings. In addition, differences in accent intelligibility are also often only found in the presence of other adverse conditions, so it is not clear if the talker-listener pairing also influences speech processing in quiet conditions.

This research had two main aims; to further investigate the relationship between accent similarity and intelligibility, and to use online EEG methods to explore the possible presence of talker-listener pairing related differences on speech perception in quiet conditions. English and Spanish listeners listened to Standard Southern British English (SSBE), Glaswegian English (GE) and Spanish-accented English (SpE) in a speech-in-noise recognition task, and also completed an event-related potential (ERP) task to elicit the PMN and N400 responses. Accent similarity was measured using the ACCDIST metric.

Results showed the same (or extremely similar) patterns in accent intelligibility and accent similarity for both listener groups, giving further support to the hypothesis that accent similarity can contribute to the level of intelligibility of an accent within a talker-listener pairing. ERP data also suggest that speech processing in quiet is influenced by the talker-listener pairing. The PMN, which relates to phonological processing, seems particularly dependent on a match between talker and listener accent, but the more semantic N400 showed some flexibility in the ability to process accented speech.

Table of Contents

Figures

Tables

1. Chapter one: Introduction

In everyday life, we commonly encounter speech in a range of accents, including native accents from a variety of countries and regions and also non-native accents of speakers with different native languages (L1s). We are able to understand some of these accents with ease, but others can be much harder to comprehend, particularly if there are other adverse factors present such as background noise or listening to speech in a language other than our L1. However, the intelligibility of an accent does not depend only on the accent of the talker, but also on its pairing with the listener's accent; one listener may find a talker to be highly intelligible, while another could have great problems understanding the same talker. For example, listeners from the south of England find Glaswegian accents harder to understand than Glaswegian listeners do (Adank, Evans, Stuart-Smith & Scott, 2009; Smith, Holmes-Elliott, Pettinato & Knight, 2014), Chinese listeners can be more accurate at identifying words in Mardarin-accented English than American listeners (Hayes-Harb, Smith, Bent & Bradlow, 2008), and highly proficient French speakers of English may find a standard native English accent to be more intelligible than French-accented English, while less proficient listeners may show the opposite pattern (Pinet, Iverson & Huckvale, 2011).

Although the talker-listener accent pairing seems to be very influential in determining the intelligibility of an accent, it is not clear how this effect arises. One factor which may underlie the intelligibility of an accent for a given pairing is the listeners' familiarity with the talker's accent, as listeners tend to find accents they are familiar with to be easier to understand than unfamiliar accents. This could explain some asymmetries in the patterns of accent intelligibility across talker-listener pairings; listeners with a standard accent often find their own accent to be more intelligible than an unfamiliar regional accent, but regional listeners who are familiar with the standard accent through extensive media exposure can find this accent as intelligible as their own regional accent (Adank et al., 2009; Smith et al., 2014; Sumner & Samuel, 2009). It has been proposed that this long-term familiarity allows listeners to form accent-specific phonological representations for their own regional accent and also the standard accent (Sumner & Samuel, 2009), which then facilitates word recognition in both accents.

Another recently explored factor which could influence the intelligibility of an accent in noise is the acoustic-phonetic similarity between talkers' and listeners' accents. Subjective judgements of accent similarity suggest that listeners whose accent is closer to that of a talker find that accent easier to understand than listeners whose accent is less similar (Evans & Iverson, 2007), and findings of studies that utilised objective measures of accent similarity suggest that a greater level of similarity between acoustic-phonetic features of talker and listener accents is associated with higher levels of with accent intelligibility. For example, vowels in regional accents whose vowel spaces are closer to the listeners' own accent are easier to identify than vowels in other regional accents which are more acoustically distant to the listeners' accent (Oder, Clopper & Ferguson, 2013; Wright & Souza, 2013), and the intelligibility of a range of native and non-native accents in noise shows a positive relationship with the degree of similarity in vowel spectral qualities and duration between talker and listener accents (Pinet et al., 2011). If acoustic-phonetic similarity does contribute to the influence of the talker-listener pairing on accent intelligibility, this would suggest that listeners deal with accented speech in a different way to that which has been suggested based on accent familiarity. Instead of forming new representations to accommodate an accent, listeners may interpret all accents through existing representations formed based on their own accent. More similar accents may then be easier to map onto these representations than accents which are more distant to the listener's accent.

Regardless of the factors underlying the influence of talker-listener combination on accent intelligibility, differences in the patterns of accent intelligibility across talker-listener pairs are often observed only in the presence of background noise; accents that may show very different levels of intelligibility in noise may be similarly intelligible in quiet conditions (e.g.: Adank et al., 2009, Pinet et al., 2011). This could suggest that processing difficulties affecting accent intelligibility across talker-listener pairings occur specifically as an interaction with background noise, and that listeners are able to successfully accommodate accent-related variability in quiet conditions. However, many behavioural studies measure accent intelligibility based on the outcome of word recognition processes, which raises the possibility that accented speech could cause processing difficulties in quiet conditions, but that these difficulties are not severe enough to prevent successful word recognition and affect the outcome of these tasks. Studies using online measures of word recognition

suggest that this may be the case; eye-tracking studies have shown that segmental (Trude, Tremblay & Brown-Schmidt, 2013) and suprasegmental (Reinsch & Weber, 2012) errors in non-native speech can cause some disruption to word recognition in quiet, even when word recognition accuracy is high. Using electroencephalography (EEG) measures to investigate event-related potentials (ERPs) also suggests there are qualitative differences in the processing of regional and non-native accents in quiet conditions (Brunellière & Soto-Faraco, 2013; Goslin, Duffy & Floccia, 2012; Hanulíková, van Alphen, van Gogh & Weber, 2012; Romero-Rivas, Martin & Costa, in press). If accent-related processing difficulties are present in quiet conditions, as suggested by these online studies, listeners may not be able to fully accommodate the variation occurring in accented speech even in favourable conditions.

The current research aimed to further explore links between accent intelligibility in noise and the acoustic-phonetic similarity of talker-listener accent pairings, and also to use EEG measures to investigate whether any influence of talker-listener pairing on word recognition processes could be observed in quiet conditions. Throughout, we compared responses to a standard native accent, a regional native accent and a non-native accent, (Standard Southern British English (SSBE), Glaswegian English (GE) and Spanish-accented English (SpE), respectively) for native English listeners and non-native Spanish listeners. It was necessary first to develop a suitable set of stimuli to accommodate the different task types and language background of the listeners, which is described in Chapter Two. The first part of the study then established the intelligibility of the three accents for each listener group (Chapter Three), and then went on to investigate links between accent similarity and intelligibility for the talker-listener pairings (Chapter Four). The final aspect of the research, described in Chapter Five, explored ERPs in response to each of the three accents for the two listener groups, in order to investigate whether there is any evidence of the influence of talker-listener accent pairing on online word recognition processes in quiet.

2. Chapter two: Developing new speech recognition materials suitable for non-native speakers of English

2.1. Existing speech recognition materials

Non-native speech perception research has greatly increased in recent years. However, few suitable materials have been developed specifically for this purpose, particularly at the sentence level, so it is common to use materials developed for other listener groups. Such materials can be very useful, but may not be entirely suitable for administration to non-native listeners.

A very commonly used materials set, the Bamford-Kowal-Bench (BKB) sentences (Bench, Kowal & Bamford, 1979), was developed for assessing hearing-impaired children's speech perception abilities. The BKB sentences consist of 320 simple sentences, each containing three or four key words (e.g.: "The *∂og played* with a *ɔtick*"). The BKB sentences have been used in many native and non-native speech perception studies, in areas such as accent intelligibility (Bent & Bradlow, 2003; Pinet et al., 2011; Stibbard & Lee, 2006), the influence of various maskers on speech-in-noise perception (Crandell & Smaldino, 1996; Smiljanic & Bradlow, 2011; Van Engen, 2010), and as training materials (Gao, Low, Jin & Sweller, 2013; Shin & Iverson, 2013). Although they are not syntactically complex and most words are familiar to non-native speakers (Bent & Bradlow, 2003), the BKB sentences could be seen as overly-simplistic and fairly childish, so may not be entirely suitable for administration to adults. In addition, there is no opportunity to manipulate the level of semantic context in sentences, which limits their use in EEG experiments focusing on components such as the N400 effect.

Another frequently used materials set is the Speech Perception in Noise (SPIN) sentences (Kalikow, Stevens & Elliott, 1977), which were created for assessing the speech perception abilities of hearing-impaired listeners, but adults in this case rather than children. The SPIN sentences also differ to the BKB sentences in that there are two sentence conditions with different amounts of semantic information provided. In high probability sentences, a strong semantic context means the final word is easy to predict (e.g.: "For your birthday I baked a cake"), while in low probability sentences, no useful semantic information is provided, so the final word is not easily anticipated

(e.g.: "Tom wants to know about the cake"). The SPIN sentences have been used in investigations of both native and non-native listeners' use of semantic information to support speech perception in adverse conditions (e.g.: Clopper, 2012; Mayo, Florentine & Buus, 1997; Shi, 2012, 2014; Tabri, Abou Chacra & Pring, 2011), and also in EEG studies investigating the N400 effect (e.g.: Connolly & Phillips, 1994). The flexibility offered by having multiple context conditions may mean the SPIN sentences have wider applications than the BKB sentences, but their use is also limited in non-native speech perception studies as they contain some quite advanced vocabulary (e.g.: keywords include 'brook', 'notch', 'sap' and 'tack', Kalikow et al., 1977), which may be challenging for non-native speakers, particularly those who are not highly proficient in English.

While both the BKB and SPIN sentences are often used in both native and non-native speech perception studies, there are other material sets which are generally used only for native listeners. One example is the Harvard sentences (IEEE, 1969), which are commonly used in investigations into the perception of noise-vocoded or otherwise spectrally degraded speech (e.g.: Bent, Buchwald & Pisoni, 2009; Stacey & Summerfield, 2007), but are unsuitable for administration to many non-native listeners as the sentences are fairly complex, both in syntax and vocabulary (e.g.: "Trample the spark, else the flames will spread").

Due to the limitations of administering these material sets in non-native speech perception studies, some materials have been developed specifically for use with non-native listeners. To investigate the use of semantic information to compensate for difficulties in adverse listening conditions, Bradlow and Alexander (2007) developed a set of sentences similar to the SPIN sentences, but with vocabulary that is more familiar to non-native speakers of English. While this set is more useful for non-native listeners, it contains only 120 sentences, which limits its use in studies with multiple within-subject conditions. High and low predictability sentences also differ in length, and low predictability sentences comprise only a small number of very simple sentence structures, meaning the conditions may differ in other features as well as the level of semantic information available. The only large-scale materials set developed specifically for non-native speakers of English is the recent Basic English Lexicon (BEL) sentences (Calandruccio & Smiljanic, 2012), which are based on a lexicon developed from recordings of spontaneous non-native speech. The BEL

sentences have so far been used in both non-native (Rimikis, Smiljanic & Calandruccio, 2013) and native speech perception studies (Smiljanic, Sheft, Chandrasekaran & Shafiro, 2013; van Engen, Chandrasekaran & Smiljanic, 2012). These materials have great potential for use in future research, but the BEL sentences are similar to the BKB sentences in that there is no opportunity to manipulate the level of contextual information present. Sentences are also restricted to a limited number of template forms, meaning some sentence structures become repetitive. In addition, some vocabulary may be unfamiliar to some non-native speakers, particularly those without exposure to American English.

For the present studies, we required sentence materials suitable for fairly advanced, but not proficient non-native listeners. In order to use the sentences in an EEG study in addition to speech-in-noise tasks we needed multiple sentence conditions which varied in the level of contextual information available. The set also needed to be large enough to allow a number of experimental conditions without having to repeat sentences. As none of the existing material sets described above met all these criteria, a new set of materials was developed.

2.2. The new materials set: Non-native speech recognition sentences

The non-native speech recognition (NNSR) sentences developed for the current research contain three related sentence conditions (predictable, neutral and anomalous), which differ based on the level of contextual constraint and/or the congruity of the final keyword. Sentences are organised into 439 related triplets containing one sentence in each of the three conditions to give a total of 1317 individual sentences. Sentences were formed by combining a sentence frame (the main body of a sentence without the final word) and a final keyword. Sentence frames have either a strongly or weakly constrained context, as determined by two or three 'pointer words' (content words which generate the context of a sentence, Kalikow et al., 1977). In strongly constrained sentence frames, the pointer words generate a very specific context, while in weakly constrained sentence frames, a more ambiguous context is generated. Final keywords are either congruous or incongruous to the context generated in the sentence frame.

Predictable sentences are formed of strongly constrained sentence frames and congruous final keywords; the specific context generated in the sentence frame can

be completed by very few words, so final keywords in this condition are highly predictable. Neutral sentences contain the same congruous final keywords, but in this case they complete weakly constrained sentence frames. The more ambiguous context generated means that many words could complete the sentence, so final keywords cannot be easily predicted and are now neutral. Anomalous sentences combine strongly constrained sentence frames with incongruous final keywords. As the keyword is not the predictable word that would be expected based on the context, the sentence becomes anomalous. The same sets of sentence frames and keywords appear in more than one condition, so the sentence content overlaps within each triplet; predictable and neutral sentences have different sentence frames, but share the same final keyword, while predictable and anomalous sentences show the opposite relationship (Table 1).

To ensure the NNSR sentences are suitable for lower-proficiency non-native speakers of English, lexical items and syntactic structures used in the sentences were drawn from materials designed for speakers at the B1 level of the Common European Framework of Reference for Languages (CEFR). The B1 level is an 'intermediate level', where speakers can communicate successfully on a range of topics, but still have large gaps in their knowledge (North, Ortega & Sheehan, 2010). All words appearing in the materials were drawn from the Preliminary English Test (PET), whose vocabulary list contains approximately 3300 words (University of Cambridge ESOL Examinations, 2012). This source was chosen as the PET is a commonly administered B1 level examination which is taken by learners of English around the world, meaning that its vocabulary list is not likely to be biased towards speakers of a particular L1. The vocabulary list is also readily available as a study aid, meaning that

Table 1: Examples of how sentence frames and keywords are combined to form the three sentence conditions

Condition	Sentence Context	Final Keyword	Example
Predictable	Strongly constrained	Congruous	**The dolphins are swimming in the SEA.**
Neutral	Weakly constrained	Congruous	The children are playing in the **SEA.**
Anomalous	Strongly constrained	Incongruous	**The dolphins are swimming in the** ROAD.

Content overlapping across sentence types are shown in bold, pointer words are underlined and final keywords are capitalised

this is a good resource of words suitable for the B1 level. Syntactic structures are also limited to those expected to be familiar at the B1 level of the CEFR Core Inventory, which includes the majority of common syntactic structures (North et al., 2010, p10-11). To avoid the repetitive use of a limited number of syntactic structures, sentence structures are not restricted in any other way.

2.3. The development process

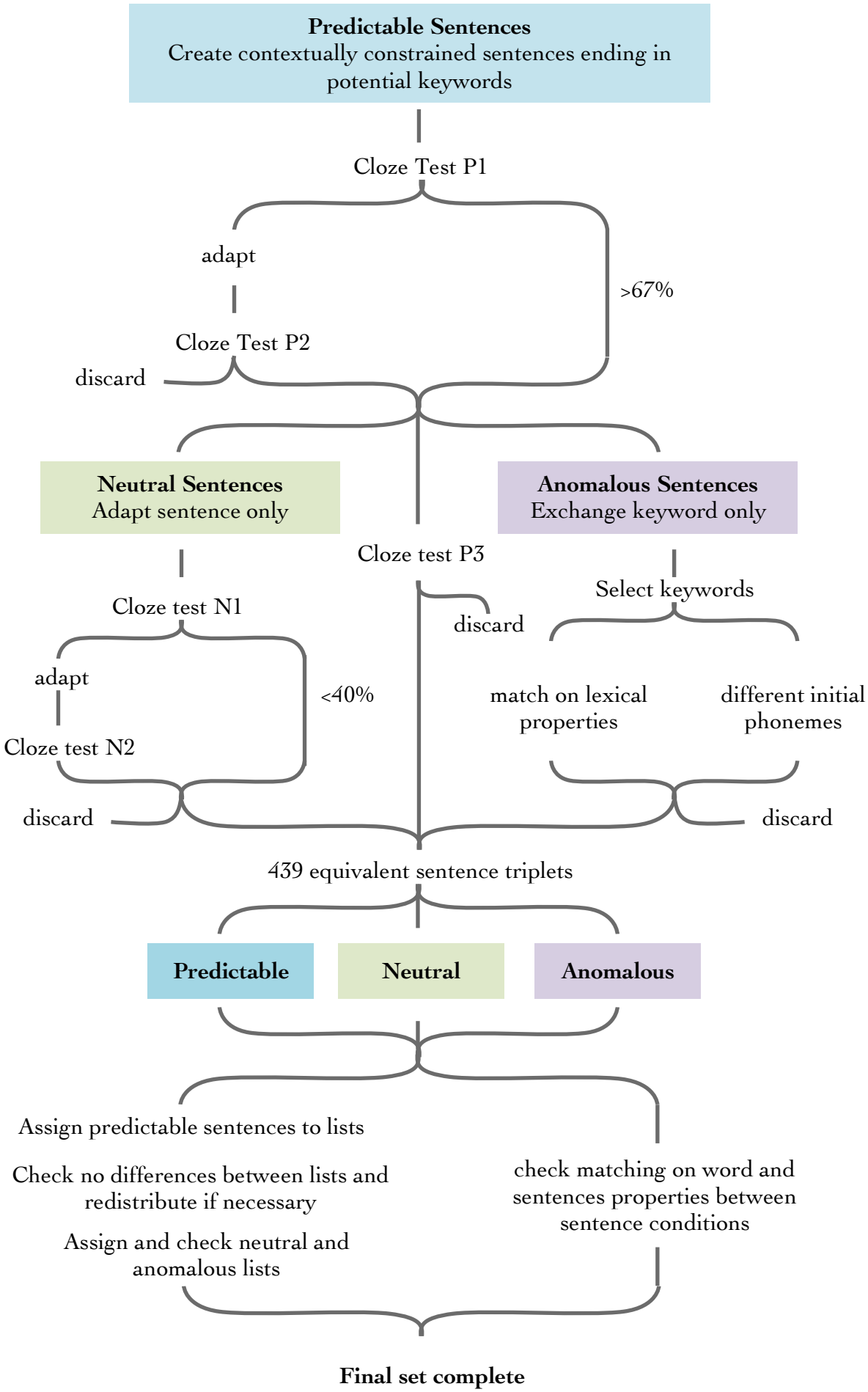
The development of the NNSR sentences began with creating predictable sentences, which were then used as the basis of neutral and anomalous sentences. The process of development and validation is described below and summarised in Figure 2.1, and the complete materials set can be found in Appendix 1.

The first stage of development was to select a pool of potential final keywords from the PET vocabulary list (University of Cambridge ESOL Examinations, 2012). As in the SPIN sentences, final keywords were limited to nouns to maintain similarity across sentences (Kalikow et al., 1977). All nouns on the PET vocabulary list were identified, excluding nouns that are also verbs (e.g.: book), multi-word nouns (e.g.: weather forecast, although one-word compounds were retained), acronyms (e.g.: DVD), words with common abbreviations (e.g.: bicycle/bike), occupations with different male/female forms (e.g.: actor/actress), titles (e.g.: Mr., Miss), hyphenated words (e.g.: make-up). These words were excluded in order to minimise possible confusions as to which word should complete a strongly constrained sentence frame. A small number of words were also excluded because they did not appear in word property databases used at later stages in development. This left a pool of 1413 potential final keywords of between one and five syllables and with a frequency of between 0.04 and 5250 occurrences per million words (mean frequency = 61 occurrences/million words, Brysbaert & New, 2009). As the words were all drawn from B1 level materials, even the least frequent words were likely to be familiar to non-native participants (e.g.: notepaper, footballer).

2.3.1. Predictable sentences

Predictable sentences were constructed by creating strongly constrained sentence frames that are congruently completed by one of the potential keywords. Each sentence frame contained two or three related pointer words in order to generate a specific context related to its keyword. In line with existing materials, the length of

Figure 2.1: Development process of the new sentence materials



sentence frames was limited to 5-9 words/5-12 syllables (e.g.: Block & Baldwin, 2010; Bradlow & Alexander, 2007; Calandruccio & Smiljanic, 2012), giving complete sentence lengths of 6-10 words and 6-16 syllables. To maximise the size of the final materials set, a highly constrained sentence frame was created for as many of the potential keywords as possible, giving an initial set of 553 predictable sentences.

To ensure these sentences were indeed predictable, the predictability of the final keyword of each sentence was assessed using a series of cloze tests. In a cloze test, participants receive a list of sentences frames and supply a word to complete the sentence (e.g.: "The dolphins are swimming in the _____"). No possible options are provided. A word's cloze probability is the proportion of participants who choose that word to complete the sentence. For example, if nine out of ten participants chose 'sea' to complete the above sentence, it has a cloze probability of 90%. If a sentence has a highly constrained context and a predictable final keyword, the cloze probability of the final keyword should be high (Kutas & Hillyard, 1984). A cloze probability of greater than 65% was set as the threshold for inclusion in the predictable sentences set, which is consistent with thresholds set in other stimuli sets which constrained the predictability of the final word (Block & Baldwin, 2010; Bradlow & Alexander, 2007). Predictability ratings are usually assessed based on native speakers' responses, but as these materials are intended for use in non-native speech perception research, both native and proficient non-native speakers participated in the cloze tests. In order to ensure the materials set is not biased towards speakers of any particular language, the L1 of non-native participants was not restricted, and speakers of 20 different L1s took part in the various cloze tests (Table 2). Although the current research focuses on native Spanish speakers, this means that the materials could also be administered to a wider population in future work.

Cloze test P1 contained all of the predictable sentences divided randomly into four lists of approximately 140 sentences. Sentence frames appearing in the four surveys did not differ based on syllable, pointer word or total word count. A cloze test was created for each list and completed online by 18 native (13 female) and 26 proficient non-native English speakers (13 female, average age of acquisition (AoA)= 9.45years, for L1s see Table 2)) with a mean age of 29.75 years. Each participant completed only one survey, was requested to work alone without a dictionary, and was not

Table 2: Native languages of cloze test participants

Cloze Test P1	Cloze Test P2	Cloze Test P3	Cloze Test N1	Cloze Test N2
Albanian (1)	Dutch (1)	Bosnian (1)	English (9)	Cantonese (1)
Arabic (2)	English (10)	French (1)	Kiswahili (1)	English (14)
Cantonese (2)	French (1)	German (1)	Korean (2)	German (1)
Dutch (2)	German (2)	Hindi (2)	Mandarin (1)	Romanian (1)
English (18)	Romanian (1)	Hungarian (5)	Slovak (1)	Slovak (1)
French (1)	Serbian (1)	Italian (2)		
German (7)	Spanish (2)	Korean (3)		
Hungarian (3)		Russian (2)		
Italian (1)		Spanish (9)		
Korean (1)		Thai (1)		
Polish (1)		Vietnamese		
Romanian (2)		(8)		
Serbian (1)				
Spanish (2)				

Where the number of speakers of each language is given in brackets

compensated for their time. The average cloze probability for all sentences was 81.8%, showing that overall the final keywords were highly predictable. Based on the cloze probabilities of the keywords, sentences were either retained, adapted or removed from the set of predictable sentences; most sentences with a keyword cloze probability over 65% were retained unmodified (387), but some were adapted slightly based on responses to further strengthen contextual constraint (54), or removed for being too specifically British (7). Sentences whose keyword's cloze probability was under the 65% threshold were adapted to reduce contextual ambiguity (62) or removed (42). For one sentence with 100% cloze probability, the given response was not the intended keyword. This alternative response also appeared on the potential keywords list, so this response replaced the intended keyword in the retained sentence.

Cloze test P2 was then carried out to ensure the 116 sentences modified after cloze test P1 now passed the 65% cloze probability threshold. A new cloze test was completed online by 10 native (7 female) and 8 proficient non-native English speakers (4 female, average AoA = 9.88years, for L1s see Table 2) with a mean age of 31.4 years. Again, participants worked alone and did not receive any compensation. Sentences whose keyword's cloze probability was now over the 65% threshold were retained (88), with one sentence adapted very slightly based on responses to reduce ambiguity. Sentences under the 65% threshold were either removed (23) or adapted

based on responses if their cloze probability was close to 65% (3). An additional sentence frame was changed back to its original form, as its keyword had a higher cloze probability in test P1 (this sentence had originally been over the 65% threshold, but had been modified slightly based on responses to attempt to further strengthen the context). Along with the 388 sentences included after cloze test P1, this gave a set of 481 highly constrained sentences with a predictable final keyword (average cloze probability = 92.4%). These remaining predictable sentences were used as the basis of the development of the neutral and anomalous sentence conditions.

To ensure the sentences are also suitable for lower-proficiency non-native participants, a third cloze test, P3, was administered to lower level non-native learners of English. The 481 predictable sentences were divided into four lists of approximately 120 sentences, which did not differ based on the number of pointer words, syllables or total word count. A cloze test was compiled for each list, and completed either in pen-and-paper form or online by 36 participants (19 female, mean age = 27.7 years, mean AoA = 7.5 years, for L1s see Table 2). All participants were students enrolled in pre-intermediate (1), intermediate (17) or upper-intermediate level (18) English classes, covering the CEFR levels A2 - B2. Participants completed only one cloze test each, were asked to work alone without a dictionary, and were not compensated for their time. One upper-intermediate level participant's responses were excluded as they completed only a small part of the test. The average cloze probability of final keywords was 67.9%, showing that the sentences were less predictable for this group than for the native and proficient non-native participants. The cloze probability of most sentences was still over the 65% threshold; 284 sentences had a keyword cloze probability over 65%, along with 7 sentences that also had a cloze probability of over 65%, but where the most common response was related to, but not the intended keyword. Of sentences under the 65% threshold, nine were removed as their keyword had a very low cloze probability or responses suggested participants may not understand the sentence, and five sentences were modified to be easier to understand. For many other sentences with a keyword cloze probability under the 65% threshold, responses were often related to the intended keyword. For example, to complete "The dolphins are swimming in the _____", words such as 'river' or 'lake' may be given instead of the more expected 'ocean' or 'sea'. Although sentences are less predictable than for native and proficient non-native speakers, it seems that the relevant context is still activated, and so the

sentences are still suitable for lower proficiency non-native speakers of English. Sentences that were removed or modified from the predictable condition following cloze test P3 were also removed or modified accordingly in the neutral and anomalous conditions during their development.

2.3.2. Neutral sentences

Neutral sentences were created by adapting predictable sentences. The same final keyword was retained in each sentence, but was now paired with a new, weakly constrained sentence frame. These weakly constrained sentence frames were created by substituting pointer words in the strongly constrained sentence frames for others which are less related to the final keyword (e.g.: 'dolphins' -> 'children', 'swimming' -> 'playing'). This generates a more weakly defined context so final keywords are no longer easily predictable. The number of pointer words was unchanged, but in some cases function or filler words were permitted to be added to or deleted to maintain naturalness. In some cases it was not possible to generate a weakly constrained context only by substituting pointer words, so new frames were constructed with the same number of pointer words. For example, "*Meat* from a *cow* is called beef" was difficult to modify by changing only the pointer words, so it became "My *favourite meat* is beef". While this meant that some strongly-weakly constrained sentence frame pairs were less similar than other pairs where only the pointer words differ, the structure of the sentence frames was kept as similar as possible across pairs. To ensure these modified sentences with weakly constrained sentence frames were neutral, further cloze tests were carried out. In this case, if a sentence frame has a weakly constrained context and its final keyword is not easy to predict, the cloze probability of the final word should be low. The cloze probability threshold for inclusion in the neutral condition was set at under 40%, and applied to the most common response given instead of just the intended keyword. This threshold was again chosen to be similar to thresholds set in similar stimuli sets (Block & Baldwin, 2010).

Cloze test N1 contained all 481 neutral sentences and was completed online by 9 native (6 female) and 5 proficient non-native (5 female, average AoA = 8.60 years, for L1s see Table 2) English speakers with an average age of 25.78 years. Participants had not completed any of the previous cloze tests, and received course credits for their time. Sentences where the most common response had a cloze probability under

the 40% threshold were retained unmodified (248) or adapted slightly to further weaken contextual constraint (e.g.: "My *favourite meat* is beef" became "My *favourite food* is beef"). The nine sentences removed from the predictable condition after cloze test P3 were also removed from the neutral condition at this point, even though they had been under the 40% threshold. Sentences whose most common response had a cloze probability of over 40% were adapted to increase contextual ambiguity (195).

Cloze test N2 contained the 224 modified sentences after cloze test N1, and was completed online by 14 native (12 female) and four proficient non-native (3 female, average AoA = 9.75 years, for L1s see Table 2) English speakers with an average age of 32.61 years. Participants received course credits for their participation, and had not completed any of the previous surveys. Sentences whose most common response now had a cloze probability of under 40% were retained (168 sentences), along with three sentences just over this threshold, but where the most common response was not the intended keyword. Sentences which still had a final word cloze probability above the 40% threshold were either removed (15) or modified based on responses to further weaken contextual constraint and then retained (38). Following these procedures, 457 pairs of predictable and neutral sentences sharing the same final keyword remained.

2.3.3. Anomalous sentences

To form anomalous sentences, the congruous final keywords of the predictable sentences were replaced by alternatives which are incongruous to the strongly constrained sentence frames. These incongruous final keywords were selected from the remaining pool of 932 potential keywords by matching congruous-incongruous keyword pairs as closely as possible on a number of features, including noun type (i.e.: a singular countable noun was substituted by another singular countable noun), syllable count, lexical stress pattern, lexical frequency (Brysbaert & New, 2009), phonological neighbourhood density (Marian, Bartolotti, Chabal & Shook, 2012) and phonological Levenshtein distance (Balota, Yap & Hutchinson, 2007). As far as possible, words were also matched on concreteness ratings (Wilson, 1988), but age of acquisition was not used as a matching criteria as this data was only available for around half of the potential keywords (Wilson, 1988). Keyword pairs were also selected to be immediately acoustically distinguishable, with no initial phonological overlap between the two words; initial consonants (singletons or clusters) differ in

place and/or manner of articulation and voicing (e.g.: /b/ vs. /s/, /sl/ vs. /tr/), and the first vowel also differs in height and/or roundedness (e.g.: /i:/ vs. /æ/). As the pool of potential keywords was limited, it was not possible to find a suitable incongruous keyword to match each congruous keyword, so 18 sets of predictable and neutral sentences were removed at this point, leaving a final set of 439 sentence triplets.

2.4. Ensuring equivalence across sentence conditions

Sentences within each triplet were closely matched on a one-to-one basis during the development process, but to ensure equivalence was maintained across the three sentence conditions the final sets were also compared as a whole. Initial comparisons found that although strongly and weakly constrained sentence frames differ in content and in some cases structure, they two sets of frames as a whole did not differ based on syllable count or pointer word count,. However, they did differ on total word count; weakly constrained sentence frames were slightly shorter on average than strongly constrained frames, so approximately 20 of the shortest weakly constrained sentence frames were lengthened by separating contractions, which had been counted as one word (e.g.: don't -> do not), or adding 'filler' words (e.g.: very, really). Following this the two sets did not differ based on syllable count, $F=1.167$, $p=.280$, pointer word count, $F=0.215$, $p=.643$, or total word count, $F=2.271$, $p=.132$. While the total pointer word count did not differ between the two sets of sentence frames, the average frequency of each pointer word across the set was higher for weakly constrained sentence frames (Table 3). This is because the less defined context generated in the weakly constrained sentences requires more general pointer words which may occur frequently compared to the more specific pointer words in the strongly constrained frames. For example, "people" may be used a number of times in weakly constrained frames to substitute more specific, but less frequently used pointer words such as "children", "students", "teachers" and "scientists" in strongly constrained frames.

Congruous and incongruous final keywords did not differ based on syllable count, $F=0.006$, $p=.936$, lexical frequency, $F=0.190$, $p= .663$, phonological neighbourhood density, $F=0.002$, $p=.969$, or phonological Levenshtein distance, $F=0.523$, $p=.470$. However, due to difficulties matching pairs on all features, the two sets of keywords were found to differ based on concreteness, $F=43.691$, $p<.001$, with congruous keywords having more concrete ratings than incongruous keywords (Table 4).

Table 3: Properties of strongly and weakly constrained sentence frame sets

	Strongly constrained context	Weakly constrained context
Syllable count	8.40 (1.58)	8.36 (1.32)
Total word count	6.51 (1.15)	6.40 (1.04)
Pointer word count (per sentence)	2.50 (0.50)	2.46 (0.49)
Pointer word count (across whole set) *	1100 (623 unique)	1087 (425 unique)
Pointer word frequency (across whole set)	1.79 (1.69)	2.56 (3.57)

*Where values are in the form: mean (s.d.), except **

Table 4: Properties of congruous and incongruous final keyword sets

	Congruous	Incongruous
Syllable Count	1.792 (0.839)	1.797 (0.840)
Lexical Frequency (SUBTLEX Lg10)	3.137 (0.597)	3.120 (0.593)
Phonological Neighbourhood Density (CLEARPOND)	12.430 (13.791)	12.467 (13.830)
Phonological Levenshtein Distance (English Lexicon Project)	1.910 (0.871)	1.867 (0.884)
Concreteness (MRC)	543.947 (84.697)	493.706 (105.775)

Where values are in the form: mean (s.d.)

Table 5. Properties of keywords and sentences used as dependent variables in investigations into the equivalence of complete sentence sets across the three conditions and of smaller experimental lists within each sentence condition

Keyword properties	Sentence properties
Syllable count	Sentence frame syllable count
Lexical frequency	Sentence frame pointer word count
Phonological neighbourhood density	Sentence frame word count
Phonological Levenshtein distance	Complete sentence syllable count
Concreteness	Complete sentence word count

Table 6: Examples of completed sentence triplets

Predictable	Neutral	Anomalous
A0106 To EARN MONEY you need a JOB	B0106 To BE HAPPY you need a JOB	C0106 To EARN MONEY you need a TALK
A0901 RABBITS like EATING fresh ORANGE CARROTS	B0901 Some PETS like EATING fresh TASTY CARROTS	C0901 RABBITS like EATING fresh ORANGE SWIMMERS
A1822 You WEAR a HAT on your HEAD	B1822 He PUT the BOOK on his HEAD	C1822 You WEAR a HAT on your GIRL

Pointer words and final keywords are capitalised

2.5. Forming equivalent lists of sentence triplets

Although the current research used the complete set of NNSR sentences, in the future it may be desired to use only a subset of the materials, depending on experimental design. In this case, it is important that the subset chosen reflects the properties of the materials as a whole, so the 439 sentence triplets were organised into 18 equivalent experimental lists of 24 sentences, with the remaining 7 triplets forming a training list.

The lists were created by first distributing predictable sentences across 18 lists, with a spread of keyword syllable counts, sentence syllable counts, final keyword cloze probabilities and pointer word counts within each list. A MANOVA with list number as a fixed factor and the keyword and sentence frame properties listed in Table 5 as dependent variables showed that these initial experimental lists of predictable sentences differed only on sentence frame pointer word count. Bonferroni-corrected post-hoc comparisons showed that lists 1 and 3 had lower pointer word counts, and lists 10 and 11 had higher pointer word counts than other lists. To correct the balance, a small number of sentences (matched for other properties) were exchanged among these lists. A second MANOVA was conducted and the 18 lists of predictable sentences now did not differ based on any of the sentence frame or keyword properties described in Table 5 (all comparisons $p>.261$). The neutral and anomalous sentences of each triplet were then assigned to the list corresponding to that of the triplet's predictable sentence (i.e.: if a predictable sentence was assigned to predictable list 3, the neutral and anomalous sentences from its triplet were assigned

to neutral list 3 and anomalous list 3, respectively). This gave 18 corresponding experimental lists for the three sentence conditions. Further MANOVA tests showed that within each sentence condition, the neutral and anomalous lists also did not differ based on the properties listed in Table 5.

The final sentence triplets are identified via a code comprising sentence type (predictable = A, neutral = B, anomalous = C), a list identifier (01-18 plus 00 for the training list) and finally a sentence number identifier (01-24). For example, sentence A0101 is the first predictable sentence in list 1. The same code describes each member of a triplet; sentence A0101 is drawn from the same triplet as B0101 and C0101. Examples of complete sentence triplets are shown in Table 6.

3. Chapter three: Accent intelligibility in noise across different talker-listener pairings

3.1. Introduction

The intelligibility of an accent depends on the particular combination of talker and listener, rather than being purely driven by features of the talker's speech. In this way, different talker-listener pairings can give rise to many patterns of relative accent intelligibility. A listener's familiarity with a talker's accent is often proposed to be a major contributor to accent intelligibility (e.g., Adank et al., 2009), but recently the level of acoustic-phonetic similarity between the talker and listener's accents has also been suggested to contribute to the intelligibility of accented speech in noise (e.g., Pinet et al., 2011). This chapter begins by reviewing some findings in this field and discussing how they could support either the influence of familiarity or similarity on accent intelligibility. We then move on to examine the intelligibility of accents within the talker-listener pairings in this study. Note that the mechanisms through which accent familiarity and similarity may influence intelligibility, and the implications this may have for word recognition will be discussed in the next chapter.

3.1.1. Accent intelligibility for native listeners

Native listeners who have a standard native accent (e.g., SSBE, General American etc.) generally find this accent to be more intelligible than a regional accent in noise. For example, southern English listeners are less accurate at recognising Northern Irish-accented speech than SSBE (Pinet et al., 2011), and are also slower to identify speech in a Glaswegian accent (Adank et al., 2009) and do so less accurately (Smith et al., 2014). Similar effects are seen in American English; listeners with a General American accent are slower to recognise words in the non-rhotic New York accent than in their own rhotacised accent (Sumner & Samuel, 2009), and are more accurate at transcribing sentences in a General American accent than other more highly marked regional accents (Clopper & Bradlow, 2008). This disadvantage for processing regional accents likely stems from the systematic variations in these accents compared to the relevant standard accent; particular phonemes may be realised phonetically differently in either spectral or durational terms, may occur in different phonotactic environments or may have different lexical distributions, and there may also be differences in suprasegmental features (Wells, 1982a, pp. 72-86).

These variations could impede comprehension as they may not be familiar to standard-accented listeners, who may not commonly encounter speakers of these accents or receive as much exposure to regional accents through the media. It is also possible that regional accents disrupt processing for standard-accented listeners as these variations mean the regional accent is less acoustic-phonetically similar to their own accent.

If the pairing is reversed, native listeners with a regional accent tend to find their own regional accent and the relevant standard accent to be equally intelligible. This has been observed across multiple regional-standard accent pairings, in different countries and languages; word identification in SSBE and Glaswegian accents occurs equally quickly (Adank et al., 2009) and accurately (Smith et al., 2014) for Glaswegians, and is also equally fast in General American and New York accents for New Yorkers (Sumner & Samuel, 2009), and in a local regional accent and standard Parisian French for listeners from the south of France (Floccia, Goslin, Girard & Konopczynski, 2006). Given that the regional accent is both highly familiar to the listeners and also phonetically very similar to their own accent, it may not be surprising that in this case the regional accent is highly intelligible. The standard accent is also likely to be highly familiar to regional listeners through extensive media exposure and to a lesser extent, possibly also through interaction with speakers of the standard accent (Adank et al., 2009, Sumner & Samuel, 2009). This allows listeners to accommodate the differences between the standard accent and their own, and so leads to this accent being more intelligible to regional listeners than in the reverse pairing. However, it is hard to account for this advantage for a standard accent shown by regional listeners based on accent similarity, as the standard accent should be equally distant from the regional accented listeners' accent than the regional accent is for listeners with a standard accent.

While this asymmetry in accent intelligibility is usually accounted for by assuming that a listener's own accent is inherently highly intelligible, and that the standard accent also becomes highly intelligible with sufficient exposure, it could be possible that the reverse is true, and standard accents are inherently more intelligible than other accents and regional listeners' extensive exposure to their own accent and its phonetic similarity to their own speech allows them to process it with ease. Standard accents contain features that could help them to be relatively more intelligible than

other accents; SSBE vowels on average have more central formant placements as compared to other regional English accents, meaning this accent is of a similar acoustic difference to regional accents as diverse as those spoken in Glasgow, East Anglia and Birmingham (Ferragne & Pellegrino, 2010), and so may be comparably intelligible to listeners all around the country. Standard accents may also be more intelligible than other accents as they lack some features of regional accents that could make words harder to distinguish. For example, in many Northern English accents the vowels in words such as *could* and *cud* are both realised as /ʊ/, and in a Liverpool accent the vowels in *fairy* and *furry* are merged into a single /ɜ/ vowel. In SSBE, both pairs of words are minimal pairs rather than homophones (Wells, 1982b, pp. 356, 361). The Glaswegian accent also adheres to the Scottish Vowel Length Rule, meaning that words such as *beat* and *bead* are both realised with a short vowel (Scobbie, Hewlett & Turk,1999). In this accent, the main cues used to distinguish the words appear in the final consonant, while in SSBE vowel duration cues would also be available. In these cases, the standard accent has more cues available to differentiate the words, which may help this accent to be generally more intelligible than regional accents. This could account for the finding in some studies that regional listeners can find the standard accent to be more intelligible than their own accent (Evans & Iverson, 2007; Sumner & Samuel, 2009).

In addition to showing difficulties processing unfamiliar regional accents, native listeners also tend to find a non-native accent to be less intelligible than a standard native accent. English listeners are more accurate at recognising SSBE than French-accented English (Pinet & Iverson, 2010; Pinet et al., 2011), and are faster at recognising their own English accent than a Spanish (Adank et al., 2009) or French accent (Floccia, Butler, Goslin & Ellis, 2009). American listeners find the General American accent more intelligible than Mandarin-accented (Hayes-Harb et al., 2008; Munro & Derwing, 1995), Korean-accented (Bent & Bradlow, 2003) or Spanish-accented English (Imai, Walley & Flege, 2005), and Dutch listeners find a native Dutch accent easier to understand in noise than English-accented Dutch (van Wijngaarden, 2001). These non-native accents may be less intelligible than a native accent as they contain both systematic variations compared to native accents, such as a tendency for French speakers to drop /h/ when speaking in English (Walter, 2001), and also more unsystematic variations due to the high level of variance within non-native talkers' ability to produce L2 sounds accurately and consistently (e.g., Burgos,

Cucchiarini, van Hout & Strik, 2014; Evanini & Huang, 2012; Flege, Bohn & Jang, 1997). These accent features may be unfamiliar to native listeners as non-native accents are not commonly represented in the media, and listeners may have few encounters with non-native speakers depending on where they live, which could account for the lower intelligibility of these accents. The difficulties posed by non-native accents may also relate to acoustic-phonetic differences to native accents. Non-native speech is influenced by the L1 sound system, and as such, vowels produced by non-native speakers may differ in terms of both spectral properties and duration to vowels produced by native speakers (Flege et al., 1997; Flege, Schirru & McKay, 2003). However, this depends on L2 proficiency levels, and more proficient non-native speakers' productions tend to be closer to those of native speakers than less proficient speakers' productions (Burgos et al., 2014; Flege et al., 1997; Pinet et al., 2011). As well as being less similar to native speech, less proficient non-native talkers also tend to be harder to understand than more proficient talkers (Bent & Bradlow, 2003; Stibbard & Lee, 2006), which could suggest a link between the similarity of non-native and native accents and the intelligibility of non-native accents. It should be noted though that this would depend on the specific talker-listener accent pairing, as there is considerable variation between both native and non-native accents.

3.1.2. Accent intelligibility for non-native listeners

Considering the intelligibility of accented speech for non-native listeners is more complex than for native listeners. Non-native speakers have an incomplete model of their second language (L2), and the influence of the L1 sound system can cause problems discriminating and identifying L2 sounds, factors which are exacerbated in the presence of conditions which may make speech recognition more difficult (see García Lecumberri, Cooke & Cutler, 2010 for a review). However, there is a great deal of variability in L2 ability and experience among non-native listeners, meaning that while the combination of talker-listener accent remains important for determining accent intelligibility, the L2 proficiency of non-native listeners is also likely to play a role.

One situation where there is a clear relationship between listener proficiency and accent intelligibility is the relative intelligibility of a non-native listener's own accent and that of a standard native accent. Highly proficient non-native speakers may behave in a similar way to native listeners, in that the standard accent may be more

intelligible than the non-native accent; highly proficient French speakers find SSBE to be more intelligible than French-accented English (Pinet et al., 2011), and a General American accent is more intelligible than the listeners' own accent for experienced Spanish (Imai et al., 2005), Dutch (van Wijngaarden, Steeneken & Houtgast, 2002) and Chinese listeners (Hayes-Harb et al., 2008). Non-native listeners of slightly less experience may not show this advantage, and instead can find the standard accent equally intelligible to their own non-native accent. This has been found for French-accented English and SSBE for French speakers (Pinet & Iverson, 2010), and for the listeners' own accent compared to a General American accent for Chinese (Bent & Bradlow, 2003; Xie & Fowler, 2013), Korean (Bent & Bradlow, 2003), Spanish (Imai et al., 2005) and Dutch speakers (van Wijngaarden, 2001). Low proficiency non-native listeners show the opposite pattern to highly proficient listeners, where their own accent is more intelligible than a standard native accent (Pinet & Iverson, 2010; Pinet et al., 2011; Van Wijngaarden et al., 2002; Xie & Fowler, 2013).

This increasing relative intelligibility of a standard native accent as L2 proficiency develops could be accounted for in terms of both familiarity and similarity. More proficient L2 speakers are likely to have had greater exposure to native speech, and so will be more familiar with a standard native accent than less proficient listeners. This means they will have more experience of the L2 sound system, and are more familiar with features which may be more likely to occur in native rather than non-native speech, such as vowel reduction in unstressed syllables in stress-timed languages or a failure to release final stops in continuous speech. A greater awareness of these features could then help listeners to understand standard native accents. Accent similarity could also account for the increasing intelligibility of a standard accent as L2 proficiency develops; speakers tend to become more accurate at producing L2 sounds as their L2 proficiency develops (Burgos et al., 2014) and their accent becomes more similar to that of native speakers (Pinet et al., 2011). As such, it may be easier for listeners to understand the native accent if it more closely matches their own.

When non-native talkers and listeners have different L1s, different patterns of intelligibility may be seen. For fairly proficient listeners, if the speaker's L1 is similar to their own, this accent can be as intelligible as the listener's own accent; Chinese

and Korean listeners can find both Chinese and Korean-accented English to be equally intelligible, and at least as intelligible as General American (Bent & Bradlow, 2003). However, if the talker's L1 is more dissimilar to that of the listener, this accent can be less intelligible, particularly if the talker is of low proficiency; this pattern has been found in English for French speakers listening to Korean and French accents (Pinet et al., 2011), Dutch speakers listening to Dutch and Japanese accents (Weber, Broersma & Aoyagi, 2011), and Korean and Arabic speakers listening to low-proficiency talkers of both accents (Stibbard & Lee, 2006). These differences in accent intelligibility have been proposed to be related to the talkers' and listeners' interlanguage, or the knowledge of both the L1 and L2 which speakers apply to the L2. If speakers have the same or similar L1s (e.g.: Chinese and Korean), knowledge relating to the L1 system and its interaction with the L2 system may overlap, meaning that similar features appear in both L2 accents (Bent & Bradlow, 2003). For example, both Chinese and Korean lack the English /æ/ and do not distinguish /ɪ/ and /i:/, which may lead to similar problems in pronouncing these sounds in Chinese- and Korean-accented English (Chang, 2001; Lee, 2001). These variations in the talker's accent may therefore be familiar to the listener if they also occur in their own accent, and shared features are also likely to mean that the accent of talkers with a similar L1 may be quite acoustically similar to the listener's accent. If speakers have more dissimilar L1s (e.g.: Arabic and Korean), their interlanguage will overlap to a lesser extent, so different features may occur in the speakers' L2 accents (Stibbard & Lee, 2006). For example, the vowel inventory of Arabic is much smaller than that of Korean, which can result in very different realisations of English vowels by speakers of these languages (Lee, 2001; Smith, 2001). The accent of a talker with a very different L1 may then be much less familiar, and a lack of shared features could also mean that the accents of the talker and listener may be quite acoustic-phonetically distant.

Regional native accents can also be difficult for non-native listeners to understand; listeners can be less accurate at identifying words in a regional accent than in either a standard native accent or the listeners' own non-native accent (Northern Irish, SSBE and French-accented English, Pinet et al., 2011; Quebecois French, Standard French and English-accented French, Pinet 2012), and word recognition in an unfamiliar regional accent may be slower than in a standard native accent (Jamaican Mesolect, Cockney English and Standard Australian English, Ying, Shaw & Best, 2013). These

accents may be less intelligible because they are likely to be unfamiliar to non-native listeners as regional accents are less commonly represented in the media and teaching materials. Alternatively, the variation between the accents could also increase the acoustic-phonetic distances between the accents and reduce their intelligibility.

3.1.3. Accent intelligibility for talker-listener pairings in the current study

In this study, we presented Standard Southern British English (SSBE), Glaswegian English (GE) and Spanish-accented English (SpE) to groups of English and Spanish listeners. The English listeners also have an SSBE accent, so we could have predicted that they would find the SSBE accent to be more intelligible than the regional GE accent, based on both familiarity and accent similarity. The SpE accent may have been of a similar intelligibility to the GE accent, as found by Adank et al. (2009), or it could have been less intelligible than the other accents; this would likely depend on the accent of these specific Spanish talkers and how close it was to native speech, as listeners were likely to have little familiarity with this accent. It was harder to predict the relative intelligibilities of the accents for the Spanish listeners. They have a high level of proficiency, so it seems unlikely that the SpE accent would have been the most intelligible, but based on comparisons to listener groups in other studies, it was hard to say if the SSBE and SpE accents would be equally intelligible, or if the listeners are of high enough proficiency to show an advantage for the SSBE accent. Although there have been few prior studies investigating the intelligibility of a regional accent for non-native listeners, we could have predicted that the Spanish listeners' lack of exposure to GE speech may also mean that this accent would be the least intelligible for this group. In addition, while we may have expected these patterns of intelligibility in noise, it is likely that in quiet differences would be much less pronounced, if they are observed at all.

3.2. Methods

3.2.1. Listeners

One group of native, monolingual Southern British English listeners, and one group of native Spanish listeners completed the study. All participants were right handed, reported no known hearing, language or learning impairments, and grew up speaking only their native language at home. The 16 English participants (7 female, mean age = 25.25 years, s.d. = 4.20 years, range = 19-32 years) grew up in Southern England and had a Standard Southern British English accent. None had previously lived in

Scotland or Spain. Due to technical problems, one participant's data were excluded from the analysis. The 16 Spanish participants (12 female, mean age = 19.38 years, s.d. = 2.02 years, range = 18-24 years) were raised in northeast Spain, and none had ever lived in an English-speaking country. All were first or second year students in an English Studies degree at the University of the Basque Country, spoke English at an upper-intermediate or advanced level and had begun learning English between the ages of 5 and 7.

3.2.2. Talkers

The NNSR sentences (Chapter 2) were recorded by 4 talkers (2 male, 2 female) for each of three different accents: Standard Southern British English (SSBE), Glaswegian English (GE), and Spanish-accented English (SpE). SSBE and GE talkers were native, monolingual English speakers, with an accent typical of southeastern England or Glasgow, respectively. SpE talkers were native Spanish speakers from northeastern Spain, and all were in the third year of an English Studies degree at the University of the Basque Country. They spoke English at an upper-intermediate or advanced level, and had begun learning English in primary school between the ages of 5 and 8. Recordings were made digitally in a recording booth at UCL (SSBE talkers and one GE talker), the University of Glasgow (other GE talkers) or the University of the Basque Country (SpE talkers) at a sampling rate of 44100 Hz and with 24 bits per sample. Recordings were normalised to the same mean intensity after completion.

3.2.3. Procedure

Testing took place at UCL (English listeners) or the University of the Basque Country (Spanish listeners). The complete set of 432 neutral NNSR sentences were presented over headphones at a comfortable volume. Sentences were embedded in stationary speech-shaped noise based on the specific talker's average long-term spectrum at three signal-to-noise ratios (SNRs): +3dB, 0dB and –3dB, and also presented in quiet. Sentences were presented in a random order and were equally distributed across the combinations of talker and noise conditions. For each participant, sentences appeared in only one of these combinations, but between participants sentences were counterbalanced so that each sentence appeared in every accent and at every noise level across the experiment. After each sentence participants repeated the words they understood, and the experimenter recorded the

Table 7: Average sentence and final keyword durations of the neutral sentences presented in each accent in the speech-in-noise recognition task

Accent	Sentence duration (s)	Final keyword duration m(s)
SSBE	1.97 (1.15 – 3.27)	0.49 (0.18 – 0.94)
GE	1.90 (1.00 – 3.83)	0.45 (0.12 – 0.91)
SpE	2.18 (1.23 – 3.76)	0.47 (0.14 – 0.92)

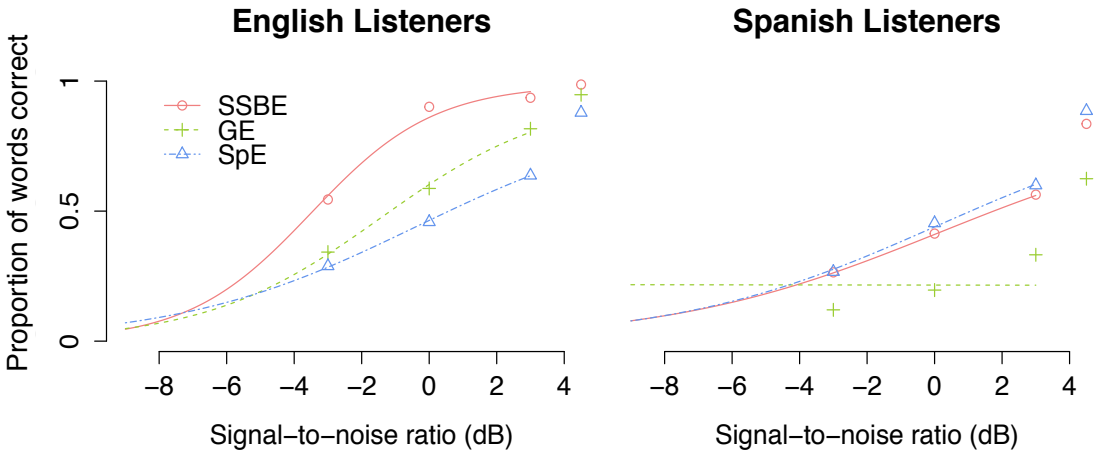
Where values are in the form: mean (min – max)
SSBE = Standard Southern British English, GE = Glaswegian English, SpE = Spanish-accented English

number of keywords correctly identified per sentence. Short breaks were given throughout the task. The mean total sentence durations and mean final keyword durations were very similar across the three accents (Table 7).

3.3. Results

The mean proportion of words correctly identified in each accent as a function of noise level is shown in Figure 3.1. Focusing on the accuracy of recognition at the three noise levels suggests that English listeners were more accurate overall than Spanish listeners, and that the intelligibility of the three accents in noise follows different patterns for the two listener groups. Turning to the scores in quiet, as represented by the separate points at the right of the plots, there is less difference in the intelligibility of most of the accents, with average word recognition accuracy over or close to 85%. The exception was the GE accent for Spanish listeners, which had a much lower recognition score of around 60%.

Figure 3.1: Recognition accuracy of SSBE, GE and SpE as a function of noise level for native and non-native listeners



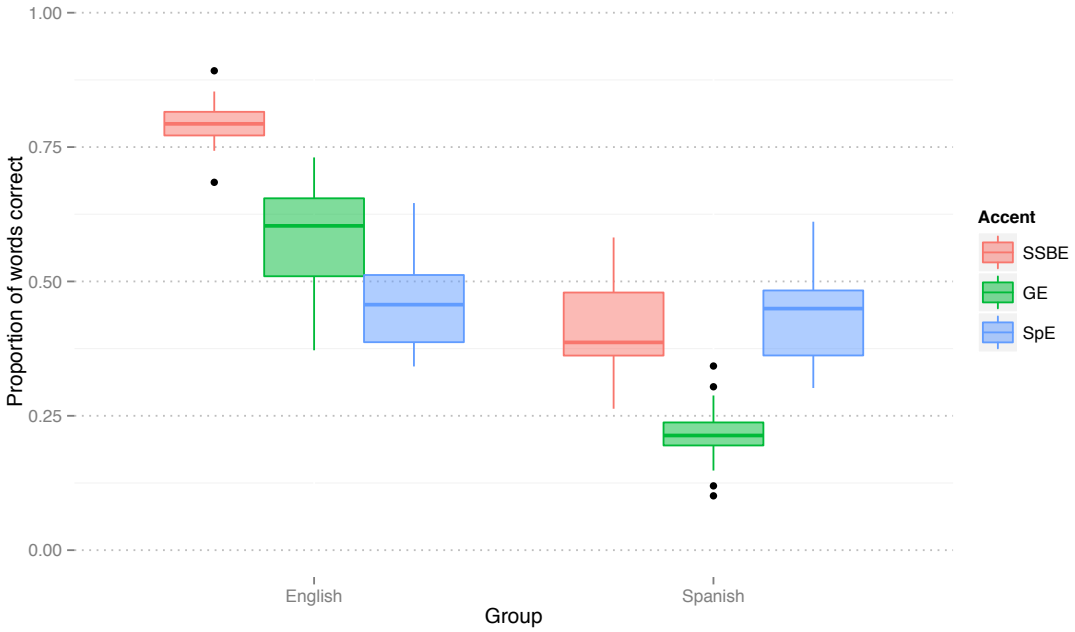
The furthest right data points for each listener group show speech recognition accuracy in quiet.
SSBE = Standard Southern British English, GE = Glaswegian English, SpE = Spanish-accented English

To explore the relationship between accent and recognition accuracy in noise for the English and Spanish listeners, the proportion of words correctly identified in each accent was averaged over the three SNRs for each listener to give average speech-in-noise accuracy levels (Figure 3.2). Sentences presented in quiet were not included in this calculation. Mean accuracy scores for each accent were then entered into a linear mixed-effect model with the fixed effects of accent and listener group (including the interaction term) and by-participant random intercepts. There were significant main effects of accent, $F(2, 62)=161.77$, $p<0.0001$, and listener group, $F(1,31)=100.88$, $p<0.0001$, with the SSBE accent being in general more intelligible than the other accents, and English listeners being more accurate at identifying words than Spanish listeners. There was also a significant interaction between the terms, $F(2, 62)=147.23$, $p<0.0001$. To investigate this interaction further, bonferroni-corrected pairwise contrasts were performed to compare the intelligibility of the three accents for each listener group. These tests confirmed that English listeners were selectively tuned to their own accent; the SSBE accent was more intelligible than the GE accent, and the SpE accent was in turn less intelligible than the GE accent (all three accents were significantly different from each other, $p<0.0001$). For Spanish listeners, the SSBE and SpE accents were equally intelligible in noise ($p=0.671$, n.s.), but both accents were more intelligible than the GE accent ($p<0.0001$).

3.4. Discussion

Our findings show a clear effect of talker-listener accent pairing on the intelligibility of an accent in noise. English listeners display a distinct advantage for their own SSBE accent, finding it to be much more intelligible in noise than either of the other accents, even though all three were of a similar intelligibility in quiet. To a lesser extent, this advantage extended to native speech in general, as the GE accent was more intelligible in noise than the SpE accent. This pattern of intelligibility could reflect the listeners' familiarity with the accents; they will be highly familiar with their own SSBE accent, and less so with the others. However, it is hard to say which of the GE and SpE accents would be most familiar to these listeners. While listeners may have more exposure to GE speech in the media, these listeners reside in London, where there is a large population of Spanish speakers who listeners may interact with. The intelligibility of the accents could also correspond to the level of accent similarity across the talker-listener pairings; the listeners also have an SSBE accent, so this accent will of course be the most similar to their speech, while variations in the

Figure 3.2: Accent intelligibility in noise, with accuracy averaged across SNRs for each listener (excluding quiet)



SSBE = Standard Southern British English, GE = Glaswegian English, SpE = Spanish-accented English

GE and SpE accents compared to the SSBE accent will make these accents less similar to the listeners' accent. However, because variations in the GE accent are in general quite systematic and also based on a broadly similar sound system, this accent may be more similar to the listeners' accent than the SpE accent as this may contain more unsystematic variations and is also influenced by the Spanish sound system. Although there was some overlap in the intelligibility of GE and SpE talkers for these listeners, the intelligibility of individual speakers was not specifically investigated in these analyses, as the current research is focusing more on between, rather than within-accent differences in intelligibility. However, this would be an interesting avenue for further research.

Spanish listeners were less accurate overall at recognising speech in noise than English listeners, which could be expected as they have to cope with the extra demands of listening in an L2, and will also be more adversely affected by the presence of noise than the native listeners (Cooke, García Lecumberri & Barker, 2008). The Spanish group also showed a different pattern of accent intelligibility; these listeners found the SSBE and SpE accents to be equally intelligible, while the GE accent was considerably harder to understand. As they did not show the

advantage for a standard native accent which has previously been observed for highly proficient L2 speakers (Imai et al., 2005; Pinet et al., 2011; van Wijngaarden et al., 2002), this suggests that although our listeners are sufficiently proficient to study a degree taught in English, they have not had enough exposure to native English accents in their small Spanish city to allow them to tune to the SSBE accent more selectively. However, as the great majority of English these listeners hear in their daily lives is spoken by other native Spanish speakers, in this case selectively tuning to an SSBE accent may not be necessary and could even be detrimental to the listeners in their more every day interactions.

The difficulty the Spanish listeners faced with the regional GE is consistent with other investigations into regional native accent processing by non-native speakers (Pinet et al., 2011; Pinet, 2012). This accent is unfamiliar to the listeners (none reported any trips to Scotland, or having Scottish friends etc.), which could account for why it was so hard to understand. In addition, the Spanish listener's interlanguage is likely to contain knowledge relating to a standard English accent, as these accents are commonly represented in the media and in teaching material. As the Scottish sound inventory differs to that of the SSBE accent, and the GE accent also contains features not observed in the SSBE accent (Wells, 1982b), the accents of the Spanish listeners and the GE talkers may be quite acoustically-phonetically dissimilar, which could also contribute to the low intelligibility of this accent.

While the patterns of intelligibility for each of the listener groups are consistent with those found in previous research, it is not clear from these data whether this influence of talker-listener pairing on accent intelligibility stems from differences in the familiarity of the accents to the listeners, of if it can be accounted for by the acoustic-phonetic similarity across the talker-listener combinations. In light of this, the next part of this research went on to further investigate links between accent intelligibility and similarity.

4. Chapter four: The relationship between accent intelligibility and similarity

4.1. Introduction

Listeners' familiarity with an accent and also the acoustic-phonetic similarity between talkers' and listeners' accents seem to be able to account for a range of patterns of accent intelligibility. However, the mechanisms through which accent familiarity and similarity may contribute to the influence of talker-listener pairing on accent intelligibility are likely to differ and may then have different implications for word recognition processes.

Accent familiarity may contribute to the influence of talker-listener pairing on accent intelligibility, by allowing listeners to form multiple exemplars for words in each accent. Although regional listeners may not have much personal interaction with speakers of a standard accent, accents such as SSBE and General American tend to be the media standard in the relevant countries, and as such these listeners may receive high levels of exposure to a standard accent (e.g.: Adank et al., 2009; Clopper & Bradlow, 2008; Sumner & Samuel, 2009). This familiarity may allow listeners to become 'multi-dialectical', where they are able to store phonological representations of words in their own accent and also in the standard accent (Sumner & Samuel, 2009). This could account for the asymmetry seen in accent intelligibility across standard-regional accent pairings, as standard listeners will lack regional-accent specific representations, but regional listeners can directly map input onto stored phonological forms that match the features of the relevant accent.

However, even extensive media exposure to a standard accent may not be enough to allow regional listeners to accommodate differences between the standard accent and their own without also having personal contact with speakers of this accent (Evans & Iverson, 2004), and immersion in a regional accent environment also does not seem to be sufficient for standard-accented listeners to form additional long-term representations for the regional accent (Sumner & Samuel, 2009). These findings suggest it is unlikely that regional listeners store multi-accent phonological representations as a matter of course. Accent familiarity also is not able to account for all patterns in accent intelligibility. For example, low-proficiency French listeners can

find Korean-accented English to be equally as intelligible as SSBE, where accent familiarity would predict that the SSBE accent would be more intelligible than the unfamiliar Korean accent (Pinet et al., 2011).

Accent similarity may instead influence accent intelligibility through a different mechanism; instead of listeners flexibly processing accents in a multi-dialectal way, listeners may process all accents through their own accent. This may suggest that accents which are more similar to the listener's own are easier to map to stored phonological representations based on the listener's accent than accents which are more acoustically-phonetically distant.

Accent similarity is often gauged using subjective perceptual tasks, such as accent free classification, where raters assign speakers to groups based on the similarity of their accents (e.g.: Clopper & Bradlow, 2008, 2009; Clopper & Pisoni, 2007). While this can be useful to explore the factors which influence the perceptual similarity of accents, the classifications can be hard to relate to accent intelligibility as there is a great deal of variability in ratings (Clopper & Bradlow, 2008) and classifications of accent similarity may also be influenced by features which are not directly related to accent, such as a speaker's gender (Clopper & Pisoni, 2007). Accentedness ratings may also give another subjective measure of accent similarity that is possible to relate to accent intelligibility; listeners from the north of England whose accent was rated as being more similar to a southern accent found SSBE to be more intelligible than listeners who were rated as sounding more northern (Evans & Iverson, 2007). However, perception of accentedness may also be influenced by factors unrelated to accent, such as whether a talker mumbles (Derwing & Munro, 1997), which means such ratings may not be a reliable measure of accent similarity.

Objective measures based on the acoustic-phonetic qualities of speech have recently been used to compare accents, with a number of studies performing formant-based comparisons of vowels in different accents to investigate links between accent similarity and intelligibility. Oder et al., (2013) compared the position of vowels in various American English accents according to their first and second formants (F1 and F2, respectively), and found the Mid-Atlantic accent was more similar to the Midland accent than the Southern accent and also that Mid-Atlantic vowels were more intelligible to Midland listeners than Southern vowels. A similar pattern has

been found for synthesised vowels designed to be equivalent to the F1-F2 positions of vowels in the Pacific Northwest (PNW) accent or to be acoustically close or distant to this accent; PNW listeners found the more distant vowels to be harder to identify than either the close vowels or the PNW vowels (Wright & Souza, 2013). Dutch listeners also had more difficulty understanding German-accented vowels whose F1-F2 position was very different native Dutch vowels than they did when the German-accented vowels had more similar formant frequencies to the native vowel (Witteman, Weber & McQueen, 2013).

Another objective measure of accent similarity is the ACCDIST metric (Huckvale, 2004, 2007), which compares the distance between spectral properties of segments within one speaker's productions to those of other speakers. Relative, rather than absolute distances are used, so talker-specific features unrelated to accent do not influence the ratings, which avoids some of the issues of subjective measures of accent similarity. ACCDIST can also be applied to a much wider range of speech samples than the isolated vowels in the studies above, so it can be used in studies looking at more global measures of accent intelligibility. Pinet et al. (2011) used ACCDIST to measure the similarity between talker and listener accents in their study of accent intelligibility. For English listeners with an SSBE accent, they found that the similarity of the talkers' accents to that of the listeners showed a positive relationship with the intelligibility of the accents in noise, with SSBE being both most intelligible and also closest to the listeners' accent. The non-native accents were least intelligible and also least similar to the listeners' accent, with the regional Northern-Irish accent intermediate in terms of both intelligibility and accent similarity. A similar pattern was also found for low-proficiency French listeners; French-accented English was most similar to their own accent and most intelligible, Northern Irish English was the most distant and also the least intelligible, and SSBE and Korean-accented English were intermediate both in terms of accent similarity and intelligibility. Higher proficiency French listeners who found the SSBE accent to be more intelligible also showed a higher level of similarity between their own accent and the SSBE accent.

Together, these findings suggest that the intelligibility of accents may be at least in part driven by the similarity of the talker and listener's accents, although findings are so far limited. To further expand research in this area, this study went on to

investigate the similarity of accents across the talker-listener pairings described in Chapter 3 using the ACCDIST metric, and explored links between these levels of similarity and the patterns of accent intelligibility previously observed.

4.2. Methods

The 16 English and Spanish listeners that participated in the accent intelligibility task (section 3.2.1.) also recorded the first 48 sentences of the predictable NNSR sentences (Appendix 1). These recordings were compared to the same sentences as read by the SSBE, GE and SpE talkers from the accent intelligibility task (section 3.2.2.) using the ACCDIST metric (Huckvale, 2004, 2007) in order to assess the similarity of the talkers' and listeners' accents. In the first stage, an automatic phonetic alignment was performed using the HTK Hidden Markov Modelling Toolkit (1989), whereby hidden Markov models were used to identify the sections of the speech recording that corresponded to each phoneme in a transcription of the sentence. These automatic alignments were then hand checked to ensure phoneme boundaries had been located correctly. In the following analyses, only the segments corresponding to vowels (excluding schwa) were considered.

To measure the similarity of vowel spectra among the talker-listener pairings, the spectral qualities of vowels for each speaker were evaluated by calculating Mel-frequency cepstral coefficients (MFCCs) across the first and second half of each vowel, which are derived using a filter bank approximating the function of the cochlea, giving a more perceptual representation of a signal's spectral properties (Vergin, O'Shaughnessy & Farhat, 1999). The MFCCs of vowels appearing in repeated tokens of words such as 'and' and 'you' were averaged across each word, but vowels occurring in different contexts, such as 'large' and 'stars' were not averaged. An intra-speaker vowel distance table was then computed based on the Euclidian distance between the MFCC vectors of each pair of vowels for each talker and listener. This use of relative rather than absolute distances between vowels normalises speaker-specific differences in production (Huckvale, 2007). The similarity of the accents was then obtained by calculating the correlation between the vowel spectral distance tables of each talker-listener pair. To give a more representative measure of the similarity of a listener's accent to that of each accent group as a whole rather than to the individual talkers, for each listener the similarity of their vowels to those of the four talkers of each accent were averaged to give the

mean similarity to each of the SSBE, GE and SpE accents.

A measure of accent similarity based on vowel duration was also calculated. For each talker and listener individually, the duration of each vowel token was extracted from the forced alignment data (repeated tokens were not averaged in this case), giving an intra-speaker list of vowel durations. The correlation of these vowel duration lists was then calculated for each talker-listener pair to give a measure of accent similarity. These similarity measures were then averaged across the four talkers of each accent for each listener to give a mean listener-accent similarity in the same way as described above.

4.3. Results

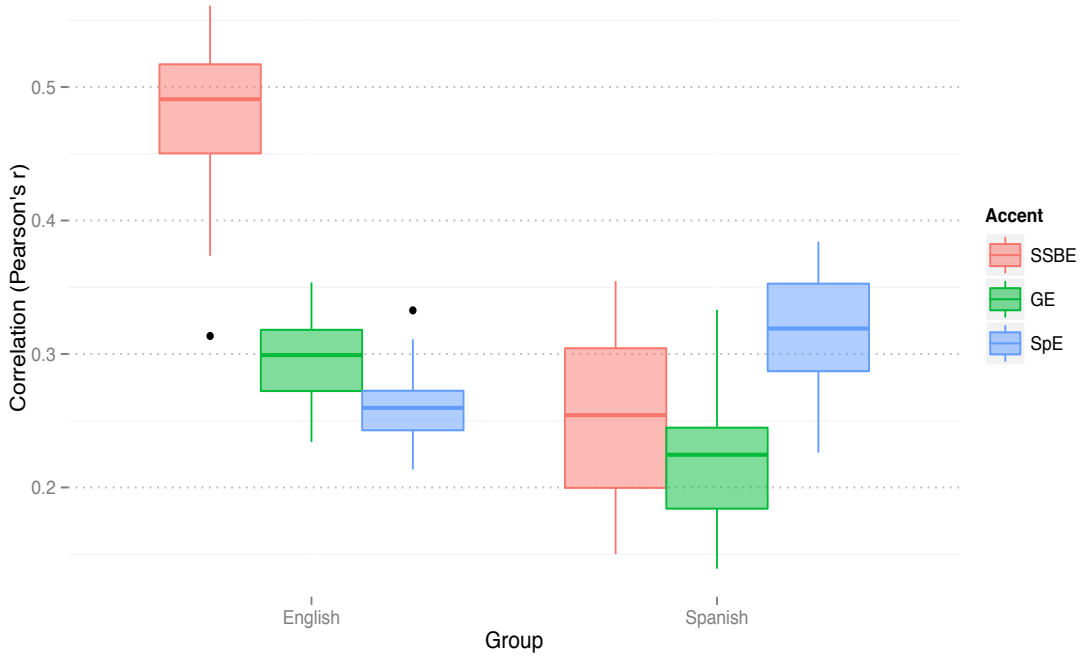
The similarity between the listeners' accents and the SSBE, GE and SpE accents based on vowel spectral qualities and duration can be seen in Figure 4.1. To confirm which accents were closer to those of the listeners, the level of similarity between each listener-talker accent combination based on both measures of accent similarity were entered into separate linear mixed effects models with talker accent and listener group as fixed effects (also including their interaction term), and by-listener random intercepts.

For talker-listener accent similarity based on vowel spectral qualities, there was a significant effect of listener group, $F(1,32)=29.33$, $p<0.0001$, with the English listeners' vowels closer in spectral characteristics to the talkers' accents overall than the Spanish listeners' vowels (average similarity measures of 34.6% and 26.5% respectively). There was also a significant effect of talker accent, $F(2,64)=88.21$, $p<0.0001$ and a significant interaction between the terms, $F(2,64)=136.46$, $p<0.0001$. Pairwise contrasts (Bonferroni-corrected) showed that the similarity of the three talker accents to the listener accents differed for the two listener groups. English listeners' vowels were closest to the SSBE accent than the other two accents (both $p<0.0001$), with the GE accent being more similar than the SpE accent ($p=0.0173$). Spanish listeners' accents were closest to the SpE accent than the other accents (both $p<0.001$), with SSBE more similar than the GE accent ($p=0.0105$). The similarity of talker-listener accent pairings based on vowel duration also showed a significant effect of listener group, $F(1,31)=32.17$, $p<0.0001$, again due to greater similarity between the duration of English listeners' vowels and those of the talkers than for

Spanish listeners (average similarities of 62.6% and 51.2% respectively). The effect of talker accent was also significant, $F(2,64)=323.85$, $p<0.0001$, along with the interaction between talker accent and listener group, $F(2, 64)=209.76$, $p<0.0001$. Pairwise contrasts (Bonferroni-corrected) again found that the English listeners' vowel durations were most similar to those in the SSBE accent, then GE and finally SpE (all differences $p<0.0001$). Spanish listeners' vowels were equally similar in terms of duration to those of the SSBE and SpE accents, and were less similar to the GE vowels ($p<0.001$). In general, listeners' accents showed a higher level of similarity to the talkers' accents in terms of vowel duration than vowel spectral similarity.

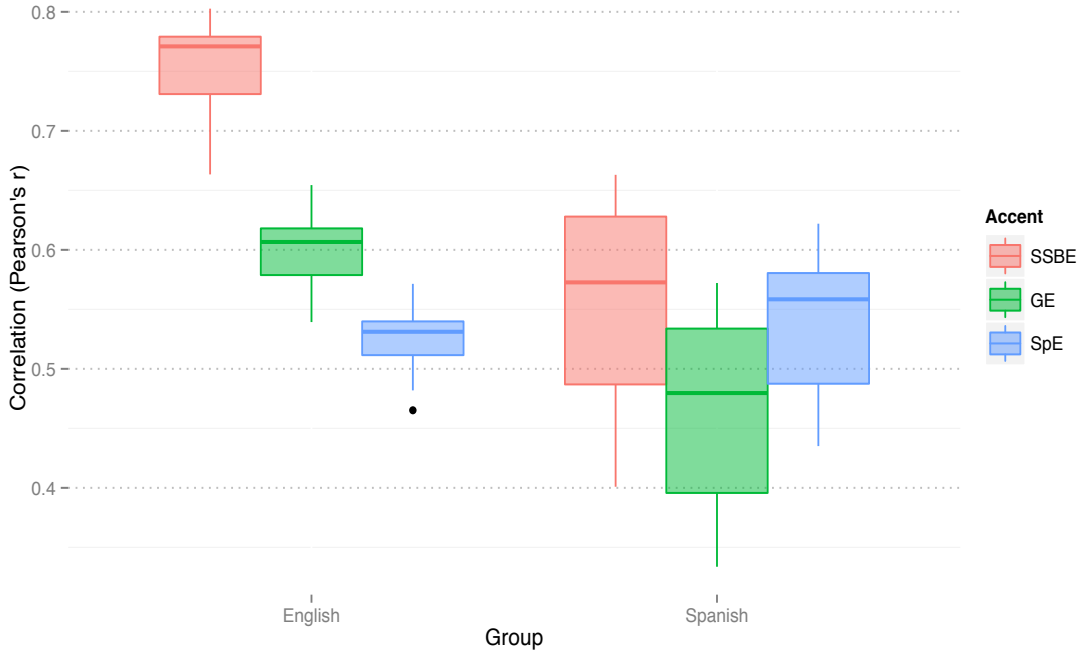
Comparing accent intelligibility in noise to the similarity between talker and listener accents suggests our data may show a positive correlation between the level of accent similarity across a talker-listener pairing and the intelligibility of an accent for the listener groups (Figure 4.3). To explore this relationship further, word recognition accuracy in noise was entered into a linear mixed effects model, with vowel spectral similarity, vowel duration similarity and listener group as fixed effects and also by-accent and by-listener random intercepts. The two measures of accent similarity were highly correlated, $\rho= 0.79$, $p<0.001$, but comparing this full model to reduced models excluding each of the measures in turn showed that vowel spectral similarity, $\chi^2(4)=18.40$, $p=0.0010$, and vowel duration similarity, $\chi^2(4)=25.87$, $p<0.001$, were both able to account for unique variance in speech in noise intelligibility. A three-way interaction between the two accent similarity measures and listener group was also found, $F(1,69)=16,14$, $p=0.001$. Figure 4.3 suggests that this interaction may arise as English listeners seem to show a stronger link between accent intelligibility and similarity than Spanish listeners. To investigate this further, mixed effects models were then constructed for the two groups separately, each containing word recognition accuracy in noise, the fixed effects of vowel spectral and duration similarity and by-accent and by-listener random intercepts. Using a method developed by Nakagawa and Schielzeth (2013), the amount of variance in accent intelligibility accounted for by the fixed effects in each model was then calculated. This showed that for English listeners, accent similarity measures were able to account for around three-quarters of the variation in accent intelligibility, $R^2=0.7408$, compared to only around a third of variance in intelligibility for Spanish listeners, $R^2=0.2948$.

Figure 4.1: Similarity between listeners' speech and SSBE, GE and SpE in terms of correlation between relative intra-speaker vowel spectral distances as measured using the ACCDIST metric



SSBE = Standard Southern British English, GE = Glaswegian English, SpE = Spanish-accented English

Figure 4.2: Similarity between listeners' speech and SSBE, GE and SpE in terms of correlation in vowel duration



SSBE = Standard Southern British English, GE = Glaswegian English, SpE = Spanish-accented English

Figure 4.3: The relationship between accent intelligibility in noise for SSBE, GE and SpE and the level of acoustic-phonetic similarity between these accents and listeners' speech in terms of vowel spectral similarity or vowel duration similarity, for both native and non-native listeners

SSBE = Standard Southern British English, GE = Glaswegian English, SpE = Spanish-accented English

4.4. Discussion

The aim of this study was to explore possible links between the intelligibility of accents in noise across talker-listener pairings and the acoustic-phonetic similarity of speakers' accents. We found different levels of similarity between the accents of the English and Spanish listeners and the SSBE, GE and SpE talker accents, but evidence of a relationship between accent similarity and intelligibility was seen for both listener groups.

English listeners showed the same pattern of accent similarity in terms of both vowel spectral qualities and duration as observed by Pinet et al. (2011); their accent was most similar to talkers of their own standard native accent, followed by a regional native accent, and was least similar to a non-native accent. This pattern seems to reflect the level of variation between the regional and non-native accents and the listeners' standard accent; vowels in both accents contain variations compared to the standard accent, but in a regional accent these are based on a broadly similar sound system as the standard accent, and are consistently produced (Wells, 1982a), whereas variations in non-native accents may be more severe as they are based on the interaction of the L1 and L2 sound systems (e.g.: Flege et al., 2003), and can also be rather inconsistent both within and between speakers (Flege et al., 1997; Wade, Jongman, & Sereno, 2007), leading to greater acoustic-phonetic distance to a standard accent.

Spanish listeners showed slightly different patterns of accent similarity across the pairings depending on the measure used. In terms of vowel spectral qualities, the accent of the Spanish listeners was closest to the SpE accent, followed by SSBE and finally the GE accent. As both the Spanish listeners' and talkers' representations of the English sound system are influenced the Spanish vowel system, and they also have similar English experiences (they were all studying the same English degree course, in the same Spanish city with little exposure to native English accents), it would be expected that the similarity of this talker-listener pairing would be highest. The similarity between the Spanish listeners' accent and those of the talkers is in contrast to the pattern shown by the more experienced French listeners in Pinet et al.'s study (2011), whose accent was most similar to that of the SSBE talkers. However, Pinet et al.'s listeners were living in London and so would have had much more experience with the SSBE accent than our Spanish listeners, which may have

helped them develop a more native-like accent. In spite of these differences, in both cases the pattern of similarity across talker-listener pairings was consistent with the intelligibility of the accents for the two listener groups. The similarity of accents based on vowel duration was slightly different, with Spanish listeners' vowels equally similar in duration to both the SpE and the SSBE accents, and least similar to GE. This finding that the Spanish listeners' accent was more similar to SSBE in terms of vowel duration than spectral properties may stem from the large spectral differences between the Spanish and English vowel systems; Spanish has only five vowels (Martínez-Celdrán, Fernández-Planas & Carrera-Sabaté, 2003), so usually two or three English vowels can correspond to a single Spanish vowel category, which can cause difficulty distinguishing English vowels (Coe, 2001). In comparison, durational cues may be more salient and so easier for these listeners to acquire.

Although the Spanish listeners have little interaction with native English speakers, most are likely to have learnt English according to an SSBE-based model as teaching materials in Europe are usually based on British English, with mostly SSBE speakers appearing in recordings. This greater familiarity with SSBE may in part account for why it is more similar to the Spanish listeners' accent than GE. In addition, GE differs to SSBE in terms of both spectral and durational features (Scobbie et al., 1999), so GE may be less intelligible than SSBE if the Spanish listeners' interlanguage is comprised of features of the Spanish and SSBE vowel systems.

We also found a strong link between accent similarity and intelligibility across the talker-listener pairings, with accents which were more similar to that of the listeners generally being more intelligible than less similar accents; English listeners found their own SSBE accent to be more intelligible than GE, which was more intelligible than SpE. This same SSBE>GE>SpE pattern was also found for the similarity of the accents to the listeners' own speech, in terms of both vowel spectral properties and duration. Spanish listeners found SpE and SSBE to be equally intelligible and these accents were also equally similar to the listeners' speech in terms of vowel duration. GE was least intelligible to the Spanish listeners and also the most distant from their speech in terms of both measures of accent similarity. This link between accent similarity and intelligibility may then suggest that listeners process all accents in a fairly inflexible manner, whereby all input is recognised through stored representations related to the listener's own accent. If an accent matches that of the

listener, or is quite acoustically-phonetically close to it, mapping input to these representations should be easy, and so the accent is more intelligible. For an accent that is more distant to that of the listener, mismatches between the input and the stored representations would make the mapping process more difficult, so word recognition is harder and the accent is less intelligible. Both vowel spectral and durational similarity were able to account for unique variance in accent intelligibility, showing that both cues are important in the mapping process.

Although both listener groups showed a positive relationship between accent similarity and intelligibility, the strength of this relationship was much weaker for the Spanish listeners. This likely reflects the lack of clear distinction between the accents in terms of their similarity to the Spanish listeners' accent (Figure 4.3). There are also additional difficulties posed by listening in an L2 that may influence the relationship between accent similarity and intelligibility. For example, incomplete knowledge of the L2 sound system and the influence of L1 knowledge can lead to listeners having difficulties discriminating some L2 contrasts. This could then mean that the perceptual similarity of a talker's accent to a non-native listener's own accent may also contribute to its intelligibility; phonetic variations in a non-native accent may not impede word recognition by non-native listeners if these variations are perceptually confusable for features of the listeners' own accent or a native accent (Weber et al., 2011). If input is perceptually similar to a listener's accent, it may then be easier to map onto stored representations than other variations which are not perceptually confusable but are similarly different in terms of acoustic-phonetic properties. In addition, although listeners tend to become more accurate in both perceiving and producing L2 sounds as their proficiency develops, it seems that gains in perceptual accuracy may often occur before equivalent improvements in production (e.g.: Bradlow, Pisoni, Akahane-Yamada & Tokhura, 1997; Flege et al., 1997). Finally, non-native listeners are also disproportionately affected by the presence of background noise (Cooke et al., 2008). These factors may also contribute to the weaker link between accent intelligibility and similarity seen for non-native listeners.

Overall, accent similarity was able to account for between a third and three-quarters of the variance in accent intelligibility, depending on the listener group. Along with the findings of similar studies (Oder et al., 2013; Pinet et al., 2011; Wright & Souza, 2012), these data provide further support for the hypothesis that talker-listener

accent similarity is an important contributor to accent intelligibility in noise. If this is the case, it may suggest that listeners are rather inflexible and process all accents through stored representations relevant to their own accents. This would be consistent with findings that listeners show rather little change in their vowel best exemplar locations (Evans & Iverson, 2007) and don't seem to form new representations relating to a regional accent that differs to their own (Sumner & Samuel, 2009) even after extensive exposure to an accent.

However, listeners do show some flexibility in their speech perception, and are able to retune phoneme category boundaries in response to specific variations in speech. For example, when either /f/ or /s/ is replaced with an ambiguous fricative midway between /f/ and /s/, listeners are able to retune the relevant /f/ or /s/ category (depending on which phoneme is replaced) to accommodate this ambiguous phoneme (McQueen, Cutler & Norris, 2006; Norris, McQueen & Cutler, 2003). This category retuning occurs even when the manipulation appears in the context of a global non-native accent (Reinisch & Holt, 2014), and has also been observed in response to systematic variations in vowel height (Maye, Ashlin & Tannenhaus, 2008). Nonetheless, this flexibility in processing is limited; category retuning seems to be largely talker-specific, or at least limited to speakers whose voice is similar to that of the speaker listeners were initially exposed to (Eisner & McQueen, 2005; Maye et al., 2008), and does not occur if the variation is a context-specific dialect feature rather than a context-independent feature of a talker's speech (Kraljic, Brennan & Samuel, 2008). In light of these findings, this surface flexibility may be a mechanism to allow listeners to cope with idiosyncratic features of individual talkers' speech, rather than reflecting a more general level of flexibility in accent accommodation. The retuning of categories also generalises to new words where the variation was not previously heard, showing this flexibility is not a result of the formation of new stored representations to accommodate these variations (McQueen et al., 2006). This may also suggest that listeners continue to process the variant forms through their own stored presentations.

Although these findings suggest that listeners may show a long-term inflexibility in their processing of accented speech, in some cases listeners seem able to process multiple accents with ease, at least at a surface level (Adank et al., 2009; Sumner & Samuel, 2009). As such, accent familiarity may contribute to determining accent

intelligibility across talker-listener pairings along with accent similarity. Listeners may process all accents through stored representations relating to their own accent, with the level of similarity between accents giving a 'baseline' intelligibility for the talker's accent based on how difficult input is to map to the listener's existing stored representations. Familiarity with an accent may then allow listeners to learn how to better perform this mapping process, allowing some perceptual flexibility in processing accented speech. For example, in the lexically guided category retuning studies described above, listeners could use the context that the variant form appeared in to map it to their own stored representations.

5. Chapter five: Electrophysiological responses to accented speech in quiet

5.1. Introduction

The importance of the talker-listener pairing for the intelligibility of an accent in noise is clear. However, when speech is presented in quiet conditions, this relationship often breaks down, and differences that are robust in noise may not be observed. For example, Adank et al. (2009) found that although English listeners found the unfamiliar Glaswegian accent to be less intelligible than their own SSBE accent in noise, the accents were equally intelligible in quiet. Pinet et al.'s (2011) findings also suggest that native English and French-English bilingual listeners find SSBE, Northern-Irish, French and Korean accents all to be highly intelligible in quiet, even though they show distinct tuning to the SSBE accent in noise (but note that accuracy in quiet was not specifically analysed). For less proficient French speakers, it appears that there is some difference in the intelligibility of the accents in quiet, but this is less pronounced than the pattern seen in noise. Some studies have reported significant differences in the intelligibility of accents in quiet, but in each case other adverse conditions which may impede speech processing were also present; for native listeners, non-native accents may be less intelligible than a native accent in quiet for anomalous sentences (Behrman & Akhund, 2013) or isolated words (Hayes-Harb & Watzinger-Tharp, 2012), as contextual information is not available, and also if the talker has low L2 proficiency (Stibbard & Lee, 2006) which further increases the acoustic-phonetic variation present in the speech.

If differences in accent intelligibility across talker-listener combinations arise only in the presence of background noise or other adverse conditions, this may suggest that processing difficulties caused by accented speech arise specifically as an interaction with noise and are not present in quiet. Background noise masks parts of the speech signal, so listeners must use 'glimpses' of the signal where the SNR is temporarily favourable enough in order to understand speech (Cooke, 2006). While the segmental and suprasegmental variation in accented speech may not be severe enough to disrupt processing in quiet conditions, when listeners have to rely on these glimpses of the speech signal, they may not be able to compensate for this variation, resulting in differing levels of accent intelligibility in noise. However, accent

intelligibility tends to be measured using tasks such as word recognition accuracy scores, or the response times of lexical decision or other speeded judgement tasks. These tasks give only a measure of the outcome of word recognition processes, so it may be possible that accented speech can disrupt processing in quiet conditions, but that the difficulties caused are not severe enough to prevent successful word recognition. This means differences in accent intelligibility in quiet may not be identified by outcome-based tasks unless other adverse conditions are present which further increase processing difficulties and cause word recognition to begin to break down.

Instead of these outcome-based measures of word recognition, there are also online measures which could be useful to investigate accent-related processing difficulties. Eye-tracking studies that give a measure of ongoing word recognition processes suggest that the talker-listener pairing may be influential even in quiet conditions. For example, listeners do not rule out competitors in French-accented English as quickly as in their own American English accent (Trude et al.,2013), and suprasegmental errors in Hungarian-accented Dutch also cause native listeners to be slower to rule out competitors, even after the target word is identifiable based on its segmental properties (Reinsch & Weber, 2012). Word recognition accuracy in both cases was very high (over 95%), which lends support to the hypothesis that processing difficulties related to talker-listener accent pairing are present even in quiet conditions, but are difficult to observe using common behavioural tasks.

Recently, electrophysiological measures (EEG) of word recognition have also been used to further investigate accent related processing difficulties in quiet. There are two particular EEG components related to word recognition that may be influenced by global features of accented speech, rather than specific segmental variations; the Phonological Mapping Negativity (PMN) and the N400 effect. The PMN is a relative negativity occurring around 200-350ms after critical word onset, and is caused by input which mismatches phonological expectations about an upcoming word (e.g.: Connolly & Phillips, 1994; Diaz & Swaab, 2007; Newman & Connolly, 2009). The N400 effect is also a relative negativity, but peaks around 400ms after critical word onset, and is elicited by violations of semantic expectations related to upcoming words (Kutas & Hillyard, 1984). For both the PMN and N400, words which cause greater violations of these expectations lead to more negative responses

Table 8: Situations that may elicit the PMN and N400 effect

	Key word	Phonological mismatch	Semantic mismatch	Effects
I like my coffee with sugar and…	cream			Baseline (fully expected)
	crime		x	N400
	milk	x		PMN
	meat	x	x	PMN & N400

(e.g.: Connolly, Phillips, Stewart & Brake, 1992). Phonological and semantic expectations are created by the context which precedes the critical word, either through priming or more commonly through a highly constrained sentence context that leads listeners to expect a particular word to complete the sentence. Input which does not match this predicted word causes violations of the phonological and semantic expectations created, which gives rises to the PMN and N400 effect (see Table 8 for examples of situations where the PMN and N400 effects may be elicited). These features mean the PMN and N400 are useful components for investigating the presence of accent-related processing difficulties in quiet; if the same sentences are presented in each accent, the extent to which the final key word violates expectations based on the linguistic content of the sentence will be equivalent across accents, so any differences observed in the PMN and N400 effects would then be attributable to features specific to the accent of the talker and would then suggest that the talker-listener accent pairing does influence word recognition in quiet.

Recently, a number of studies have begun to explore the influence of accented speech in quiet on the PMN and N400 effect. In a study focusing on regional accents, Brunelliére and Soto-Faraco (2013) found that native Catalan speakers showed clear a PMN and N400 effect in response to phonological and semantic anomalies in their own Eastern accent, and also in the regional Western accent. The PMN appears to be smaller for the regional accent, but the relative sizes of the responses in the two accents were not specifically compared, so we do not know whether the responses actually differ for the two accents. Other studies do provide some evidence that the talker-listener pairing can influence speech processing in quiet conditions. Native listeners have been found to show a smaller PMN in response to a regional accent

compared to their own accent, and an even smaller response to a non-native accent. No difference was found in the N400 effects in response to the listeners' own accent and a regional accent, but responses to a non-native accent were smaller (Goslin et al., 2012). As the non-native accent elicited a smaller PMN and N400, compared to just a smaller PMN for a regional accent, this could suggest that the difficulties caused by a non-native accent are more long-lived and are harder to compensate for. However, it seems that this may not be the case in all situations; Dutch listeners show equivalent N400 effects in response to semantic violations in a native Dutch accent and Turkish-accented Dutch (Hanulíková et al., 2012), and Spanish listeners have exhibited a larger N400 effect in response to violations in a mixed group of non-native accents when compared to a native Spanish accent (Romero-Rivas et al., in press). While inconclusive, these findings do seem to suggest that the talker-listener accent pairing is able to influence the PMN and N400 effects in quiet, and so could reveal differences in accent processing in quiet conditions that are difficult to observe behaviourally.

The aim of this part of the study were to further explore whether talker-listener pairings influences word recognition processes in quiet conditions by investigating the online PMN and N400 responses to different accents. To expand on the limited research conducted so far in this area and explore a wider variety of talker-listener combinations, we presented a standard native (SSBE), regional native (GE) and non-native (SpE) accent to English and Spanish listener groups.

5.2. Methods

5.2.1. Listeners and talkers

The same English and Spanish listeners who participated in the speech in noise task (section 3.2.1.) also completed this EEG task. They also heard the same SSBE, GE and SpE talkers (section 3.2.2.). One English listener's EEG data were excluded due to technical problems.

5.2.2. Procedure

Testing took place at UCL (English listeners) or the University of the Basque Country (Spanish listeners), between one and four days before the speech in noise recognition task. Listeners were presented with 216 predictable and 216 anomalous sentences from the NNSR sentences (from different sentence triplets) in quiet, with

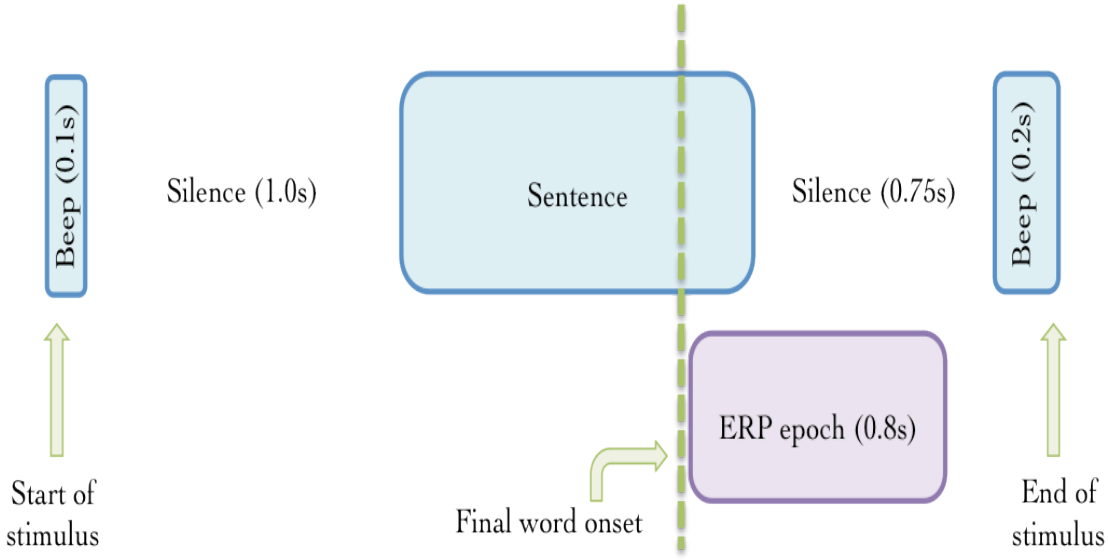
an equal number occurring in each accent. Sentences were presented in a random order, and conditions were counterbalanced so that each sentence appeared in both sentence conditions and in each accent across the experiment. Mean total sentence durations and final keyword durations of the predictable and anomalous sentences in each accent presented were also fairly similar, except for both sentence conditions the GE sentences and final keywords were slightly shorter in duration (Table 9). The speech in noise task used the neutral sentences, so listeners did not hear repeated sentences across the tasks, although listeners heard two sentences from each triplet in different accents across the tasks (e.g.: A0101 in SSBE in the ERP experiment and B0101 in GE in the speech in noise task).

Stimuli were presented binaurally through shielded insert earphones at the same volume for each subject. Each stimulus consisted of a short beep followed by 1000ms of silence and then a sentence. This was followed by 750ms of silence and then a second, longer beep (Figure 5.1). The next stimulus was presented after a response from the participant (see below). The relevant ERP data was recorded during an 800ms epoch time-locked to the onset of the final word of the sentence, so this second silence ensured that the responses were recorded before the next sentence was presented. Participants were asked to blink when they heard the first beep of the stimulus, and to try not to blink again until the second beep to attempt to minimise artifacts relating to eye movement. To ensure participants attended to the sentences, they were asked to decide if the final word of each sentence matched the context, and pressed a corresponding button (labelled "yes" or "no") on a keyboard held on their lap after the second beep at the end of each stimulus. The next stimulus was presented after this response. Before starting the main task, a short training task with 4 sentences in each accent was given to familiarise participants with the experimental procedure. These sentences were not repeated in the main task. Short breaks were given after every 50 sentences.

5.2.3. EEG methods

EEG recordings were made from 64 Ag-AgCl active electrodes (BioSemi) arranged according to the 10/20 system, along with electrodes placed above and below the left eye and electrodes adjacent to the external canthus of each eye. Data were collected at a sampling rate of 2048Hz, and online referenced to the left mastoid, filtered with a low-pass cut-off of 100Hz and a high-pass cut-off of 0.16Hz. Unless otherwise

Figure 5.1: Diagram showing the structure of stimuli presented in the ERP task and the EEG recording window of interest



Where blue boxes denote the auditory stimulus components presented to participants and the purple box denotes the time window where the relevant EEG data were recorded. The start of this window was time-locked to the onset of the final word of the sentence, marked by the dashed green line

Table 9: Average sentence and final keyword durations of the predictable and anomalous sentences for each accent presented in the EEG task

Predictable Sentences

Accent	Sentence duration (s)	Final keyword duration m(s)
SSBE	2.09 (1.13 – 3.53)	0.51 (0.22 – 1.00)
GE	1.90 (1.08 – 3.57)	0.46 (0.18 – 1.00)
SpE	2.32 (1.20 – 4.19)	0.50 (0.14 – 0.97)

Anomalous Sentences

Accent	Sentence duration (s)	Final keyword duration m(s)
SSBE	2.12 (1.23 – 3.60)	0.52 (0.23 – 0.99)
GE	1.93 (1.20 – 3.36)	0.48 (0.17 – 0.90)
SpE	2.29 (1.33 – 4.04)	0.51 (0.20 – 1.00)

Where values are in the form: mean (min – max)
SSBE = Standard Southern British English, GE = Glaswegian English, SpE = Spanish-accented English

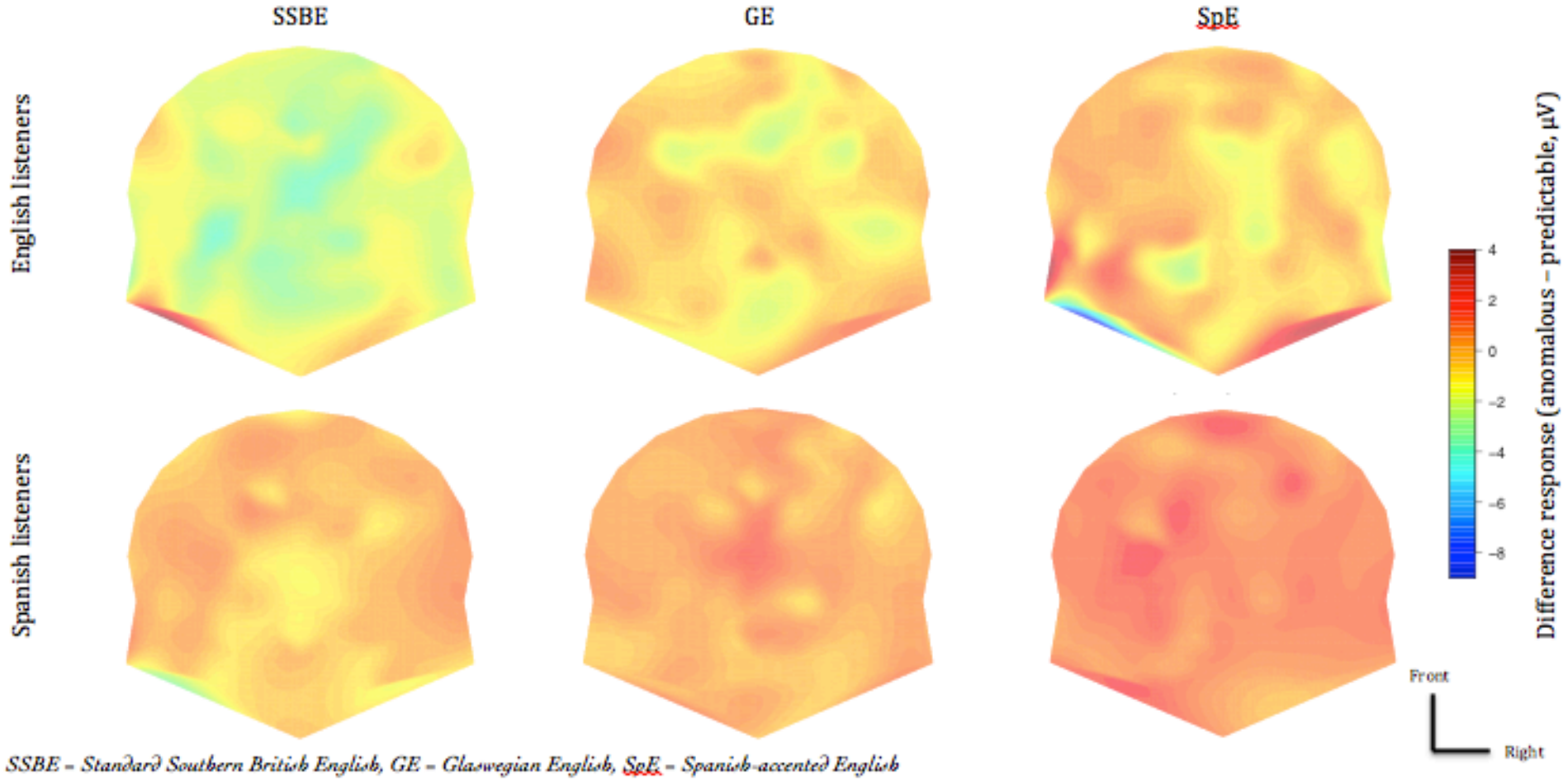
specified, data were analysed using SPM8 (Litvak et al., 2008). Data were re-referenced offline to an electrode on the tip of the nose, high-pass filtered with a cut-off of 0.5Hz, then low-pass filtered with a cut-off of 30Hz before being downsampled to 512Hz. Artifacts related to eye-movements in continuous data were corrected for using independent component analysis (ICA; EEGLAB, Delorme & Makeig, 2004), and then data relating to each sentence was extracted in 1000ms epochs time-locked to the onset of the final keyword (200ms pre-stimulus baseline, 800ms post-stimulus onset). Any trials that still contained artifacts exceeding a threshold of ±150μV were rejected (an average of 10.87 trials per English listener and 11.31 trials per Spanish listener). Remaining trials were averaged over each combination of accent and sentence condition for each participant. Grand-average difference waveforms were also calculated for each accent by subtracting responses to predictable sentences (averaged over participants) from those to anomalous sentences.

5.3. Results

Scalpmaps showing grand average responses averaged across the time windows corresponding to the PMN (Figure 5.2a) and N400 effect (Figure 5.2b) for the English and Spanish listeners suggest that there may be some differences in the responses to the three accents in quiet conditions. To investigate the distribution of responses across the scalp, a regional analysis was performed. Grand average difference waveforms for each listener group and accent were first averaged across the time windows corresponding to the PMN (200-350ms) and N400 (350-500ms).

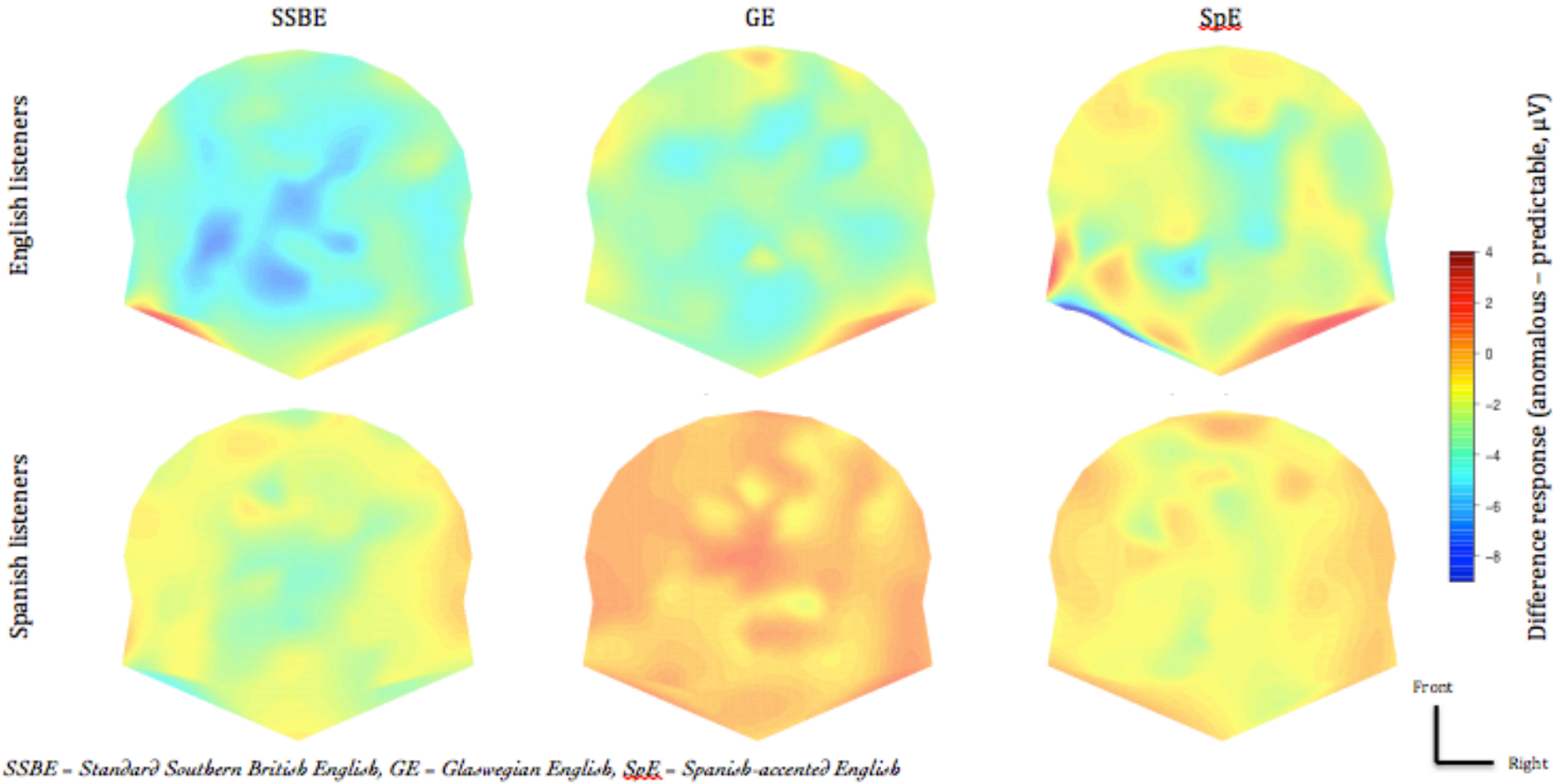
As the responses at neighbouring electrodes are not independent of each other, responses were then averaged over electrodes within nine regions of interest (Figure 5.3) to avoid over-inflating any effects. Mean responses at each ROI were entered into ANOVAs for each listener group and time window separately. During the early time window, English listeners showed a significant effect of ROI on PMN amplitude, $F(8,16)=3.02$, $p=0.0284$, with the strongest responses concentrated over the midline regions and also less strongly over right fronto-central regions. Spanish listeners however did not show a significant effect of ROI. The usual distribution of the PMN is a frontal-central distribution evenly spread over the left and right hemispheres (e.g.: Newman, Connolly, Service & McIvor, 2003), and as we did not find this distribution for either listener group, this may suggest that a PMN effect was not reliably elicited in this study. Turning to the N400 effect, a significant effect

Figure 5.2a: Scalpmaps showing grand-average differences between responses to anomalous and predictable final words in SSBE, GE and SpE for native and non-native listeners during the PMN time window (200-350ms)



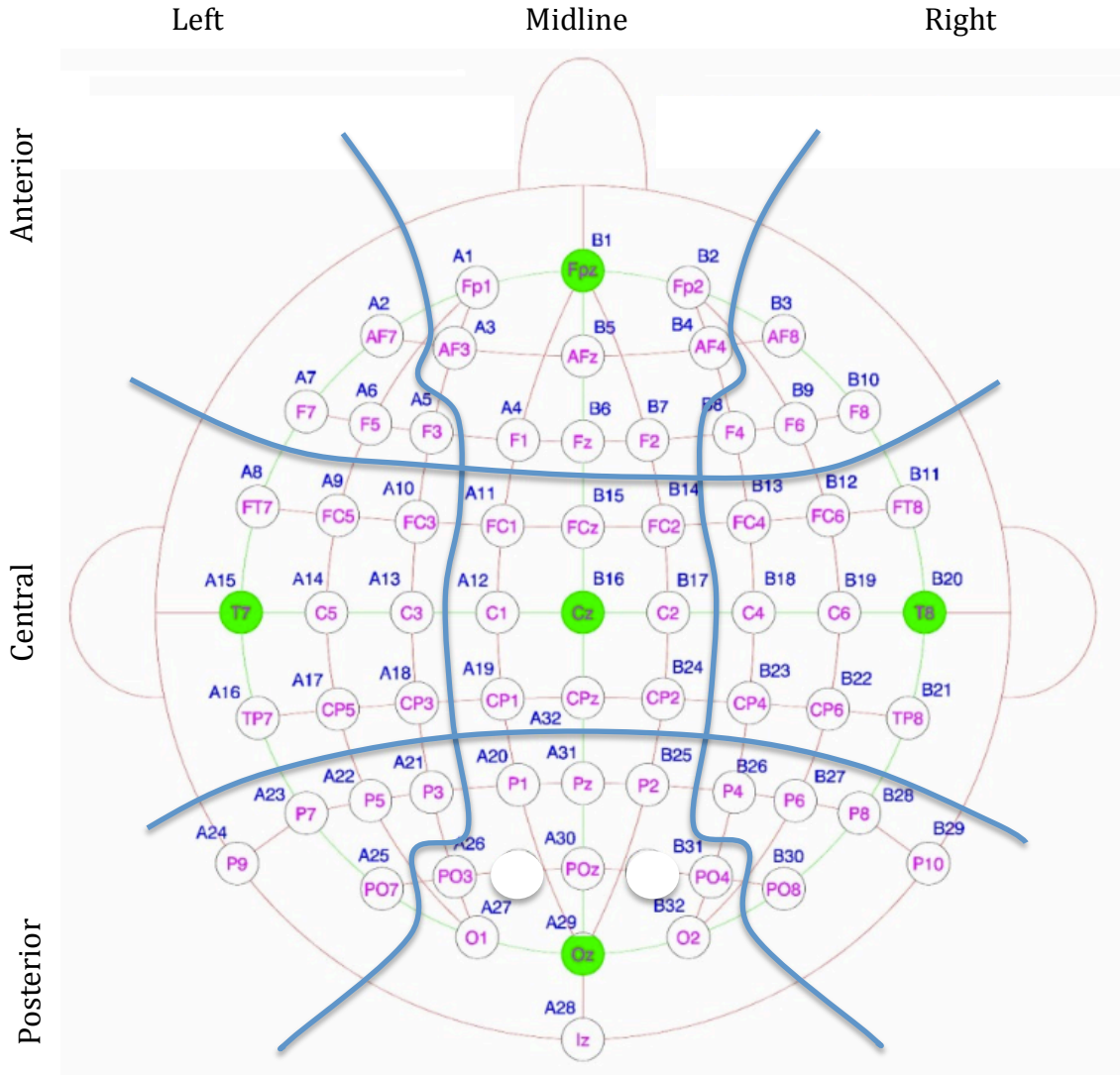
SSBE = Standard Southern British English, GE = Glaswegian English, SpE = Spanish-accented English

Figure 5.2b: Scalpmaps showing grand-average differences between responses to anomalous and predictable final words in SSBE, GE and SpE for native and non-native listeners during the N400 time window (350-500 ms)



SSBE – Standard Southern British English, GE – Glaswegian English, SpE – Spanish-accented English

Figure 5.3: Locations of electrodes contained within the nine regions of interest included in initial analyses of ERP scalp distribution



of ROI was seen for both English listeners, $F(8,16)=4.76$, $p=0.0039$, and Spanish listeners, $F(8,16)=3.89$, $p=0.0100$. The strongest effects were exhibited at the midline/central region for English listeners and at the midline/central and midline/parietal regions for Spanish listeners. The N400 is usually concentrated over centro-parietal sites (see Kutas & Federmeier, 2011 for review), so these results suggest the study successfully elicited the N400 effect for both listener groups.

Based on the findings of the regional analyses, further analyses of the PMN and N400 effects in response to the three accents focused on the Cz electrode (Figure 5.4). The PMN effect for each accent was calculated by averaging the amplitude of

responses in each sentence condition across the 200-350ms time window, and then subtracting the mean amplitude for predictable sentences from that of anomalous sentences. The PMN is negative going throughout the response, but during the N400 time window, responses are first negative going, and then begin to return to baseline. Inspection of each participant's difference waveforms at Cz suggested individual differences in the latency of the negative peak and also in the rate of return to baseline, which could obscure differences in the N400 effect between participants if responses are averaged across the whole time window. To avoid this, the N400 effect was calculated based on each participant's average latency across all accents. The latency was determined by first constructing a difference wave for each accent across the 350-500ms time window by subtracting responses to predictable sentences from those to anomalous sentences at each sample, and then averaging across the three accents to give a mean N400 response across all accents. The most negative amplitude within the window was identified, and this time point used as that participant's N400 latency. The N400 effect for each accent was then calculated at this latency by subtracting the amplitude of the response to predictable sentences at that time point from the response to anomalous sentences. PMN and N400 effect amplitudes were then entered into separate linear mixed-effects models containing the fixed effects of accent and listener group (with their interaction term) and by-participant random intercepts.

5.3.1. PMN (200-350ms)

The PMN effect at Cz by accent for each listener group can be seen in Figure 5.5. Significant effects of accent, $F(2, 93)=6.04$, $p=0.0034$, and listener group, $F(1,93)=4.94$, $p=0.0286$, were found, with larger responses for English listeners than for Spanish listeners. No significant interaction between the terms was found.

Responses seemed rather small (Figure 5.5), so to explore the PMN effect further, average amplitudes in response to the anomalous and predictable sentences over the 200-350ms time window were entered separately into another mixed effects model, with sentence type, listener group and accent as fixed effects and by-participant random intercepts. No significant main effects were found, but significant two-way interactions were seen between sentence type and accent, $F(2,155)=6.12$, $p=0.003$, sentence type and listener group, $F(1,155)=5.01$, $p=0.0275$, and accent and listener group, $F(2,155)=6.47$, $p=0.0020$. Pairwise comparisons (Bonferroni-corrected)

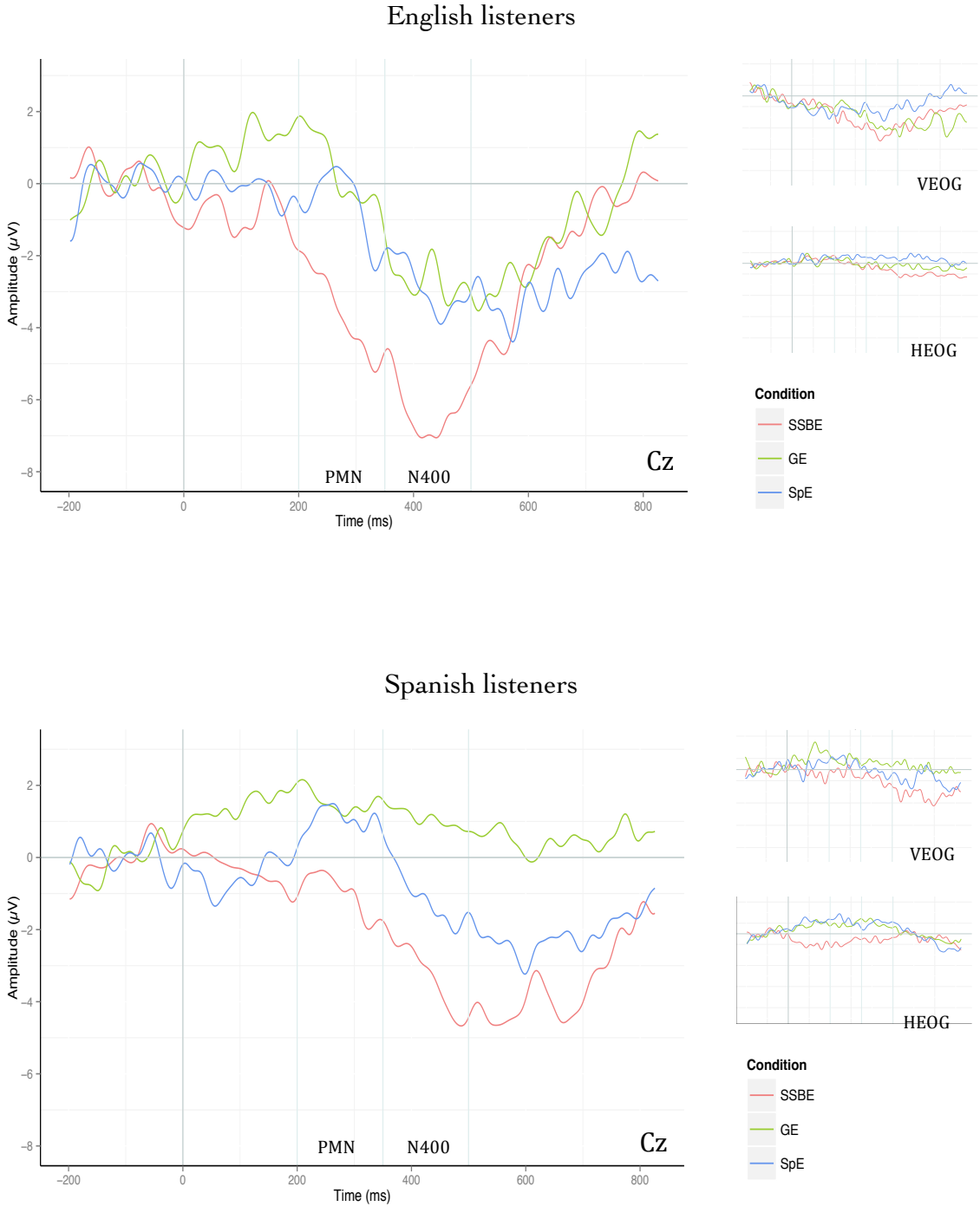
showed that these interactions arise as the only significant difference between responses to anomalous and predictable key words occurred in response to SSBE for English listeners ($p=0.0017$). This means that a significant PMN effect is seen only for the talker-listener pairing of SSBE accent-English listener, suggesting that there may need to be a match between talker and listener accent to elicit a PMN response. This is consistent with the weak ROI results discussed above.

5.3.2. N400 (350-500ms)

The average latency of the N400 differed between the two groups; 434ms post final word onset for the English listeners, compared to 468ms for the Spanish listeners, $t(62)=-5.21$, $p<0.0001$. The N400 effect by accent for each listener group is shown in Figure 5.6. Again, significant effects of accent, $F(2, 93)=8.20$, $p=0.0005$, and listener group, $F(1, 93)=8.17$, $p=0.0052$, were found, with no significant interaction. Overall, Spanish listeners showed smaller N400 effects compared to the English listeners, but both listener groups show the same general pattern in N400 magnitude; the largest N400 effect was in response to the SSBE accent, followed by the SpE accent and a weaker still N400 for the GE accent. In both cases, the N400 effect response to the SE accent is significantly larger than that for the GE accent (English listeners, $p=0.0267$; Spanish listeners, $p=0.0010$). The response to the SpE accent is in between those to the SSBE and GE accents for English listeners, and is not significantly different to either, but for the Spanish listeners it is more similar to the N400 effect for the SSBE accent, and is also significantly larger than the response to the GE accent ($p=0.0393$).

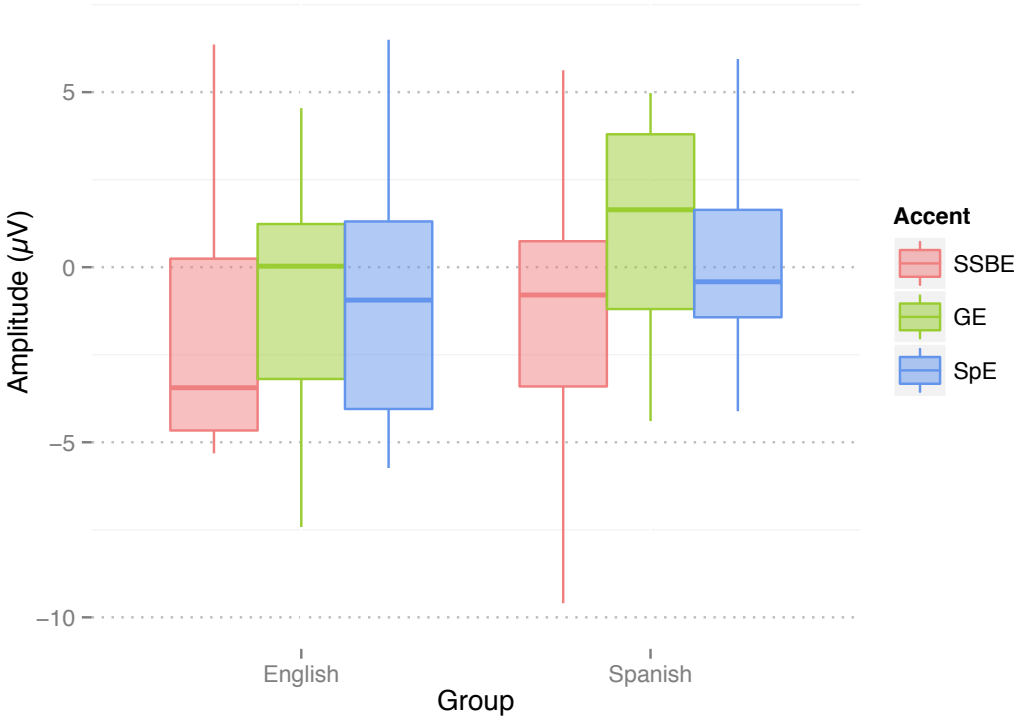
To explore the N400 effect further, amplitudes for anomalous and predictable sentences at each participants' N400 latency were entered into another mixed effect model with sentence type, listener group and accent as fixed effects and by-participant random intercepts. A significant main effect of sentence type was found, $F(1,155)=62.93$, $p<0.0001$, with more negative responses to anomalous final keywords. Significant two-way interactions were also found between sentence type and accent, $F(2,155)=7.57$, $p=0.0007$, and between sentence type and group, $F(1,155)=7.54$, $p=0.0067$, with larger differences in responses to predictable and anomalous sentences for English listeners. Bonferroni-corrected pairwise comparisons showed significant differences between responses to anomalous and predictable keywords for all accents for English listeners (all $p<0.05$), and for SSBE

Figure 5.4: Grand-average waveforms showing differences in responses to anomalous and predictable final words in SSBE, GE and SpE for native and non-native listeners



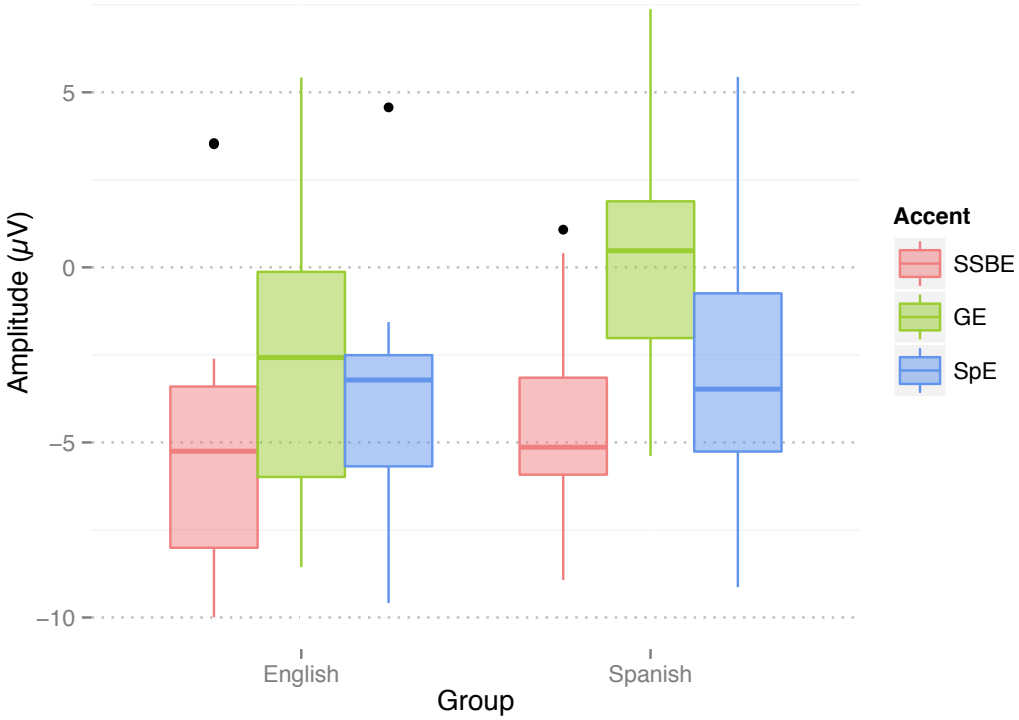
SSBE = Standard Southern British English, GE = Glaswegian English, SpE = Spanish-accented English
VEOG = Vertical electrooculargram, HEOG = Horizontal electrooculargram,

Figure 5.5: PMN responses at Cz to SSBE, GE and SpE in quiet for native and non-native listeners



SSBE = Standard Southern British English, GE = Glaswegian English, SpE = Spanish-accented English

Figure 5.6: N400 responses at Cz to SSBE, GE and SpE in quiet for native and non-native listeners



SSBE = Standard Southern British English, GE = Glaswegian English, SpE = Spanish-accented English

for Spanish listeners ($p<0.001$). The N400 effect in response to SpE for the Spanish listeners was marginally significant ($p=0.0764$), but was no effect was found in response to GE ($p=1.0000$, n.s.). As an N400 effect was seen for all talker-listener combinations except for the GE accent-Spanish listener pairing, this suggests that the N400 effect may be more flexibly influenced by the talker-listener accent combination than the PMN. The N400 effect for Spanish listeners in response to SpE was weak, but this may reflect the slightly small sample size in this study and may have been more robust if more participants had been tested.

5.3.3. The relationship between the N400 and accent intelligibility

To further investigate the relationship between EEG responses and accent intelligibility, average word recognition scores in quiet and in noise were entered into separate linear mixed effects models with the fixed effect of N400 response amplitude and by-listener group random intercepts. PMN amplitude was not entered into these models as we did not find a reliable PMN for most talker-listener pairings.

N400 amplitude showed a significant relationship with accent intelligibility in quiet, $F(1, 88)=5.49$, $p=0.0214$ and also accent intelligibility in noise, $F(1, 75)=6.92$, $p=0.0103$. However, N400 effect size was able to account for more variance in intelligibility when speech was presented in quiet, $R^2=0.091$, than in noise, $R^2=0.039$. In both cases, the amount of variance in intelligibility accounted for by N400 amplitudes was very small, suggesting the N400 reflects only some of the processes which contribute to accent intelligibility.

5.4. Discussion

The aim of this study was to investigate whether an influence of talker-listener pairing could be observed in quiet conditions. To do this, we compared English and Spanish listeners' EEG responses to SSBE, GE and SpE accents during time windows corresponding to the PMN and N400 effect. These responses are elicited by phonological and semantic anomalies, respectively (e.g.: Connolly & Philips, 1994), but as the same linguistic content was presented in each accent, any resulting differences in the PMN and N400 for the listener groups could then be attributed to properties of the speech, rather than to sentence content. We found overall effects of listener background and talker accent on the presence and amplitude of the PMN and N400 effect, with smaller overall responses by Spanish listeners and to the GE

and SpE accents.

The PMN seems to be particularly dependent on a match in the talker-listener combination, even in quiet conditions. We found a reliable PMN response only for the SSBE accent-English listener pairing, suggesting that even if accented speech is highly intelligible in quiet, earlier phonological processing stages can be severely affected by mismatches between the talker's accent and that of the listener. However, there seem to be some situations where a mismatching accent can elicit a PMN, as Brunelliére and Soto-Faraco (2013) found a clear PMN response for the listeners' own accent and also a regional accent. The distinction between these accents seems to be based on quite minor differences in the application of vowel reduction, so in this case the regional accent may be similar enough to the listeners' own accent to be processed in a similar way and also elicit a PMN response. This study did find some evidence that listeners do not form fine phonological expectations in the regional accent though, as a PMN was not elicited when the accent changed from the regional to the listeners' own accent on the final word of the sentence, but was elicited with the reverse manipulation. Goslin et al. (2012) also reported differences in responses during the time window corresponding to the PMN for regional and non-native accents compared to the listeners' accent. However, the methodology used differs to that of the current study and other ERP studies mentioned; this study measured absolute responses to fairly neutral sentences rather than using the more standard methodology which is to calculate the relative differences between responses to anomalous and predictable words. This makes it difficult to compare the findings of the current study to Goslin et al.'s (2012) findings.

During the later time window, we found that Spanish listeners showed a longer latency of the N400 effect than English listeners. This is consistent with the findings of a number of other studies, and may reflect the greater difficulty of speech processing for non-native listeners (e.g.: Hahne, 2001; Newman, Tremblay, Nichols, Neville & Ullman, 2012; Weber-Fox & Neville, 1996). Spanish listeners also showed smaller N400 effects overall than the English listeners, a pattern which again has also been found previously (auditory N400: Hahne, 2001; Hanhe & Friederici, 2001; visual N400: Martin et al., 2013; Newman et al., 2012). Despite these group differences, we found very similar patterns of responses for both listener groups, with the largest N400 effects overall in response to the SSBE accent, followed by SpE and

finally the GE accent. That the Spanish listeners also showed this pattern is interesting, as it may suggest that listeners form expectations based on SSBE, rather than their own SpE accent. This in turn could suggest that the listeners are beginning to tune their English word representations to a native accent, even though they are not able to produce a native-like accent. The N400 effect also seems to be more robust to accented speech than the PMN, with responses observed for all pairings except the GE accent for Spanish listeners. The greater flexibility of N400 effect responses across the talker-listener pairings than seen for the PMN may suggest that lexical integration processes are better able to accommodate differences among accents than phonological processes. N400 amplitudes also showed closer links to accent intelligibility in quiet than in noise. Together, these findings provide further support that the talker-listener accent pairing influences word recognition processes in quiet, even though this is hard to observe using behavioural methods. It should be noted that our findings differ to those of some previous studies; Goslin et al. (2012) found equivalent responses to the listeners' own accent and a regional accent, with smaller responses to a non-native accent (using the same methodology as described for the PMN), but Romero-Rivas et al. (in press) found larger responses to non-native accents than the listeners' own accent and Hanulíková et al. (2012) did not find any differences in N400 effect size in response to a native or a non-native accent. These inconsistencies could result from the specific talker-listener pairings in the studies, or perhaps from differences in methodology such as differences in the number of talkers appearing in the studies or differences in methods of calculating the N400 effect. However, even with the different patterns of results across the studies, findings do seem to suggest that there are differences in accent processing in quiet conditions.

In general, PMN and N400 effects are elicited in response to input which conflicts with expected phonological or semantic forms, respectively. The conflicting input may be harder to map onto activated lexical candidates than the expected form, meaning lexical integration is more effortful and resulting in larger responses (Brown & Hagoort, 1993). Applying this to the current study, acoustic-phonetic variation in accented speech could be expected to mean that anomalous words cause greater conflict with expected forms than in a standard accent, causing further lexical integration difficulties and increasing PMN and N400 effects. However, the opposite pattern was observed in this study, and PMN and N400 effects for accented speech

were smaller than responses to a standard accent, and in some cases were not observed at all. This could instead suggest that listeners form weaker expectations in response to accented speech, meaning that predictable words are less expected and anomalous words are less unexpected than in a standard accent, leading to smaller PMN and N400 effects. Spanish listeners' responses were also smaller than those of English listeners, suggesting that their expectations may also be weakened as a result of listening in an L2. Non-native listeners are less able to use contextual information to recognise words than native listeners (Bradlow & Alexander, 2007; Mayo et al., 1997; Shi, 2014), and also experience more diffuse activation of lexical competitors during word recognition (e.g.: Broersma, 2012; Broersma & Cutler, 2011; Weber & Cutler, 2004), in addition to having incomplete language knowledge of the L2. All these factors may mean that non-native listeners are less able to form fine phonological and semantic expectations about upcoming words than native listeners.

Weaker expectations may be formed about upcoming words in accented speech because the acoustic-phonetic variations in regional and non-native accents compared to a standard accent can cause difficulties identifying words and also lead to lexical uncertainty (see Mattys, Davis, Bradlow & Scott, 2012 for a review). Artificially degraded speech that causes similar processing difficulties elicits reduced N400 effects compared to clear speech, with less intelligible speech generally leading to smaller responses (Aydelott, Dick & Mills, 2006; Boulenger, Hoen, Jacquier & Meunier, 2011; Obleser & Kotz, 2011; Strauß, Kotz & Obleser, 2013). The reduced intelligibility of degraded speech may limit listeners' access to the semantic information in a sentence, meaning the context is less clearly defined. Listeners' semantic expectations about upcoming words will then be weaker, resulting in smaller N400 effects (Aydelott et al., 2006). Phonological expectations may be affected in the same way, as the only study to report findings during the PMN time window found a PMN effect for clear, but not degraded speech (Strauß et al., 2013). Our results generally follow this pattern, with smaller N400 responses to the less intelligible GE and SpE accents than for the SSBE accent, and a reliable PMN seen only for the most intelligible accent, which could suggest expectations are weakened by accented speech in a similar way. However, the accents presented in this study were generally highly intelligible in quiet, and we also found little link between N400 amplitude and accent intelligibility, so it seems unlikely that this is the only mechanism through which accents influence the PMN and N400. However, the GE

accent was difficult for the Spanish listeners to understand even in quiet, so difficulties accessing the content of the sentences could contribute to the lack of PMN and N400 effects seen for this talker-listener pairing.

Listeners' expectations about upcoming words may also be influenced by global knowledge based on a talker's accent. Previous knowledge of a talker's accent can affect listeners' speech perception, with just the suggestion that a speaker has a particular native accent (Hay, Nolan & Drager, 2006; Niedzielski, 1999) or is a non-native speaker (Hu & Lindemann 2009; Rubin, 1992) influencing listeners' judgements, even if the same talker is heard in all "accents". Listeners also seem to expect non-native speech to contain more variation or a greater number of errors compared to a standard native accent; listeners are more tolerant of phonological errors in non-native speech than in native speech (Schmid & Yeni-Komshian, 1999) and process it in less detail (Lev-Ari & Keysar, 2012), and syntactic errors elicit a P600 effect in native speech, but not in non-native speech where they may be less unexpected (Hanulíková et al., 2012). Expectations formed about upcoming words are also influenced by listeners' prior knowledge or biases about a talker; a mismatch between input and expectations based on a speaker's age, gender or social class can elicit N400 effects without a semantic anomaly (e.g.: if a child says "I should stop smoking", Van Berkum, van den Brink, Tesink, Kos & Hagoort, 2008), and smaller N400 effects occur if semantic anomalies are congruent with prior knowledge of a character (e.g.: "The Hulk picked up the lorry", Filik & Leuthold, 2013). It could then be expected that listeners are also influenced by their prior knowledge and biases when forming expectations about accented speech. If listeners expect more variation, they may form less defined expectations about upcoming words in order to accommodate this increased level of ambiguity in accented speech. This would mean that predictable words conform less to expectations and anomalous words violate expectations less, leading to smaller PMN and N400 effects.

Whether weaker expectations arise because of difficulties accessing the context of sentences or due to the influence of listeners' prior experiences of accented speech, our findings suggest that phonological and semantic expectations may also depend on the talker-listener pairing, even in quiet conditions. Phonological expectations were severely affected by accented speech; English listeners showed a clear PMN only for their own SSBE accent and Spanish listeners showed no PMN at all. This could

suggest that listeners may be too uncertain about the phonological variation in unfamiliar regional and non-native accents to be able to form detailed phonological expectations about accents that are different to their own. This requirement that accents either match or be very similar to the listener's own in order to elicit a PMN response (Brunelliére & Soto-Faraco, 2013) may also provide further support for the hypothesis that accent similarity is important in determining accent intelligibility. Semantic expectations seem to be more robust across talker-listener pairings, as more flexibility was seen in N400 effects across talker-listener combinations. This may be because semantic forms are less specific to accent than phonological forms, and so may be less affected by mismatches between talker and listener accent.

Forming weaker expectations in relation to accented speech could also be a compensatory mechanism to accommodate the ambiguity associated with accented speech, possibly by limiting the occurrence of costly repair processes. Minor variation or errors in accented speech may not inhibit successful communication, and as these errors may not necessarily require repair, weaker expectations could allow them to be overlooked (Hanulíková et al., 2012) in order to maintain efficiency in processing. Less clearly defined expectations could also allow more severe variations in speech to occur without triggering repair processes. For example, if a speaker uses "glass" when "cup" would be correct, repair may not be necessary if a listener expects "something to drink from" rather than something more specific to the features of a cup, as the input can still be mapped to this less constrained representation (Lev-Ari & Keysar, 2012). Listeners have also been found to show slight delays in word recognition processes if a signal is unreliable, because confidence in having correctly identified the input is weaker (McQueen & Huetting, 2012; Trude et al., 2013). This delay may allow listeners to avoid prematurely identifying words and then needing to apply repair processes if later input contradicts this judgement. Forming weaker expectations may be analogous to this process, allowing listeners to avoid incorrectly identifying words. While forming weaker expectations about upcoming words may protect listeners from unnecessary repair processes or premature word recognition, this mechanism may still introduce some processing inefficiency. More predictable words are more intelligible than neutral or anomalous words (e.g.: Bradlow & Alexander, 2007; Clopper, 2012; Kalikow et al., 1977), possibly as having strong expectations about upcoming words facilitates the activation of relevant lexical candidates and means input is more easily mapped to representations of the

predictable word (Aydelott & Bates, 2004). Weaker expectations may mean that anomalous input is less disruptive to lexical integration, but would also mean that congruent input does not benefit from this support given by stronger expectations, and word recognition may be comparatively slower and more effortful.

To return to our aim of investigating whether the influence of talker-listener pairing is also important in quiet conditions, the reduced PMN and N400 effects we observed for accented speech in quiet (along with the weaker expectations we hypothesise are associated with them) suggest that this is the case. Phonological processes reflected in the PMN seem to be reliant on a talker and listener sharing the same L1 accent, but lexical integration processes, reflected in the N400, show a similar pattern to the intelligibility of accents across the talker-listener pairings in quiet, with smaller responses (and more difficulties) for less intelligible accents. These difficulties may relate to a reduced efficiency of word recognition processes, and so do not necessarily prevent word recognition if there are no further adverse listening conditions present. This could explain why we could observe accent related difficulties with the online EEG measures, but accent intelligibility in quiet remained high.

6. Chapter six: General discussion

The findings of this research have added to our understanding of the mechanisms of how talkers' and listeners' backgrounds interact to influence accent intelligibility. Findings provide further evidence to support the contribution of accent similarity across talker-listener combinations to accent intelligibility in noise, with accent similarity in terms of vowel spectral qualities and duration able to account for variance in accent intelligibility. This relationship was observed for native and non-native listeners, but was weaker for non-native listeners, suggesting other factors may also contribute to accent intelligibility for this group. Online EEG measures of word recognition processes also showed that the influence of talker-listener pairing was present in quiet conditions and so did not arise specifically as an interaction with difficulties caused by background noise. Listeners' ability to form phonological expectations about upcoming words was severely affected by mismatches in talker-listener accent, with a PMN response elicited only by the English listeners' own SSBE accent. Semantic expectations were less severely affected by a mismatching accent, but difficulties seemed to remain with weaker responses to regional and non-native accents.

Previous research has proposed that different patterns of intelligibility across talker-listener pairings reflect listeners' differing levels of familiarity with the talkers' accents (e.g., Adank et al., 2009). As listeners become more familiar with a media-standard accent, they may be able to develop multiple stored phonological representations relating to their own accent and also this standard accent (Sumner & Samuel, 2009). This would be consistent with exemplar-based models of word recognition such as MINERVA (Hintzman, 1986) or the exemplar-resonance model (Johnson, 2006) where multiple exemplars of each word are stored in order to account for the high level of variability in speech. Input is then compared to these exemplars, with matching exemplars activated in order to retrieve the relevant conceptual representation. As the level of activation depends on the level of similarity between the input and stored exemplars (Hintzman, 1986; Johnson, 2006), if familiarity with an accent allows listeners to form accent-specific representations, there will be a better match between input in that accent and stored exemplars, leading to stronger activation and thus easier word recognition.

However, listeners do not always have sufficient flexibility to form multi-accent stored representations; Sumner and Samuel (2009) found that while speakers with a typical New York accent store representations in both the standard rhotic form and the regional non-rhotic form, New Yorkers who produce the more standard rhotic forms store representations only of this rhotic form, even though they are highly familiar with the regional non-rhotic form. This suggests that forming accent-specific representations may be very difficult for listeners to achieve, even with extensive exposure. Sumner and Samuel (2009) suggest that listeners may need this extensive exposure to an accent in early childhood; the typical New Yorkers would have received exposure to non-rhotic forms at home, along with rhotic forms through the media, but rhotic New Yorkers would have received much less exposure to non-rhotic forms as they heard rhotic forms at home, and non-rhotic forms are less represented in the media. If this very early exposure is required to form multi-accent representations, most listeners would never be able to form multiple representations, suggesting that familiarity with an accent may not influence accent intelligibility by allowing new exemplars to be formed.

Instead of accent familiarity being the main determiner of accent intelligibility, the similarity of accents across talker-listener pairings also seems to be influential (e.g, Pinet et al., 2011). In this study, we observed the same patterns of accent intelligibility and similarity across our talker-listener pairings, which could support this hypothesis. A greater role of accent similarity would suggest listeners are more inflexible and process accents by mapping multiple variations onto a single abstract representation based on the listener's own accent (Sumner & Samuel, 2009). The general premise of abstract models of word recognition such as TRACE (McClelland & Elman, 1986), Shortlist (Norris, 1994) and Merge (Norris, McQueen & Cutler, 2000) is similar to that of the exemplar based models described above; input is compared to stored representations, and units that match the input are activated. Competition between activated units leads to eventual lexical retrieval. The difference between the models is the nature of the stored forms - instead of multiple episodic memory traces for each unit, in the abstract models representations have been stripped of surface variation and are stored as an abstract representation. The similarity of a talker's accent to that of the listener could then influence intelligibility based on the ease of mapping the accented input onto the listener's stored phonological representations. Input in a similar accent is easier to recognise as

corresponding to a particular stored unit, be that feature-based representations, as in TRACE (McClelland & Elman, 1986) or phonemes, as in Shortlist (Norris, 1994) or Merge (Norris et al., 2000) than input which is more acoustically-phonetically distant, which may not be recognised, or may be misidentified. This more efficient mapping to stored representations would then make word recognition easier in more similar accents.

ERP findings in this study may also suggest that listeners only store representations relating to their own accent. The only reliable PMN effect found was in response to SSBE for English listeners, suggesting that listeners are only able to form fine-grained phonological expectations in their own accent. This inflexibility may reflect the underlying nature of their stored phonological representations, as multiple representations could be expected to allow listeners to adapt their expectations based on accent. Brunelliére & Soto-Faraco (2013) found that if a regional accent is similar enough to that of the listeners, they may be able to form phonological expectations, leading to a PMN in response to mismatching input. However, no PMN was elicited in another part of the study where the final word of the sentence changed from the regional accent into the listeners' own accent, but a clear PMN was seen in the reverse situation. This asymmetry may suggest that the expectations formed about upcoming words in the regional accent are still based on stored representations specific to their own accent.

While these findings show that the level of similarity between a talker and listener's accent can influence the accent intelligibility, the contribution of accent familiarity cannot be completely discounted as listeners are able to use knowledge of particular accent features to aid speech perception (e.g., Dahan, Drucker & Scarborough, 2008; Oder et al., 2013) and can quickly adapt to unfamiliar accents (e.g., Bradlow & Bent, 2008; Clarke & Garrett, 2004). This could provide support for a hybrid model of word recognition, incorporating elements of both abstract and exemplar-based models. Goldinger (2007) has proposed a hybrid 'complementary learning system' containing a stable cortical network of abstract representations along with a fast-learning hippocampal network that is able to quickly form episodic memories in order to accommodate idiosyncratic variation. When listeners encounter a new accent, they can use the hippocampal network to form short-lived traces to aid word recognition, which could account for listeners' ability to rapidly adapt to a previously

unfamiliar accent. Dahan et al. (2008) proposed that listeners adapt to a specific accent feature by altering their stored representations to incorporate this variation, but this could also have occurred by recruiting this fast-learning hippocampal network. If a listener has more long-term exposure to an accent, traces in the hippocampal network can interact with the cortical network to affect the listeners' abstract representations. This could possibly allow representations to encompass multiple accented forms, rather than forming separate accent-specific representations, and may account for Sumner and Samuel's (2009) finding that New Yorkers with a standard rhotic accent are also able to easily process the non-rhotic forms that they have extensive exposure to even though they retain only rhotic stored representations.

A further possibility may be that the acoustic-phonetic similarity between accents determines the 'baseline' intelligibility of an accent for a listener. Familiarity with an accent may then allow listeners to build on this baseline level of intelligibility. This could be consistent with a recently proposed model of word recognition that takes a rather different approach than the activation-based models described above. Instead of matching input to stored abstract representations based on the sequences of phonemes contained in the input, in Shortlist B (Norris & McQueen, 2008) the input is phoneme probabilities. This replaces the interaction-activation process in other models with Bayesian judgements of likelihood in order to recognise words, and listeners identify speech based on phoneme likelihoods - their prior knowledge of the likelihood of a phoneme occurring given the specific input. These probabilities of a phoneme's occurrence are then used to estimate the likelihood of a particular word occurring. Phoneme likelihood functions are based on listeners' knowledge of the probability of certain acoustic input being associated with different phonemic categories. For example, input A may be more likely to be interpreted as /s/ than input B, and so the phoneme likelihood for /s/ will be higher for input A. If a talker's accent is very similar to a listener's own accent, the listener's knowledge of phoneme likelihoods may apply well to the talker's accent. However, if the accent is more acoustically-phonetically distant, the phoneme likelihoods may not fit well, making word recognition more difficult. Familiarity with an accent may contribute to accent intelligibility by allowing listeners to update their knowledge of phoneme likelihoods to incorporate regular variation that they encounter in accented forms. This could account for the ability of listeners to learn to interpret an ambiguous segment as

either /f/ or /s/ depending on its lexical context (McQueen et al., 2006; Norris et al., 2003). Listeners may have updated their likelihood functions of the relevant phoneme to have greater density corresponding to the ambiguous input. In this way, listeners may not modify their original representations in response to accented speech, but exposure may allow them to become more skilled at mapping from the accented input to their own representations.

There remain a number of questions this study did not explore which may be interesting avenues for future research. One option would be to investigate the relationship between accent similarity and intelligibility in a more fine-grained manner, as there is generally a lot of variation in talker intelligibility within accent groups as well as between accents. Reanalysing the current data to compare listeners' responses to the four individual talkers of each accent, rather than looking at their responses to the accents in general would allow this to be explored further. If listeners do process all speech through their own representations, links between similarity and intelligibility may be observed even within one accent group. To further investigate the possibility of forming accent-specific phonological representations, it would be interesting to extend this research to a group with long-term exposure to another accent, as listeners in this study were largely unfamiliar with the accents that did not match their own. One such group are Glaswegian listeners, as this group will obviously be highly familiar with GE, but will also have received extensive exposure to SSBE through the media. If Sumner and Samuel's (2009) proposal is correct, these listeners may have had sufficient early exposure to both accents to form multi-accent long-term representations. If this is the case, a weaker relationship between accent similarity and intelligibility could be expected. In terms of ERP data, if listeners have stored representations corresponding to both SSBE and GE, they may be able to form expectations about upcoming words in both accents. This would mean that input in both accents would mismatch less with expectations, leading to less distinction between differences in the PMN and N400 responses to SSBE and GE. However, if listeners continue to interpret both accents through GE-based representations, a PMN may only be observed in response to the GE accent, and the N400 effect may be strongest for GE and the other accents. It may also be interesting to include a group of Spanish listeners who have lived in London for an extended period to see whether they become more tuned to SSBE than SpE, and if this also manifests in EEG responses.

7. References

Adank, P., Evans, B. G., Stuart-Smith, J., & Scott, S. K. (2009). Comprehension of familiar and unfamiliar native accents under adverse listening conditions. *Journal of experimental psychology. Human perception and performance*, *35*(2), 520–9. doi:10.1037/a0013552

Aydelott, J., & Bates, E. (2004). Effects of acoustic distortion and semantic context on lexical access. *Language and Cognitive Processes*, *19*(1), 29–56. doi:10.1080/01690960344000099

Aydelott, J., Dick, F., & Mills, D. L. (2006). Effects of acoustic distortion and semantic context on event-related potentials to spoken words. *Psychophysiology*, *43*(5), 454–64. doi:10.1111/j.1469-8986.2006.00448.x

Balota, D., Yap, M., & Hutchison, K. (2007). The English lexicon project. *Behavior Research …*, *39*(3), 445–459. Retrieved from http://link.springer.com/article/10.3758/BF03193014

Behrman, A., & Akhund, A. (2013). The Influence of Semantic Context on the Perception of Spanish-Accented American English. *Journal of Speech, Language, and Hearing …*, *56*(October), 1567–1579. doi:10.1044/1092-4388(2013/12-0192)listeners

Bench, J., Kowal, A., and Bamford, J. (1979). "The BKB (Bamford-Kowal- Bench) sentence lists for partially-hearing children," *British Journal of Audiology*. 13, 108–112.

Bent, T., & Bradlow, A. R. (2003). The interlanguage speech intelligibility benefit. *The Journal of the Acoustical Society of America*, *114*(3), 1600. doi:10.1121/1.1603234

Bent, T., Buchwald, A., & Pisoni, D. B. (2009). Perceptual adaptation and intelligibility of multiple talkers for two types of degraded speech. *The Journal of the Acoustical Society of America*, *126*(5), 2660–9. doi:10.1121/1.3212930

Block, C. K., & Baldwin, C. L. (2010). Cloze probability and completion norms for 498 sentences: behavioral and neural validation using event-related potentials. *Behavior research methods*, *42*(3), 665–70. doi:10.3758/BRM.42.3.665

Boulenger, V., Hoen, M., Jacquier, C., & Meunier, F. (2011). Interplay between acoustic/phonetic and semantic processes during spoken sentence comprehension: An ERP study. *Brain and language*, *116*, 51–63. doi:10.1016/j.bandl.2010.09.011

Bradlow, A. R., & Alexander, J. A. (2007). Semantic and phonetic enhancements for speech-in-noise recognition by native and non-native listeners. *The Journal of the Acoustical Society of America*, *121*(4), 2339. doi:10.1121/1.2642103

Bradlow, A. R., & Bent, T. (2008). Perceptual adaptation to non-native speech. *Cognition*, *106*(2), 707–29. doi:10.1016/j.cognition.2007.04.005

Bradlow, A. R., Pisoni, D. B., Akahane-Yamada, R., & Tohkura, Y. (1997). Training Japanese listeners to identify English/r/and/l: IV. Some effects of perceptual learning on speech production. *The Journal of the …*, *101*(4), 2299–2310. Retrieved from http://scitation.aip.org/content/asa/journal/jasa/101/4/10.1121/1.418276

Broersma, M. (2012). Increased lexical activation and reduced competition in second- language listening. *Language and Cognitive Processes*, *27*(7-8), 1205–1224.

Broersma, M., & Cutler, A. (2011). Competition dynamics of second-language listening. *Quarterly journal of experimental psychology (2006)*, *64*(1), 74–95. doi:10.1080/17470218.2010.499174

Brown, C., & Hagoort, P. (1993). The processing nature of the N400: Evidence from masked priming. *Journal of cognitive neuroscience*, *5*(1), 34–44. doi:10.1162/jocn.1993.5.1.34

Brunellière, A., & Soto-Faraco, S. (2013). The speakers' accent shapes the listeners' phonological predictions during speech perception. *Brain and language*, *125*(1), 82–93. doi:10.1016/j.bandl.2013.01.007

Brysbaert, M., & New, B. (2009). Moving beyond Kucera and Francis: a critical evaluation of current word frequency norms and the introduction of a new and improved word frequency measure for American English. *Behavior research methods*, *41*(4), 977–90. doi:10.3758/BRM.41.4.977

Burgos, P., Cucchiarini, C., van Hout, R., & Strik, H. (2014). Phonology acquisition in Spanish learners of Dutch: error patterns in pronunciation. *Language Sciences*, *41*, 129–142. doi:10.1016/j.langsci.2013.08.015

Calandruccio, L., & Smiljanic, R. (2012). New Sentence Recognition Materials Developed Using a Basic Non-Native English Lexicon. *Journal of speech, language and hearing research*, *55*(October), 1342–1355. doi:10.1044/1092-4388(2012/11-0260)b

Chang, J. (2001) Chinese speakers. In Swan, M. & Smith, B. (Eds), *Learner English* (pp. 310-324), Cambridge, UK: Cambridge University Press

Clarke, C. M., & Garrett, M. F. (2004). Rapid adaptation to foreign-accented English. *The Journal of the Acoustical Society of America*, *116*(6), 3647. doi:10.1121/1.1815131

Clopper, C. G. (2012). Effects of dialect variation on the semantic predictability benefit. *Language and Cognitive Processes*, *27*(7-8), 1002–1020.

Clopper, C. G., & Bradlow, A. R. (2008). Perception of dialect variation in noise: intelligibility and classification. *Language and speech*, *51*(Pt 3), 175–98. Retrieved from http://www.pubmedcentral.nih.gov/articlerender.fcgi?artid=2744323&tool=pmcentrez&rendertype=abstract

Clopper, C. G., & Bradlow, A. R. (2009). Free classification of American English dialects by native and non-native listeners. *Journal of Phonetics*, *37*(4), 436–451. doi:10.1016/j.wocn.2009.07.004

Clopper, C.G., & Pisoni, D. (2007). Free classification of regional dialects of American English. *Journal of phonetics*, *35*, 421–438. doi:10.1016/j.wocn.2006.06.001

Coe, N. (2001). Speakers of Spanish and Catalan. In Swan, M. & Smith, B. (Eds), *Learner English* (pp. 195-213), Cambridge, UK: Cambridge University Press

Connolly, J. F., Phillips, N. A., Stewart, S. H., & Brake, W. G. (1992). Event-Retated Potential Sensitivity to Acoustic and Semantic Properties of Terminal Words in Sentences. *Brain and language*, *43*, 1–18.

Connolly, J.F., & Phillips, N. (1994). Event-related potential components reflect phonological and semantic processing of the terminal word of spoken sentences. *Journal of Cognitive Neuroscience*, *6*(3), 256–266. Retrieved from http://www.mitpressjournals.org/doi/abs/10.1162/jocn.1994.6.3.256

Cooke, M. (2006). A glimpsing model of speech perception in noise. *The Journal of the Acoustical Society of America*, *119*(3), 1562. doi:10.1121/1.2166600

Cooke, M., Garcia Lecumberri, M. L., & Barker, J. (2008). The foreign language cocktail party problem: Energetic and informational masking effects in non-native speech perception. *The Journal of the Acoustical Society of America*, *123*(1), 414–27. doi:10.1121/1.2804952

Crandell, C., & Smaldino, J. (1996). Speech perception in noise by children for whom English is a second language. *American Journal of Audiology*, *5*, 47–51. Retrieved from http://aja.asha.org/cgi/content/abstract/5/3/47

Dahan, D., Drucker, S. J., & Scarborough, R. A. (2008). Talker adaptation in speech perception: adjusting the signal or the representations? *Cognition*, *108*(3), 710–8. doi:10.1016/j.cognition.2008.06.003

Delorme, A. & Makeig, S. (2004) EEGLAB: an open source toolbox for analysis of single-trial EEG dynamics, *Journal of Neuroscience Methods* 134:9-21

Derwing, T., & Munro, M. J. (1997). Accent, intelligibility and comprehensibility: Evidence from four L1s. *Studies in Second Language Acquisition*, *20*, 1–16. Retrieved from http://scholar.google.com/scholar?hl=en&btnG=Search&q=intitle:Accent,+intelligibility+and+comprehensibility:+Evidence+from+four+L1s#2

Diaz, M., & Swaab, T. (2007). Electrophysiological differentiation of phonological and semantic integration in word and sentence contexts. *Brain research*, (1146), 85–100. Retrieved from http://www.ncbi.nlm.nih.gov/pmc/articles/PMC1853329/

Eisner, F., & McQueen, J. (2005). The specificity of perceptual learning in speech processing. *Perception & Psychophysics*, *67*(2), 224–238. Retrieved from http://link.springer.com/article/10.3758/BF03206487

Evanini, K., & Huang, B. (2012). Production of English vowels by speakers of Mandarin Chinese with prolonged exposure to English. In *Proceedings of Meetings on Acoustics* (Vol. 18, pp. 060004–060004). doi:10.1121/1.4793560

Evans, B. G., & Iverson, P. (2004). Vowel normalization for accent: An investigation of best exemplar locations in northern and southern British English sentences. *The Journal of the Acoustical Society of America*, *115*(1), 352. doi:10.1121/1.1635413

Evans, B. G., & Iverson, P. (2007). Plasticity in vowel perception and production: a study of accent change in young adults. *The Journal of the Acoustical Society of America*, *121*(6), 3814–26. doi:10.1121/1.2722209

Ferragne, E., & Pellegrino, F. (2010). Formant frequencies of vowels in 13 accents of the British Isles. *Journal of the International Phonetic Association* (Vol. 40, p. 1). doi:10.1017/S0025100309990247

Filik, R., & Leuthold, H. (2013). The role of character-based knowledge in online narrative comprehension: evidence from eye movements and ERPs. *Brain research*, *1506*, 94–104. doi:10.1016/j.brainres.2013.02.017

Flege, J. E., Schirru, C., & MacKay, I. R. A. (2003). Interaction between the native and second language phonetic subsystems. *Speech Communication*, *40*(4), 467–491. doi:10.1016/S0167-6393(02)00128-0

Flege, J.E., Bohn, O., & Jang, S. (1997). Effects of experience on non-native speakers' production and perception of English vowels. *Journal of phonetics*, *25*, 437–470. Retrieved from http://www.sciencedirect.com/science/article/pii/S0095447097900528

Floccia, C., Butler, J., Goslin, J., & Ellis, L. (2009). Regional and foreign accent processing in English: can listeners adapt? *Journal of Psycholinguistic Research*, *38*(4), 379–412. doi:10.1007/s10936-008-9097-8

Floccia, C., Goslin, J., Girard, F., & Konopczynski, G. (2006). Does a regional accent perturb speech processing? *Journal of experimental psychology. Human perception and performance*, *32*(5), 1276–93. doi:10.1037/0096-1523.32.5.1276

Gao, Y., Low, R., Jin, P., & Sweller, J. (2013). Effects of speaker variability on learning foreign-accented English for EFL learners. *Journal of Educational Psychology*, *105*(3), 649–665. doi:10.1037/a0033024

García Lecumberri, M. L., Cooke, M., & Cutler, A. (2010). Non-native speech perception in adverse conditions: A review. *Speech Communication*, *52*(11-12), 864–886. doi:10.1016/j.specom.2010.08.014

Goslin, J., Duffy, H., & Floccia, C. (2012). An ERP investigation of regional and foreign accent processing. *Brain and language*, *122*(2), 92–102. doi:10.1016/j.bandl.2012.04.017

Hahne, A. (2001). What's different in second-language processing? Evidence from event-related brain potentials. *Journal of Psycholinguistic Research*, *30*(3), 251–66. Retrieved from http://www.ncbi.nlm.nih.gov/pubmed/11523274

Hahne, A., & Friederici, A. D. (2001). Processing a second language: late learners' comprehension mechanisms as revealed by event-related brain potentials. *Bilingualism: Language and Cognition*, *4*(02). doi:10.1017/S1366728901000232

Hanulíková, A., van Alphen, P. M., van Gogh, M. M., & Weber, A. (2012). When One Person's Mistake Is Another's Standard Usage: The Effect of Foreign Accent on Syntactic Processing. *Journal of cognitive neuroscience*, *24*(4), 878–887. Retrieved from http://www.mitpressjournals.org/doi/abs/10.1162/jocn_a_00103

Hay, J., Nolan, A., & Drager, K. (2006). From fush to feesh: Exemplar priming in speech perception. *The Linguistic Review*, *23*(3), 351–379. doi:10.1515/TLR.2006.014

Hayes-Harb, R., & Watzinger-Tharp, J. (2012). Accent, Intelligibility, and the Role of the Listener: Perceptions of English-Accented German by Native German Speakers. *Foreign Language Annals*, *45*(2), 260–282. doi:10.111/j.1944-9720.2012.01190.x.FOREIGN

Hayes-Harb, R., Smith, B. L., Bent, T., & Bradlow, A. R. (2008). The interlanguage speech intelligibility benefit for native speakers of Mandarin: Production and perception of English word-final voicing contrasts. *Journal of Phonetics*, *36*(4), 664–679. doi:10.1016/j.wocn.2008.04.002

Hintzman, D. L. (1986). "Schema abstraction" in a multiple-trace memory model. Psychological Review, 93, 411–428.

HTK Hidden Markov Modelling toolkit (1989). http://htk.eng.cam.ac.uk/

Hu, G., & Lindemann, S. (2009). Stereotypes of Cantonese English, apparent native/non-native status, and their effect on non-native English speakers' perception. *Journal of Multilingual and Multicultural Development*, *30*(3), 253–269. doi:10.1080/01434630802651677

Huckvale, M. (2004). ACCDIST: a Metric for Comparing Speakers' Accents. In *Proceedings of the International Conference on Spoken Language Processing*. Jeju, Korea. Retrieved from http://discovery.ucl.ac.uk/12139/1/12139.pdf

Huckvale, M. (2007). ACCDIST: an accent similarity metric for accent recognition and diagnosis. In Miller, C. (Ed.) *Speaker Classification II.* Lecture Notes in Computer Science series. Series edited by Carbonell, J., Siekmann, J., Berlin: Springer, 4441st edition, 258-275. ISBN: 978-3-540-74121-3

IEEE (1969). IEEE recommended practice for speech quality measurements. *IEEE Transactions on Audio and Electroacoustics*, *AU-17*(3), 225–246. Retrieved from http://scholar.google.com/scholar?hl=en&btnG=Search&q=intitle:IEEE+Recommended+Practice+for+Speech+Quality+Meausrements#0

Imai, S., Walley, A. C., & Flege, J. E. (2005). Lexical frequency and neighborhood density effects on the recognition of native and Spanish-accented words by native English and Spanish listeners. *The Journal of the Acoustical Society of America*, *117*(2), 896. doi:10.1121/1.1823291

Johnson, K. (2006). Resonance in an exemplar-based lexicon: The emergence of social identity and phonology. *Journal of Phonetics*, *34*(4), 485–499. doi:10.1016/j.wocn.2005.08.004

Kalikow, D. N., Stevens, K. N., & Elliott, L. L. (1977). Development of a test of speech intelligibility in noise using sentence materials with controlled word predictability. *Journal of the Acoustical Society of America*, *61*(5), 1337–1351.

Kraljic, T., Brennan, S. E., & Samuel, A. G. (2008). Accommodating variation: dialects, idiolects, and speech processing. *Cognition*, *107*(1), 54–81. doi:10.1016/j.cognition.2007.07.013

Kutas, M., & Federmeier, K.D. (2000). Electrophysiology reveals semantic memory use in language comprehension. *Trends in cognitive sciences*, *4*(12), 463–470. Retrieved from http://www.ncbi.nlm.nih.gov/pubmed/11115760

Kutas, M., & Federmeier, K. D. (2011). Thirty years and counting: finding meaning in the N400 component of the event-related brain potential (ERP). *Annual review of psychology*, *62*(August), 621–47. doi:10.1146/annurev.psych.093008.131123

Kutas, M., & Hillyard, S. (1984). Brain potentials during reading reflect word expectancy and semantic association. *Nature*, *307*, 161 – 163. Retrieved from http://www.nature.com/nature/journal/v307/n5947/abs/307161a0.html

Lee, J.-A., (2001). Korean speakers. In Swan, M. & Smith, B. (Eds), *Learner English* (pp. 325-342), Cambridge, UK: Cambridge University Press

Lev-Ari, S., & Keysar, B. (2012). Less-Detailed Representation of Non-Native Language: Why Non-Native Speakers' Stories Seem More Vague. *Discourse Processes*, *49*(7), 523–538. doi:10.1080/0163853X.2012.698493

Litvak, V., Mattout, J., Kiebel, S., Phillips, C., Henson, R., Kilner, J., Barnes, G., Oostenveld, R., Daunizeau, J., Flandin, G., Penny, W., Friston, K. (2011). EEG and MEG data analysis in SPM8. *Computational intelligence and neuroscience*, *2011*, 852961. doi:10.1155/2011/852961

Marian, V., Bartolotti, J., Chabal, S., & Shook, A. (2012). CLEARPOND: cross-linguistic easy-access resource for phonological and orthographic neighborhood densities. *PloS one*, *7*(8), e43230. doi:10.1371/journal.pone.0043230

Martin, C. D., Thierry, G., Kuipers, J.-R., Boutonnet, B., Foucart, A., & Costa, A. (2013). Bilinguals reading in their second language do not predict upcoming words as native readers do. *Journal of Memory and Language*, *69*(4), 574–588. doi:10.1016/j.jml.2013.08.001

Martínez-Celdrán, E., Fernández-Planas, A. M., & Carrera-Sabaté, J. (2003). Castilian Spanish. *Journal of the International Phonetic Association*, *33*(2), 255–259. doi:10.1017/S0025100303001373

Mattys, S. L., Davis, M. H., Bradlow, A. R., & Scott, S. K. (2012). Speech recognition in adverse conditions : A review. *Language and Cognitive Processes*, *27*(7-8), 953–978.

Maye, J., Aslin, R. N., & Tanenhaus, M. K. (2008). The weckud wetch of the wast: lexical adaptation to a novel accent. *Cognitive science*, *32*(3), 543–62. doi:10.1080/03640210802035357

Mayo, L. H., Florentine, M., & Buus, S. (1997). Age of Second-Language Acquisition and Perception of Speech in Noise. *Journal of Speech, Language and Hearing research*, *40*, 686–693.

McQueen, J. M., & Huettig, F. (2012). Changing only the probability that spoken words will be distorted changes how they are recognized. *The Journal of the Acoustical Society of America*, *131*(1), 509–17. doi:10.1121/1.3664087

McQueen, J. M., Cutler, A., & Norris, D. (2006). Phonological abstraction in the mental lexicon. *Cognitive science*, *30*(6), 1113–26. doi:10.1207/s15516709cog0000_79

Munro, M., & Derwing, T. (1995). Processing time, accent and comprehensibility in the perception of native and foreign-accented speech. *Language and Speech*, *38*(3), 289–306. doi:10.1177/002383099503800305

Nakagawa, S., & Schielzeth, H. (2013). A general and simple method for obtaining R 2 from generalized linear mixed-effects models. (R. B. O'Hara, Ed.)*Methods in Ecology and Evolution*, *4*(2), 133–142. doi:10.1111/j.2041-210x.2012.00261.x

Newman, A. J., Tremblay, A., Nichols, E. S., Neville, H. J., & Ullman, M. T. (2012). The influence of language proficiency on lexical semantic processing in native and late learners of English. *Journal of cognitive neuroscience*, *24*(5), 1205–23. doi:10.1162/jocn_a_00143

Newman, R. L., & Connolly, J. F. (2009). Electrophysiological markers of pre-lexical speech processing: evidence for bottom-up and top-down effects on spoken word processing. *Biological psychology*, *80*(1), 114–21. doi:10.1016/j.biopsycho.2008.04.008

Newman, R. L., Connolly, J. F., Service, E., & McIvor, K. (2003). Influence of phonological expectations during a phoneme deletion task: evidence from event-related brain potentials. *Psychophysiology*, *40*(4), 640–7. Retrieved from http://www.ncbi.nlm.nih.gov/pubmed/14570171

Niedzielski, N. (1999). The Effect of Social Information on the Perception of Sociolinguistic Variables. *Journal of Language and Social Psychology*, *18*(1), 62–85. doi:10.1177/0261927X99018001005

Norris, D. (1994). Shortlist: a connectionist model of continuous speech recognition. *Cognition*, *52*(3), 189–234. doi:10.1016/0010-0277(94)90043-4

Norris, D., & McQueen, J. M. (2008). Shortlist B: a Bayesian model of continuous speech recognition. *Psychological review*, *115*(2), 357–95. doi:10.1037/0033-295X.115.2.357

Norris, D., McQueen, J. M., & Cutler, A. (2000). Merging information in speech recognition: feedback is never necessary. *The Behavioral and brain sciences*, *23*(3), 299–325; discussion 325–70. Retrieved from http://www.ncbi.nlm.nih.gov/pubmed/11301575

Norris, D., McQueen, J. M., & Cutler, A. (2003). Perceptual learning in speech. *Cognitive Psychology*, *47*(2), 204–238. doi:10.1016/S0010-0285(03)00006-9

North, B., Ortega, A. & Sheehan, S. (2010). *Core Inventory for General English.* London, UK: British Council & EAQUALS

Obleser, J., & Kotz, S. a. (2011). Multiple brain signatures of integration in the comprehension of degraded speech. *NeuroImage*, *55*(2), 713–23. doi:10.1016/j.neuroimage.2010.12.020

Oder, A. L., Clopper, C. G., & Ferguson, S. H. (2013). Effects of dialect on vowel acoustics and intelligibility. *Journal of the International Phonetic Association*, *43*(01), 23–35. doi:10.1017/S0025100312000333

Pinet, M. (2012) Accent effects on the recognition of speech in noise: Second-language proficiency, accents similarity and adaptation, unpublished PhD thesis.

Pinet, M., & Iverson, P. (2010). Talker-listener accent interactions in speech-in-noise recognition: effects of prosodic manipulation as a function of language experience. *The Journal of the Acoustical Society of America*, *128*(3), 1357–65. doi:10.1121/1.3466857

Pinet, M., Iverson, P., & Huckvale, M. (2011). Second-language experience and speech-in-noise recognition: effects of talker-listener accent similarity. *The Journal of the Acoustical Society of America*, *130*(3), 1653–62. doi:10.1121/1.3613698

Reinisch, E., & Holt, L. L. (2014). Lexically guided phonetic retuning of foreign-accented speech and its generalization. *Journal of experimental psychology. Human perception and performance*, *40*(2), 539–55. doi:10.1037/a0034409

Reinisch, E., & Weber, A. (2012). Adapting to suprasegmental lexical stress errors in foreign-accented speech. *The Journal of the Acoustical Society of America*, *132*(2), 1165–76. doi:10.1121/1.4730884

Rimikis, S., Smiljanic, R., & Calandruccio, L. (2013). Nonnative English Speaker Performance on the Basic English Lexicon (BEL) Sentences. *Journal of Speech, Language and Hearing research*, *56*(June), 792–804. doi:10.1044/1092-4388(2012/12-0178)materials

Romero-Rivas, C., Martin, C. D., & Costa, A. (In press). On-line adaptation in spoken sentence comprehension: Processing foreign-accented speech. *Cortex*.

Rubin, D. L. (1992). Nonlanguage factors affecting undergraduates' judgments of nonnative English-speaking teaching assistants. *Research in Higher Education*, *33*(4), 511–531. doi:10.1007/BF00973770

Schmid, P. M., & Yeni-Komshian, G. H. (1999). The effects of speaker accent and target predictability on perception of mispronunciations. *Journal of Speech, Language, and Hearing Research*, *42*, 56–64.

Scobbie, J., Hewlett, N. & Turk, A. (1999). Standard English in Edinburgh and Glasgow: the Scottish vwel length rule revealed. In Foulkes, P. & Docherty, G. (Eds) *Urban Voices, variation and change in British accents*. Chapter 13, pp 230-245. London, UK: Arnold

Shi, L.-F. (2012). Contribution of Linguistic Variables to Bilingual Listeners' Perception of Degraded English Sentences. *Journal of Speech, Language and Hearing Research*, *55*(February), 10–15. doi:10.1044/1092-4388(2011/10-0240)

Shi, L.-F. (2014). Measuring effectiveness of semantic cues in degraded English sentences in non-native listeners. *International journal of audiology*, *53*(1), 30–9. doi:10.3109/14992027.2013.825052

Shin, D.-J., & Iverson, P. (2013). Training Korean second language speakers on English vowels and prosody. In *Proceedings of Meetings on Acoustics* (Vol. 19, 060048). doi:10.1121/1.4801046

Smiljanić, R., & Bradlow, A. R. (2011). Bidirectional clear speech perception benefit for native and high-proficiency non-native talkers and listeners: intelligibility and accentedness. *The Journal of the Acoustical Society of America*, *130*(6), 4020–31. doi:10.1121/1.3652882

Smiljanić, R., Sheft, S., Chandrasekaran, B., & Shafiro, V. (2013). Effect of speech clarity on perception of interrupted meaningful and anomalous sentences. In *Proceedings of Meetings on Acoustics* (Vol. 19, 060109). doi:10.1121/1.4799539

Smith, B. (2001). Arabic speakers. In Swan, M. & Smith, B. (Eds), *Learner English* (pp. 195-213), Cambridge, UK: Cambridge University Press

Smith, R., Holmes-Elliott, S., Pettinato, M., & Knight, R.-A. (2014). Cross-accent intelligibility of speech in noise: long-term familiarity and short-term familiarization. *Quarterly Journal of Experimental Psychology*, *67*(3), 590–608. doi:10.1080/17470218.2013.822009

Stacey, P., & Summerfield, A. Q. (2007). Effectiveness of computer-based auditory training in improving the perception of noise-vocoded speech. *The Journal of the Acoustical Society …*, *121*(May), 2923–2935. doi:10.1121/1.2713668

Stibbard, R. M., & Lee, J.-I. (2006). Evidence against the mismatched interlanguage speech intelligibility benefit hypothesis. *The Journal of the Acoustical Society of America*, *120*(1), 433. doi:10.1121/1.2203595

Strauß, A., Kotz, S. A., & Obleser, J. (2013). Narrowed Expectancies under Degraded Speech : Revisiting the N400. *Journal of Cognitive Neuroscience*, *25*(8), 1383–1395. doi:10.1162/jocn

Sumner, M., & Samuel, A. G. (2009). The effect of experience on the perception and representation of dialect variants. *Journal of Memory and Language*, *60*(4), 487–501. doi:10.1016/j.jml.2009.01.001

Tabri, D., Abou Chacra, K. M. S., & Pring, T. (2011). Speech perception in noise by monolingual, bilingual and trilingual listeners. *International journal of language & communication disorders / Royal College of Speech & Language Therapists*, *46*(4), 411–22. doi:10.3109/13682822.2010.519372

Trude, A. M., Tremblay, A., & Brown-Schmidt, S. (2013). Limitations on adaptation to foreign accents. *Journal of memory and language*, *69*(3), 349–367. doi:10.1016/j.jml.2013.05.002

University of Cambridge ESOL Examinations (2012). *Vocabulary List: Preliminary English Test.* Accessed from: www.cambridgeenglish.org/images/84669-vocabulary-list.pdf

Van Berkum, J. J. A., van den Brink, D., Tesink, C. M. J. Y., Kos, M., & Hagoort, P. (2008). The Neural Integration of Speaker and Message. *Journal of cognitive neuroscience*, *20*(4), 580–591.

Van Engen, K. J. (2010). Similarity and familiarity: Second language sentence recognition in first- and second-language multi-talker babble. *Speech communication*, *52*(11-12), 943–953. doi:10.1016/j.specom.2010.05.002

Van Engen, K. J., Chandrasekaran, B., & Smiljanić, R. (2012). Effects of speech clarity on recognition memory for spoken sentences. *PloS one*, *7*(9), e43753. doi:10.1371/journal.pone.0043753

Van Wijngaarden, S. J. (2001). Intelligibility of native and non-native Dutch speech. *Speech Communication*, *35*(1-2), 103–113. doi:10.1016/S0167-6393(00)00098-4

Van Wijngaarden, S. J., Steeneken, H. J. M., & Houtgast, T. (2002). Quantifying the intelligibility of speech in noise for non-native listeners. *The Journal of the Acoustical Society of America*, *111*(4), 1906. doi:10.1121/1.1456928

Vergin, R., O'Shaughnessy, D., & Farhat, A. (1999). Generalized Mel Frequency Cepstral Coefficientsfor Large-Vocabulary Speaker-Independent Continuous-Speech Recognition. *IEEE Transactions on Audio and Electroacoustics*, *7*(5), 525–532.

Wade, T., Jongman, A., & Sereno, J. (2007). Effects of Acoustic Variability in the Perceptual Learning of Non-Native-Accented Speech Sounds. *Phonetica*, *64*(2-3),

Walter, C. (2001). French speakers. In Swan, M. & Smith, B. (Eds), *Learner English* (pp. 52-72), Cambridge, UK: Cambridge University Press

Weber-Fox, C. M., & Neville, H. J. (1996). Maturational Constraints on Functional Specializations for Language Processing: ERP and Behavioral Evidence in Bilingual Speakers. *Journal of cognitive neuroscience*, *8*(3), 231–56. doi:10.1162/jocn.1996.8.3.231

Weber, A., & Cutler, A. (2004). Lexical competition in non-native spoken-word recognition. *Journal of Memory and Language*, *50*(1), 1–25. doi:10.1016/S0749-596X(03)00105-0

Weber, A., Broersma, M., & Aoyagi, M. (2011). Spoken-word recognition in foreign-accented speech by L2 listeners. *Journal of Phonetics*, *39*(4), 479–491. doi:10.1016/j.wocn.2010.12.004

Wells, J. C. (1982a). *Accents of English: An Introduction*. Cambridge, UK: Cambridge University Press

Wells, J. C. (1982b). *Accents of English: The British Isles*. Cambridge, UK: Cambridge University Press

Wilson, M.D. (1988) The MRC Psycholinguistic Database: Machine Readable Dictionary, Version 2. *Behavioural Research Methods, Instruments and Computers*, **20**(1), 6-11.

Witteman, M. J., Weber, A., & McQueen, J. M. (2013). Foreign accent strength and listener familiarity with an accent codetermine speed of perceptual adaptation. *Attention, perception & psychophysics*. doi:10.3758/s13414-012-0404-y

Wright, R., & Souza, P. (2012). Comparing Identification of Standardized and Regionally Valid Vowels. *Journal of Speech, Language, and Hearing Research*, *55*(February 2012), 182–193. doi:10.1044/1092-4388(2011/10-0278)b

Xie, X., & Fowler, C. a. (2013). Listening with a foreign-accent: The interlanguage speech intelligibility benefit in Mandarin speakers of English. *Journal of Phonetics*, *41*(5), 369–378. doi:10.1016/j.wocn.2013.06.003

Ying, J., Shaw, J., & Best, C. (2013). L2 English learners' recognition of words spoken in familiar versus unfamiliar English accents. In *INTERSPEECH 2013* (pp. 2108–2112)

Appendix 1: Sentence Recognition Materials

Predictable Sentences			Neutral Sentences			Anomalous Sentences		
A0101	Warm **sweaters** are made from **wool** from a	**sheep**	B0101	**Farms** have lots of **animals** like	**sheep**	C0101	Warm **sweaters** are made from **wool** from a	**cruise**
A0102	The **chef** used a lot of **salt** and	**pepper**	B0102	The **chef cooked** using a lot of	**pepper**	C0102	The **chef** used a lot of **salt** and	**novels**
A0103	A **large church** is called a	**cathedral**	B0103	The **large building** over there is a	**cathedral**	C0103	A **large church** is called a	**diploma**
A0104	For **breakfast** children **eat toast** or	**cereal**	B0104	For **dinner students** sometimes **eat**	**cereal**	C0104	For **breakfast** children **eat toast** or	**literature**
A0105	Last **night** we **saw** the **stars** and the	**moon**	B0105	Some **people want** to **go** to the	**moon**	C0105	Last **night** we **saw** the **stars** and the	**hole**
A0106	To **earn money** you need a	**job**	B0106	To **be happy** you need a	**job**	C0106	To **earn money** you need a	**talk**
A0107	My **children** enjoy **singing** simple	**songs**	B0107	The **students** enjoy **hearing** simple	**songs**	C0107	My **children** enjoy **singing** simple	**books**
A0108	**Beef** and **chicken** are types of	**meat**	B0108	The **man** is **choosing** some nice	**meat**	C0108	**Beef** and **chicken** are types of	**crew**
A0109	The **clothes** are **cheap** because they are **on**	**sale**	B0109	Students **get** most of their **clothes** in the	**sale**	C0109	The **clothes** are **cheap** because they are **on**	**dirt**
A0110	**Camels** usually **live** in the	**desert**	B0110	**People** don't often **live** in the	**desert**	C0110	**Camels** usually **live** in the	**project**
A0111	The **light hangs** from the	**ceiling**	B0111	The **fly** is **walking** on the	**ceiling**	C0111	The **light hangs** from the	**ladder**
A0112	**Remote controls** can **change** the **TV**	**channel**	B0112	The **children** want to **watch** their **favourite**	**channel**	C0112	**Remote controls** can **change** the **TV**	**quarter**
A0113	Keep your **drink cold** with some	**ice**	B0113	Please can you **give** me **some**	**ice**	C0113	Keep your **drink cold** with some	**age**
A0114	**Beef** and **milk** come from	**cows**	B0114	The man **draws pictures** of	**cows**	C0114	**Beef** and **milk** come from	**bays**
A0115	He **parks** his **cars** in his	**garage**	B0115	He **keeps** his **stuff** in the	**garage**	C0115	He **parks** his **cars** in his	**member**
A0116	She usually **wakes up early** in the	**morning**	B0116	He usually **does** his **homework** in the	**morning**	C0116	She usually **wakes up early** in the	**lady**
A0117	**Cars** and **factories** can cause **air**	**pollution**	B0117	In **some cities** there is **lots** of	**pollution**	C0117	**Cars** and **factories** can *cause* **air**	**gymnastics**
A0118	Your **aunt** and **uncle's children** are your	**cousins**	B0118	My **children** like to **play** with their	**cousins**	C0118	Your **aunt** and **uncle's children** are your	**programs**
A0119	The **shop assistant served** all the	**customers**	B0119	The **angry man talked** to the	**customers**	C0119	The **shop assistant served** all the	**benefits**
A0120	The **north** is **colder** than the	**south**	B0120	The **food** is **better** in the	**south**	C0120	The **north** is **colder** than the	**pants**
A0121	The **passengers** thanked the **bus**	**driver**	B0121	The **visitors** thanked the **kind**	**driver**	C0121	The **passengers** thanked the **bus**	**soldier**
A0122	My **hair** was too **long** so I got a	**haircut**	B0122	I don't **like** going to **get** a	**haircut**	C0122	My **hair** was too **long** so I got a	**technique**

A0123	I went to the **post office** to **buy** a	**stamp**
A0124	**After dinner** we asked the **waiter** for the	**bill**
A0201	You can see **lions** and **monkeys** at the	**zoo**
A0202	**Flats don't** have **gardens** but they have	**balconies**
A0203	The **sheep** had two **cute little**	**lambs**
A0204	**Football** and **running** are types of	**sport**
A0205	The **sun** can **burn** your	**skin**
A0206	There are three **pictures hanging** on the	**wall**
A0207	The **opposite** of **midday** is	**midnight**
A0208	**Sick** people should **see** a	**doctor**
A0209	You should **put** your **rubbish** in the	**bin**
A0210	A ***T-Rex*** was a **big**	**dinosaur**
A0211	The **chef cooks** in the **hot**	**kitchen**
A0212	When there is **snow** in the **mountains** we go	**skiing**
A0213	**Spring** and **summer** are two of the **four**	**seasons**
A0214	He **opened** the **lock** with a	**key**
A0215	**Zebras** have many **black** and **white**	**stripes**
A0216	Eat **breakfast** in the **morning** and **dinner** in the	**evening**
A0217	The **day after today** is called	**tomorrow**
A0218	She **packed** her **holiday clothes** in the	**suitcase**
A0219	We **crossed** the **river** by walking **over** the	**bridge**
A0220	I always **look up new words** in a	**dictionary**
A0221	We went to **visit** our **grandfather** and	**grandmother**
A0222	Children like **pasta** with **tomato**	**sauce**
A0223	He **rides** through the **desert** on a	**camel**

B0123	I went to the **supermarket** to **buy** a	**stamp**
B0124	**After** we **finished** we **waited** for the	**bill**
B0201	You can **have** lots of **fun** at the	**zoo**
B0202	People sometimes buy **flats** with **big**	**balconies**
B0203	The **cutest baby animals** are	**lambs**
B0204	On **Sundays** I often **do** some	**sport**
B0205	**Put** the **cream** on your	**skin**
B0206	There are many **dirty marks** on the	**wall**
B0207	The **quietest time** of **day** is	**midnight**
B0208	Some **students** will **become** a	**doctor**
B0209	You should **put** your **tickets** in the	**bin**
B0210	That **animal** was a **big**	**dinosaur**
B0211	The **boy plays** in the **big**	**kitchen**
B0212	When it is **cold** in the **winter** we like	**skiing**
B0213	In some **countries** there are **only two**	**seasons**
B0214	He could not **find** the **correct**	**key**
B0215	Some **animals** have **big black**	**stripes**
B0216	Some **employees** have to **work** in the	**evening**
B0217	We are **going** to the **dentist**	**tomorrow**
B0218	She **put** all her **winter clothes** in the	**suitcase**
B0219	We **discussed** the **modern** and **expensive**	**bridge**
B0220	I always **correct mistakes** with a	**dictionary**
B0221	Every week the girl **visits** her **lonely**	**grandmother**
B0222	Children like **burgers** with **delicious**	**sauce**
B0223	He often goes to the **market** to **buy** a	**camel**

C0123	I went to the **post office** to **buy** a	**quiz**
C0124	**After dinner** we asked the **waiter** for the	**cold**
C0201	You can see **lions** and **monkeys** at the	**tap**
C0202	**Flats don't** have **gardens** but they have	**lotteries**
C0203	The **sheep** had two **cute little**	**pills**
C0204	**Football** and **running** are types of	**range**
C0205	The **sun** can **burn** your	**paint**
C0206	There are three **pictures hanging** on the	**pain**
C0207	The **opposite** of **midday** is	**knowledge**
C0208	**Sick** people should **see** a	**business**
C0209	You should **put** your **rubbish** in the	**rail**
C0210	A ***T-Rex*** was a **big**	**coconut**
C0211	The **chef cooks** in the **hot**	**station**
C0212	When there is **snow** in the **mountains** we go	**banking**
C0213	**Spring** and **summer** are two of the **four**	**warnings**
C0214	He **opened** the **lock** with a	**pop**
C0215	**Zebras** have many **black** and **white**	**flutes**
C0216	Eat breakfast in the **morning** and **dinner** in the	**figure**
C0217	The **day after today** is called	**professor**
C0218	She **packed** her **holiday clothes** in the	**peanut**
C0219	We **crossed** the **river** by walking **over** the	**throat**
C0220	I always **look up new words** in a	**babysitter**
C0221	We went to **visit** our **grandfather** and	**property**
C0222	Children like **pasta** with **tomato**	**noon**
C0223	He **rides** through the **desert** on a	**disco**

A0224	**Turn** it **on** using the **remote**	**control**
A0301	In **tennis** you **hit** the **ball** with a	**racket**
A0302	A **shape** with **no corners** is called a	**circle**
A0303	Every **country** is **run** by the	**government**
A0304	When it is **raining** you should **carry** your	**umbrella**
A0305	We **knocked** on the **front**	**door**
A0306	There are **sixty seconds** in a	**minute**
A0307	In the **day** we get **light** from the	**sun**
A0308	**Bosses** should be **kind** to their	**employees**
A0309	**February** is always the **shortest**	**month**
A0310	**Giraffes** have **spots** and a **long**	**neck**
A0311	The **mother** and **father** have four	**children**
A0312	After his **shower** he got **dried** with a	**towel**
A0313	Every **day** I **write** my **thoughts** in my	**diary**
A0314	**Tourists read** about the **sights** in their	**guidebook**
A0315	The **footballer kicked** the **round**	**ball**
A0316	**Trousers** and **skirts** are types of	**clothes**
A0317	**Eggs** come from a **duck** or a	**chicken**
A0318	**Doctors** try to **cure dangerous**	**diseases**
A0319	There was lots of **rain** and **lightning** during the	**storm**
A0320	The **bride** is **wearing** a **white**	**dress**
A0321	My **shoes** are made of **brown**	**leather**
A0322	**Athletes** get **instructions** from their	**coach**
A0323	**Friday** is my favourite **day** of the	**week**
A0324	**Eating quickly** will give you a **stomach**	**ache**
A0401	The **car** has **space** for a **driver** and three	**passengers**

B0224	You must **press** the **button** on the	**control**
B0301	In some **games** you **play using** a	**racket**
B0302	That **special thing** is called a	**circle**
B0303	That **country** will soon have a **new**	**government**
B0304	When you have time you should **buy** a **better**	**umbrella**
B0305	We often **stopped** at the **big**	**door**
B0306	He **went** into the **house** for a	**minute**
B0307	Every **day** we can **see** the	**sun**
B0308	The **old manager** has lots of	**employees**
B0309	**This** is always the **shortest**	**month**
B0310	That **manager** has a **long**	**neck**
B0311	The nurse doesn't **want** to **have** any	**children**
B0312	Before he **went** he **looked for** his	**towel**
B0313	**Sometimes** I **put** my **ideas** in my	**diary**
B0314	**People read** about the **town** in their	**guidebook**
B0315	The **athlete held** the really **heavy**	**ball**
B0316	Some **people** do not have **nice**	**clothes**
B0317	Her **family** like **meat** from a	**chicken**
B0318	**Scientists** try hard to **stop different**	**diseases**
B0319	In the **summer** we had a very **big**	**storm**
B0320	That **teacher** is **wearing** a **nice**	**dress**
B0321	My **coat** is made of **nice**	**leather**
B0322	The **athlete** needs a **new**	**coach**
B0323	I want to **visit** them **for** a	**week**
B0324	**Playing** the **guitar** can make my **hand**	**ache**
B0401	The **train carriage** has **space** for all the	**passengers**

C0224	**Turn** it **on** using the **remote**	**report**
C0301	In **tennis** you **hit** the **ball** with a	**puzzle**
C0302	A **shape** with **no corners** is called a	**taxi**
C0303	Every **country** is **run** by the	**memory**
C0304	When it is **raining** you should **carry** your	**accountant**
C0305	We **knocked** on the **front**	**check**
C0306	There are **sixty seconds** in a	**human**
C0307	In the **day** we get **light** from the	**fair**
C0308	**Bosses** should be **kind** to their	**adventures**
C0309	**February** is always the **shortest**	**gift**
C0310	**Giraffes** have **spots** and a **long**	**form**
C0311	The **mother** and **father** have four	**pieces**
C0312	After his **shower** he got **dried** with a	**chat**
C0313	Every **day** I **write** my **thoughts** in my	**relative**
C0314	**Tourists read** about the **sights** in their	**snowboard**
C0315	The **footballer kicked** the **round**	**shop**
C0316	**Trousers** and **skirts** are types of	**steps**
C0317	**Eggs** come from a **duck** or a	**boyfriend**
C0318	**Doctors** try to **cure dangerous**	**pianos**
C0319	There was lots of **rain** and **lightning** during the	**cliff**
C0320	The **bride** is **wearing** a **white**	**club**
C0321	My **shoes** are made of **brown**	**hockey**
C0322	**Athletes** get **instructions** from their	**block**
C0323	**Friday** is my favourite **day** of the	**guess**
C0324	**Eating quickly** will give you a **stomach**	**oil**
C0401	The **car** has **space** for a **driver** and three	**signatures**

A0402	I **get** my **hair cut** by my favourite	**hairdresser**
A0403	In **winter** there can be very **cold**	**weather**
A0404	I **keep** my **wallet** in my **trouser**	**pocket**
A0405	She **smelled** the **flowers** using her	**nose**
A0406	Your **sister's son** is your	**nephew**
A0407	Your **brother's daughter** is your	**niece**
A0408	The **boss** of a **ship** is called the	**captain**
A0409	You **wear shoes** on your	**feet**
A0410	The **athlete** is a **very fast**	**runner**
A0411	A **book** about **someone's life** is called a	**biography**
A0412	**Apples** and **bananas** are types of	**fruit**
A0413	The **popular** girl has **lots of**	**friends**
A0414	They went to **watch** a **play** at the	**theatre**
A0415	He **drove too fast** and had an	**accident**
A0416	A **black** and **white horse** is a	**zebra**
A0417	We **work** during the **week** and **relax** at the	**weekend**
A0418	They gave a **prize** to the **competition**	**winner**
A0419	There are **eleven players** on a **football**	**team**
A0420	The **baseball player hit** the **ball** with his	**bat**
A0421	***Magicians*** know a lot of **card**	**tricks**
A0422	***Everest*** is the world's **highest**	**mountain**
A0423	There are **hundreds** of **countries** in the	**world**
A0424	The **queen** is **married** to the	**king**
A0501	My **phone** doesn't **work** because it's **run out** of	**battery**
A0502	These **clothes** were **made** by the **fashion**	**designer**

B0402	The **teenager admires** her **favourite**	**hairdresser**
B0403	In my **city** we have very **good**	**weather**
B0404	I **put** the **pencil** in my **little**	**pocket**
B0405	The **woman** has a really **interesting**	**nose**
B0406	Please **promise** to **help** your	**nephew**
B0407	My **kids** are **playing** with my	**niece**
B0408	The **man** in the **corner** is the	**captain**
B0409	You **have dirt** on your	**feet**
B0410	The **teacher** is a **very fast**	**runner**
B0411	The **story** of his **life** would be a **good**	**biography**
B0412	Every day I **have** a **piece** of	**fruit**
B0413	The **quiet** woman has a **lot of**	**friends**
B0414	They went to **meet** a **friend** at the	**theatre**
B0415	He **knew** the woman **had** an	**accident**
B0416	At the **zoo** the **boy saw** a	**zebra**
B0417	We **work** hard **sometimes** and **relax** at the	**weekend**
B0418	They gave a **gift** to the very **lucky**	**winner**
B0419	There are **interesting people** on the **famous**	**team**
B0420	The lazy **player forgot** to **bring** his	**bat**
B0421	**Children** know a lot of **clever**	**tricks**
B0422	My **country** only has **one**	**mountain**
B0423	There are **lots** of **people** in the	**world**
B0424	The **man** is **related** to the	**king**
B0501	My **laptop** doesn't **work** because it's got **no**	**battery**
B0502	All of my **clothes** were **made** by the **same**	**designer**

C0402	I **get** my **hair cut** by my favourite	**pineapple**
C0403	In **winter** there can be very **cold**	**candy**
C0404	I **keep** my **wallet** in my **trouser**	**lesson**
C0405	She **smelled** the **flowers** using her	**cash**
C0406	Your **sister's son** is your	**blanket**
C0407	Your **brother's daughter** is your	**coin**
C0408	The **boss** of a **ship** is called the	**office**
C0409	You **wear shoes** on your	**trucks**
C0410	The **athlete** is a **very fast**	**spelling**
C0411	A **book** about **someone's life** is called a	**curriculum**
C0412	**Apples** and **bananas** are types of	**yard**
C0413	The **popular** girl has **lots of**	**thoughts**
C0414	They went to **watch** a **play** at the	**document**
C0415	He **drove** too **fast** and had an	**officer**
C0416	A **black** and **white horse** is a	**handbag**
C0417	We **work** during the **week** and **relax** at the	**magic**
C0418	They gave a **prize** to the **competition**	**model**
C0419	There are **eleven players** on a **football**	**fire**
C0420	The **baseball player hit** the **ball** with his	**row**
C0421	***Magicians*** know a lot of **card**	**scenes**
C0422	***Everest*** is the world's **highest**	**jacket**
C0423	There are **hundreds** of **countries** in the	**thing**
C0424	The **queen** is **married** to the	**news**
C0501	My **phone** doesn't work because it's **run out** of	**comedy**
C0502	These **clothes** were **made** by the **fashion**	**relation**

A0503	The **border guard** put a **stamp** in my	**passport**
A0504	**Grandfather** has a **moustache** and a **long**	**beard**
A0505	The **customers queued** in a **straight**	**line**
A0506	**Villages** are **smaller** than **cities** and	**towns**
A0507	A **big sea is** called an	**ocean**
A0508	**Rain falls** from big **black**	**clouds**
A0509	**Famous people** are also called **stars** or	**celebrities**
A0510	Every **morning** he **washes** in the **sink** in the	**bathroom**
A0511	People **sleep** with their **head** on a	**pillow**
A0512	Please **don't tell** anyone my	**secret**
A0513	The **south** is **warmer** than the	**north**
A0514	They are **drinking coffee** in the	**café**
A0515	In some **zoos animals** live in **small**	**cages**
A0516	**One hundred years** is called a	**century**
A0517	Before you **use** it you should **read** the	**instructions**
A0518	The **student makes** a lot of **spelling**	**mistakes**
A0519	She made a **special cake** for her son's	**birthday**
A0520	Someone who **owns** a **meat shop** is called a	**butcher**
A0521	**Honest** people always **tell** the	**truth**
A0522	On her **birthday** she **ate chocolate**	**cake**
A0523	The girl likes **toast** with **strawberry**	**jam**
A0524	My **favourite flowers** are **red**	**roses**
A0601	In **rush hour** there is **a lot of**	**traffic**
A0602	**Trees grow** lots of **green**	**leaves**
A0603	**Footballers** are **happy** when they **score** a	**goal**

B0503	My **friend** often **forgets** to **bring** his	**passport**
B0504	My **uncle** has green **eyes** and a **big**	**beard**
B0505	The **schoolchildren stood** in a **messy**	**line**
B0506	These days **more** and more **people live** in	**towns**
B0507	This **place** is **far** from the	**ocean**
B0508	He **sees** some very **big black**	**clouds**
B0509	The **people** were **excited** to **meet** the	**celebrities**
B0510	Every **evening** he **changes** his **clothes** in the	**bathroom**
B0511	People **like** having a **comfortable**	**pillow**
B0512	Please **don't talk** about my	**secret**
B0513	**People** are **friendlier** in the	**north**
B0514	They are **sitting together** at the	**café**
B0515	In some **places pets** live in **little**	**cages**
B0516	A really **long time** is called a	**century**
B0517	Before you **start** you must **find** the	**instructions**
B0518	The **student hates** all the **annoying**	**mistakes**
B0519	We had a **lovely chat** about his	**birthday**
B0520	The **woman** who **lives** nearby **works** as a	**butcher**
B0521	It can be **hard** to **find out** the	**truth**
B0522	On the **weekend** she **ate creamy**	**cake**
B0523	The girl likes **eating delicious**	**jam**
B0524	I often **give** my **friend some**	**roses**
B0601	In the **city** there is **lots** of	**traffic**
B0602	We **saw** a lot of **brown**	**leaves**
B0603	**People** are **happy** when they **see** a	**goal**

C0503	The **border guard** put a **stamp** in my	**software**
C0504	**Grandfather** has a **moustache** and a **long**	**sheet**
C0505	The **customers queued** in a **straight**	**cut**
C0506	**Villages** are **smaller** than **cities** and	**drinks**
C0507	A **big sea is** called an	**apple**
C0508	**Rain falls** from big **black**	**snacks**
C0509	**Famous people** are also called **stars** or	**varieties**
C0510	Every **morning** he **washes** in the **sink** in the	**final**
C0511	People **sleep** with their **head** on a	**farmer**
C0512	Please **don't tell** anyone my	**college**
C0513	The **south** is **warmer** than the	**choice**
C0514	They are **drinking coffee** in the	**ferry**
C0515	In some **zoos animals** live in **small**	**purses**
C0516	**One hundred years** is called a	**basketball**
C0517	Before you **use** it you should **read** the	**arguments**
C0518	The **student makes** a lot of **spelling**	**partners**
C0519	She made a **special cake** for her son's	**message**
C0520	Someone who **owns** a **meat shop** is called a	**necklace**
C0521	**Honest** people always **tell** the	**luck**
C0522	On her **birthday** she **ate chocolate**	**bells**
C0523	The girl likes **toast** with **strawberry**	**corn**
C0524	My **favourite flowers** are **red**	**gases**
C0601	In **rush hour** there is **a lot of**	**winter**
C0602	**Trees grow** lots of **green**	**gaps**
C0603	**Footballers** are **happy** when they **score** a	**tune**

A0604	I **can't read** your **terrible**	**handwriting**
A0605	He **keeps money** in a **leather**	**wallet**
A0606	The **policeman shot** the **thief** with his	**gun**
A0607	The **opposite** of **war** is	**peace**
A0608	The **two boys** are **identical**	**twins**
A0609	Someone who **makes bread** is called a	**baker**
A0610	He **cuts vegetables** with a **sharp**	**knife**
A0611	I chose a **recipe** and **bought** all the	**ingredients**
A0612	The **photographer took pictures** with a	**camera**
A0613	Your **mum** and **dad** are your	**parents**
A0614	**Chairs** and **tables** are types of	**furniture**
A0615	**Students** have to **write** a lot of **long**	**essays**
A0616	I **protect** my **eyes** from the **sun** with	**sunglasses**
A0617	The **people** who **live near** you are your	**neighbours**
A0618	There are three **children** and two **parents** in the	**family**
A0619	The **carpet** is **covering** the	**floor**
A0620	We **planned** our **journey** using a	**map**
A0621	The **mess** is **cleaned** up by the	**cleaner**
A0622	The **actors performed** on the **theatre's**	**stage**
A0623	I **cut up lettuce** and **tomato** for the	**salad**
A0624	For **dinner** we often **eat fish** and	**chips**
A0701	This **beach** has **soft white**	**sand**
A0702	**French fries** and **chips** are made from	**potato**
A0703	**Tonight** we are going to a **restaurant** for	**dinner**
A0704	**Children** usually **write** with a **pen** or	**pencil**

B0604	I really **can't stand** your **terrible**	**handwriting**
B0605	He **keeps important things** in his	**wallet**
B0606	The **policeman hit** his **friend** with his	**gun**
B0607	The **president** wants to **have**	**peace**
B0608	Those **nice boys** are **obviously**	**twins**
B0609	The **man quit** his **job** and became a	**baker**
B0610	He **prepares breakfast** with an **old**	**knife**
B0611	The delicious **biscuits** have **a lot of**	**ingredients**
B0612	The **engineer borrowed** an **expensive**	**camera**
B0613	On **Fridays** I sometimes **meet** my	**parents**
B0614	My **house** has lots of **lovely**	**furniture**
B0615	**Sometimes we** have to **read** a lot of	**essays**
B0616	I **keep** myself **safe outside** with	**sunglasses**
B0617	The **people** who make **lots** of **noise** are my	**neighbours**
B0618	There are lots of **children** in the **big**	**family**
B0619	The **girl** is **sitting** on the	**floor**
B0620	Before our **trip** we **bought** a	**map**
B0621	This **place** is **looked after** by the	**cleaner**
B0622	The **schoolchildren played** on the **enormous**	**stage**
B0623	I **prepared everything** for the **simple**	**salad**
B0624	For **dinner** we often **eat eggs** and	**chips**
B0701	**She** likes to **relax** on the **nice**	**sand**
B0702	The **famous dish** is made from	**potato**
B0703	**Tomorrow** I will be too **busy** for	**dinner**
B0704	**Children** usually have a **favourite**	**pencil**

C0604	I **can't read** your **terrible**	**luxury**
C0605	He **keeps money** in a **leather**	**photo**
C0606	The **policeman shot** the **thief** with his	**part**
C0607	The **opposite** of **war** is	**snow**
C0608	The **two boys** are ***identical***	**dials**
C0609	**Someone** who **makes bread** is called a	**singer**
C0610	He **cuts vegetables** with a **sharp**	**square**
C0611	I chose a **recipe** and **bought** all the	**examiners**
C0612	The **photographer took pictures** with a	**prison**
C0613	Your **mum** and **dad** are your	**clinics**
C0614	**Chairs** and **tables** are types of	**politics**
C0615	**Students** have to **write** a lot of **long**	**olives**
C0616	I **protect** my **eyes** from the **sun** with	**microwaves**
C0617	The **people** who **live near** you are your	**melons**
C0618	There are three **children** and two **parents** in the	**radio**
C0619	The **carpet** is **covering** the	**trip**
C0620	We **planned** our **journey** using a	**gate**
C0621	The **mess** is **cleaned** up by the	**speaker**
C0622	The **actors performed** on the **theatre's**	**cook**
C0623	I **cut up lettuce** and **tomato** for the	**drawing**
C0624	For dinner we often **eat fish** and	**pipes**
C0701	This **beach** has **soft white**	**routes**
C0702	**French fries** and **chips** are made from	**discussion**
C0703	**Tonight** we are going to a **restaurant** for	**changes**
C0704	**Children** usually **write** with a **pen** or	**comic**

A0705	**After school children** must do their	**homework**
A0706	The **dining table** has **six matching**	**chairs**
A0707	**Clean** your **teeth** with **toothpaste** and a	**toothbrush**
A0708	The **husband** bought **flowers** for his	**wife**
A0709	**Dollars** and **pounds** are different types of	**currency**
A0710	***Pork*** and ***bacon*** come from a	**pig**
A0711	The **class** went on a **history trip** to the	**museum**
A0712	Put the **letter inside** the **white**	**envelope**
A0713	Every **night** I **read** my **children** a	**story**
A0714	We went **sailing** on the **lake** in our new	**boat**
A0715	He **typed** using the **computer's**	**keyboard**
A0716	I **write** my **homework sitting** at my	**desk**
A0717	There are **many trees** in the	**forest**
A0718	**Scientists** do **experiments** in a	**laboratory**
A0719	My **bag** was **stolen** by a	**thief**
A0720	We **waited** an hour in the **long**	**queue**
A0721	**Boys** quickly **grow up** and **become**	**men**
A0722	The ***orchestra*** **played** some **classical**	**music**
A0723	**Doctors take care** of their	**patients**
A0724	In **China** the most famous **drink** is **green**	**tea**
A0801	When we go **camping** we **sleep** in a	**tent**
A0802	The **plane** was **flown** by the	**pilot**
A0803	**Circles** and **squares** are different	**shapes**
A0804	**Patients** are **cared for** by **doctors** and	**nurses**
A0805	Many people **died** in the **Second World**	**War**

B0705	On **Friday I** sometimes **do** my	**homework**
B0706	The **living room** has two **nice modern**	**chairs**
B0707	Make sure your **child uses** the **right**	**toothbrush**
B0708	The **lawyer** had **dinner** with his	**wife**
B0709	Those two **countries** have **different** types of	**currency**
B0710	Her **favourite animal** is a	**pig**
B0711	The **family** went on a **group tour** of the	**museum**
B0712	Put the **form under** the **orange**	**envelope**
B0713	Every **night** she **wants** a **different**	**story**
B0714	We went **there** to **look at** the **fantastic**	**boat**
B0715	The **computer** has a **tiny**	**keyboard**
B0716	I **often eat** my **dinner** at my	**desk**
B0717	Many **animals live** in the	**forest**
B0718	**Engineers** sometimes **work** in a	**laboratory**
B0719	My **dog** was **taken** by a	**thief**
B0720	We **talked** for an **hour** in the	**queue**
B0721	**Boys** often **admire** those **famous**	**men**
B0722	The **architects know** some **interesting**	**music**
B0723	Those very **sad people** are her	**patients**
B0724	In my **country** a **popular drink** is	**tea**
B0801	When we go **walking** we **take** a	**tent**
B0802	The **house** was **bought** by the	**pilot**
B0803	**Children learn** the **names** of the	**shapes**
B0804	**Sometimes children** are **looked after** by	**nurses**
B0805	Many **people cried** during the **awful**	**War**

C0705	**After school children** must do their	**plastic**
C0706	The **dining table** has six **matching**	**notes**
C0707	**Clean** your **teeth** with **toothpaste** and a	**nightclub**
C0708	The **husband** bought **flowers** for his	**stuff**
C0709	**Dollars** and **pounds** are different types of	**scenery**
C0710	***Pork*** and ***bacon*** come from a	**fan**
C0711	The **class** went on a **history trip** to the	**solution**
C0712	Put the **letter inside** the **white**	**industry**
C0713	Every night I **read** my **children** a	**couple**
C0714	We went **sailing** on the **lake** in our new	**mess**
C0715	He **typed** using the **computer's**	**brochure**
C0716	I **write** my **homework sitting** at my	**crowd**
C0717	There are **many trees** in the	**rabbit**
C0718	**Scientists** do **experiments** in a	**certificate**
C0719	My **bag** was **stolen** by a	**trunk**
C0720	We **waited** an hour in the **long**	**blog**
C0721	**Boys** quickly **grow up** and **become**	**ways**
C0722	The ***orchestra*** **played** some **classical**	**service**
C0723	**Doctors take care** of their	**credits**
C0724	In **China** the most famous **drink** is **green**	**soul**
C0801	When we go **camping** we **sleep** in a	**gum**
C0802	The **plane** was **flown** by the	**shadow**
C0803	**Circles** and **squares** are different	**flats**
C0804	**Patients** are **cared for** by **doctors** and	**crosses**
C0805	Many people **died** in the **Second World**	**top**

A0806	The **little girl** loves her ***teddy***	**bear**
A0807	People who **design buildings** are called	**architects**
A0808	Your **heart's job** is to **move** your	**blood**
A0809	The **sports** team **built** a **big** new	**stadium**
A0810	**Land** with **water** all **around** is called an	**island**
A0811	Famous **chefs** usually **work** at **expensive**	**restaurants**
A0812	The **food** is on a **white**	**plate**
A0813	When he **moved house** he told me his **new**	**address**
A0814	The **new chemical** was **discovered** by a	**scientist**
A0815	When you **travel** by **train** you should **buy** a	**ticket**
A0816	The nasty **cat caught** the **little**	**mouse**
A0817	**Clothes** for **sleeping** in are called	**pyjamas**
A0818	I **passed** my **test** and got my **driving**	**licence**
A0819	**Footballers wear** a **t-shirt** and	**shorts**
A0820	**Girls** quickly **grow up** and **become**	**women**
A0821	**Hair above** your **lip** is called a	**moustache**
A0822	The **little girl** made a new **dress** for her	**doll**
A0823	I **eat soup** in a **white**	**bowl**
A0824	**Take aspirin** if you have a	**headache**
A0901	**Rabbits** like **eating** fresh **orange**	**carrots**
A0902	**People** usually **sleep** in a	**bed**
A0903	I prefer **pens** with **blue**	**ink**
A0904	A **sandwich** has **two pieces** of	**bread**
A0905	**Cyclists protect** their **head** with a	**helmet**
A0906	We **checked in** at the **hotel**	**reception**

B0806	The **little boy** saw the really **angry**	**bear**
B0807	Some **people** who **work** in this building are	**architects**
B0808	The **new film** has a **lot** of	**blood**
B0809	**Concerts sometimes happen** at the	**stadium**
B0810	We **travelled** to the very **beautiful**	**island**
B0811	Famous **actors** often **go** to **popular**	**restaurants**
B0812	The **stuff** is on a **white**	**plate**
B0813	When he **got here** he told me his **new**	**address**
B0814	The **new machine** was **invented** by that	**scientist**
B0815	When you **visit it** you must **have** a	**ticket**
B0816	The **lion caught** the **unlucky**	**mouse**
B0817	I like to **buy** some **interesting**	**pyjamas**
B0818	I **failed** my **test** and didn't get my	**licence**
B0819	Little **boys often** like **wearing**	**shorts**
B0820	**They** are **talking** to the **friendly**	**women**
B0821	The **pilot** has a **big orange**	**moustache**
B0822	The **father made** his **daughter** a new	**doll**
B0823	I **put** the **milk** in a **white**	**bowl**
B0824	**Buy this** if you have a	**headache**
B0901	Some **pets** like **eating** fresh **tasty**	**carrots**
B0902	**People** usually **like** their own	**bed**
B0903	I prefer **ones** with nice **blue**	**ink**
B0904	For **lunch** I have **three pieces** of	**bread**
B0905	**People protect themselves** with a	**helmet**
B0906	My son **works** at the **hotel**	**reception**

C0806	The **little girl** loves her ***teddy***	**sea**
C0807	People who **design buildings** are called	**inventions**
C0808	Your **heart's job** is to **move** your	**street**
C0809	The **sports** team **built** a **big** new	**granddaughter**
C0810	**Land** with **water** all **around** is called an	**author**
C0811	Famous **chefs** usually **work** at **expensive**	**battles**
C0812	The **food** is on a **white**	**spy**
C0813	When he **moved house** he told me his **new**	**regret**
C0814	The **new chemical** was **discovered** by a	**capital**
C0815	When you **travel** by **train** you should **buy** a	**shower**
C0816	The nasty **cat caught** the **little**	**jet**
C0817	**Clothes** for **sleeping** in are called	**recycling**
C0818	I **passed** my **test** and got my **driving**	**discount**
C0819	**Footballers wear** a **t-shirt** and	**beans**
C0820	**Girls** quickly **grow up** and **become**	**today**
C0821	**Hair above** your **lip** is called a	**cabbage**
C0822	The **little girl** made a new **dress** for her	**meal**
C0823	I **eat soup** in a **white**	**shore**
C0824	**Take aspirin** if you have a	**product**
C0901	**Rabbits** like **eating** fresh **orange**	**swimmers**
C0902	**People** usually **sleep** in a	**rock**
C0903	I prefer **pens** with **blue**	**herbs**
C0904	A **sandwich** has **two pieces** of	**snake**
C0905	**Cyclists protect** their **head** with a	**picnic**
C0906	We **checked in** at the **hotel**	**conclusion**

A0907	I **grow beautiful flowers** in my	**garden**
A0908	A **very bad cold** is called the	**flu**
A0909	The **prince's parents** are the **king** and	**queen**
A0910	**Cook** the **chicken** at a **high**	**temperature**
A0911	A **zebra** is **similar** to a	**horse**
A0912	The **busiest** part of the **city** is the	**centre**
A0913	**Police** work hard to **catch dangerous**	**criminals**
A0914	The **king** lives in an **old stone**	**castle**
A0915	Make sure you **wash** your **hands** with	**soap**
A0916	Get **out** of the **ocean** if you **see** a	**shark**
A0917	**Poor** people **don't have** a lot of	**money**
A0918	I **keep** my **money** in an **account** at the	**bank**
A0919	Someone who **writes** for a **newspaper** is a	**journalist**
A0920	**Boxes** are made of **strong paper** called	**cardboard**
A0921	**Painters** and **musicians** are different types of	**artist**
A0922	**Cows eat** a lot of **green**	**grass**
A0923	A **big boat** is called a	**ship**
A0924	You **wash** your **hair** using	**shampoo**
A1001	There are **twentysix letters** in the **English**	**alphabet**
A1002	Tomorrow there will be **rain** with **thunder** and	**lightning**
A1003	The **walkers followed** the **forest**	**path**
A1004	He often **buys** his **wife** a **bunch** of	**flowers**
A1005	A **male cow** is called a	**bull**
A1006	**Leaves fall off trees** in the	**autumn**
A1007	**Workers** get **instructions** from their	**boss**

B0907	I **eat delicious dinners** in the	**garden**
B0908	It **isn't nice** to **have** the	**flu**
B0909	The **old woman** is a **powerful**	**queen**
B0910	Make **sure it** is at the **right**	**temperature**
B0911	An **elephant** is **bigger** than a	**horse**
B0912	I don't **like needing** to **go** into the	**centre**
B0913	Some **children grow up** and **become**	**criminals**
B0914	The nice **tourists enjoyed** the **old**	**castle**
B0915	Make sure you **always use** the	**soap**
B0916	Most **people** are **scared** if they **see** a	**shark**
B0917	**Some** people **don't need** a lot of	**money**
B0918	I **keep** my **things** in a **box** in the	**bank**
B0919	The **woman** who **lives** across the road is a	**journalist**
B0920	The **artist made** a **sculpture** using	**cardboard**
B0921	That **interesting** woman is a **famous**	**artist**
B0922	**Animals eat** a lot of **fresh**	**grass**
B0923	I really **like** to **travel** by	**ship**
B0924	My dad **forgot** to **buy**	**shampoo**
B1001	Some **countries use different** types of	**alphabet**
B1002	Tomorrow there will be **heavy rain** and	**lightning**
B1003	The **children walked along** the dark	**path**
B1004	He often **gives** his **friend** some **lovely**	**flowers**
B1005	They are very **scared** of the **big**	**bull**
B1006	**It** is very **nice here** in the	**autumn**
B1007	**People** get **annoyed** by their	**boss**

C0907	I **grow beautiful flowers** in my	**painting**
C0908	A **very bad cold** is called the	**skill**
C0909	The **prince's parents** are the **king** and	**suit**
C0910	**Cook** the **chicken** at a **high**	**quality**
C0911	A **zebra** is **similar** to a	**star**
C0912	The **busiest** part of the **city** is the	**lighter**
C0913	**Police** work hard to **catch dangerous**	**periods**
C0914	The **king** lives in an **old stone**	**penny**
C0915	Make sure you **wash** your **hands** with	**chin**
C0916	Get **out** of the **ocean** if you **see** a	**pound**
C0917	**Poor** people **don't have** a lot of	**places**
C0918	I **keep** my **money** in an **account** at the	**wind**
C0919	Someone who **writes** for a **newspaper** is a	**strawberry**
C0920	**Boxes** are made of **strong paper** called	**lunchtime**
C0921	**Painters** and **musicians** are different types of	**event**
C0922	**Cows eat** a lot of **green**	**steak**
C0923	A **big boat** is called a	**field**
C0924	You **wash** your **hair** using	**lettuce**
C1001	There are **twentysix letters** in the **English**	**waterfall**
C1002	Tomorrow there will be **rain** with **thunder** and	**tennis**
C1003	The **walkers followed** the **forest**	**bride**
C1004	He often **buys** his **wife** a **bunch** of	**turkeys**
C1005	A **male cow** is called a	**mum**
C1006	**Leaves fall off trees** in the	**insect**
C1007	**Workers** get **instructions** from their	**food**

A1008	I **made** a **cake** by **following** the	**recipe**
A1009	We **study** lots of **vocabulary** and	**grammar**
A1010	The **bored children** aren't **paying**	**attention**
A1011	**Sick animals** are **cared for** by a	**vet**
A1012	You have **eight fingers** and **two**	**thumbs**
A1013	**Paintings** and **music** are types of	**art**
A1014	**Jungles** have a **hot** and **wet**	**climate**
A1015	**Students** go to **university** to get a	**degree**
A1016	Our **house** has two **bathrooms** and three	**bedrooms**
A1017	The **day** is **light** but the **night** is	**dark**
A1018	We heard **rain falling** on the **house's**	**roof**
A1019	The **pilot** got the **plane** ready for the **next**	**flight**
A1020	Women sometimes **wear nice smelling**	**perfume**
A1021	He **went** to **hospital** in the	**ambulance**
A1022	She loves **swimming** and **sunbathing** on the	**beach**
A1023	On each **foot** you have **five**	**toes**
A1024	**Letters** are **delivered** by the	**postman**
A1101	**After** the **main course** we **ordered**	**dessert**
A1102	We **got on** the **plane** at the	**airport**
A1103	The **wife cooked dinner** for her	**husband**
A1104	**Birds fly** by using their	**wings**
A1105	**History** is lots of **students' favourite**	**subject**
A1106	**Buses** and **trains** are types of **public**	**transport**
A1107	I'll **call** you if you give me your **telephone**	**number**
A1108	Go to the **dentist** if you **have**	**toothache**

B1008	I **followed** the **long** and **complicated**	**recipe**
B1009	We **practice** lots of **complicated** new	**grammar**
B1010	The **bored children gave** me their	**attention**
B1011	The **little child** wants to **become** a	**vet**
B1012	Most **animals** do **not have**	**thumbs**
B1013	The **teacher** is **interested** in	**art**
B1014	**Some countries** have a **pleasant**	**climate**
B1015	**Architects** and **engineers** need to have a	**degree**
B1016	The **couple's children** have **cosy**	**bedrooms**
B1017	My **grandfather's house** is **very**	**dark**
B1018	We saw **people fixing** the **building's**	**roof**
B1019	The **family arrived early** for their	**flight**
B1020	Women sometimes **buy nice special**	**perfume**
B1021	He **drove** there very **fast** in the	**ambulance**
B1022	She loves **reading** and **relaxing** at the	**beach**
B1023	Some **people have** very **strange**	**toes**
B1024	My **gift** was **taken** by the	**postman**
B1101	**Children** usually **love** to **have**	**dessert**
B1102	We **saw** people **arriving** at the	**airport**
B1103	The **woman baked bread** for her	**husband**
B1104	Some **insects** have got **big**	**wings**
B1105	**This** is lots of **children's favourite**	**subject**
B1106	Some **cities** have extremely **crowded**	**transport**
B1107	I'll **remind** you if you give me the **correct**	**number**
B1108	Don't **complain** loudly if you **have**	**toothache**

C1008	I **made** a **cake** by **following** the	**cabinet**
C1009	We **study** lots of **vocabulary** and	**logos**
C1010	The **bored children** aren't **paying**	**history**
C1011	**Sick animals** are **cared for** by a	**disk**
C1012	You have **eight fingers** and **two**	**links**
C1013	**Paintings** and **music** are types of	**shame**
C1014	**Jungles** have a **hot** and **wet**	**backpack**
C1015	**Students** go to **university** to get a	**poem**
C1016	Our **house** has two **bathrooms** and three	**contracts**
C1017	The **day** is **light** but the **night** is	**group**
C1018	We heard **rain falling** on the **house's**	**trade**
C1019	The **pilot** got the **plane** ready for the **next**	**track**
C1020	Women sometimes **wear nice smelling**	**sunshine**
C1021	He **went** to **hospital** in the	**underwear**
C1022	She loves **swimming** and **sunbathing** on the	**lock**
C1023	On each **foot** you have **five**	**pans**
C1024	**Letters** are **delivered** by the	**spinach**
C1101	**After** the **main course** we **ordered**	**repairs**
C1102	We **got on** the **plane** at the	**object**
C1103	The **wife cooked dinner** for her	**problem**
C1104	**Birds fly** by using their	**caps**
C1105	**History** is lots of **students' favourite**	**purpose**
C1106	**Buses** and **trains** are types of **public**	**luggage**
C1107	I'll **call** you if you give me your **telephone**	**person**
C1108	Go to the **dentist** if you **have**	**surnames**

A1109	A **very small town** is called a	**village**
A1110	The **couple** have two **girls** and a	**boy**
A1111	The **thick book** had **five hundred**	**pages**
A1112	The big **university** has thousands of **clever**	**students**
A1113	The **baby** has **big blue**	**eyes**
A1114	There are **billions** of **websites** on the	**internet**
A1115	The **alphabet** has five **vowels** and **twentyone**	**consonants**
A1116	The **model wore** a top and a **short**	**skirt**
A1117	A **baby cow** is called a	**calf**
A1118	Your **mother's sister** is your	**aunt**
A1119	She **ate** her **food** with a **knife** and	**fork**
A1120	**Zoos** have a lot of **dangerous**	**animals**
A1121	He **holds up** his **trousers** with a	**belt**
A1122	I can't **see** because the **TV** has a **small**	**screen**
A1123	**Monkeys** like to **eat yellow**	**bananas**
A1124	The **competition winner received** a	**prize**
A1201	**Stealing** and **killing people** are types of	**crime**
A1202	**Biology** and **chemistry** are types of	**science**
A1203	I keep my **pictures** in a **photo**	**album**
A1204	**Astronauts** use **rockets** to go to	**space**
A1205	Most **governments** have a **prime minister** or a	**president**
A1206	**Penguins** and **ducks** are types of	**bird**
A1207	**Cats** and **dogs** are **popular**	**pets**
A1208	The **journalist wrote** a **long**	**article**
A1209	New **shoes** usually come in a **cardboard**	**box**

B1109	I **grew up** in a **boring**	**village**
B1110	The **couple** would like **another**	**boy**
B1111	The **old book** had **a lot of**	**pages**
B1112	The famous **professor** has a lot of **interesting**	**students**
B1113	The lovely **baby** has **two nice**	**eyes**
B1114	There is **lots** of **information** on the	**internet**
B1115	The **interesting language** doesn't have **many**	**consonants**
B1116	The **student had** a **fashionable** new	**skirt**
B1117	The **children** looked at the **little**	**calf**
B1118	That nice **woman** is **helping** your	**aunt**
B1119	My **mother** has an **old silver**	**fork**
B1120	**Cities** don't have a lot of **big**	**animals**
B1121	He always **wears** a **brown**	**belt**
B1122	I'll **buy** this **one** because it has a **good**	**screen**
B1123	Some **children's favourite food** is	**bananas**
B1124	The **badminton player** was **given** a	**prize**
B1201	In this **neighbourhood** there **isn't much**	**crime**
B1202	Those **schoolchildren** enjoy **learning** about	**science**
B1203	I put her **drawings** in a **pretty**	**album**
B1204	Yesterday we **watched** a **film** about	**space**
B1205	Many **countries** have an **interesting**	**president**
B1206	That **country** has many **types** of	**bird**
B1207	**Father talked** about our **nice**	**pets**
B1208	The **grandmother saw** the **long**	**article**
B1209	The **vegetables** are under the **wooden**	**box**

C1109	A **very small town** is called a	**planet**
C1110	The **couple** have two **girls** and a	**fine**
C1111	The **thick book** had **five hundred**	**glasses**
C1112	The big **university** has thousands of **clever**	**bottoms**
C1113	The **baby** has **big blue**	**acts**
C1114	There are **billions** of **websites** on the	**embassy**
C1115	The **alphabet** has five **vowels** and **twentyone**	**motorways**
C1116	The **model wore** a top and a **short**	**breeze**
C1117	A **baby cow** is called a	**jug**
C1118	Your **mother's sister** is your	**engine**
C1119	She **ate** her **food** with a **knife** and	**cheek**
C1120	**Zoos** have a lot of **dangerous**	**enemies**
C1121	He **holds up** his **trousers** with a	**tongue**
C1122	I can't **see** because the **TV** has a **small**	**brush**
C1123	**Monkeys** like to **eat yellow**	**policemen**
C1124	The **competition winner received** a	**chain**
C1201	**Stealing** and **killing people** are types of	**spot**
C1202	**Biology** and **chemistry** are types of	**career**
C1203	I keep my **pictures** in a **photo**	**oven**
C1204	**Astronauts** use **rockets** to go to	**heat**
C1205	Most **governments** have a ***prime minister*** or a	**company**
C1206	**Penguins** and **ducks** are types of	**van**
C1207	**Cats** and **dogs** are **popular**	**miles**
C1208	The **journalist wrote** a **long**	**universe**
C1209	New **shoes** usually come in a **cardboard**	**land**

A1210	The **children** are **playing** a **fun**	**game**
A1211	**Carrots** and **potatoes** are types of	**vegetable**
A1212	**Smoking** is a very **bad**	**habit**
A1213	In the **morning** we **drink tea** or	**coffee**
A1214	She has a **gold ring** on her	**finger**
A1215	**Football teams** always have **eleven**	**players**
A1216	If you are **lost**, **ask** someone for	**directions**
A1217	Next month the **pregnant lady** will **have** her	**baby**
A1218	**Children** should **never talk** to	**strangers**
A1219	The girl **brushed** her **long blonde**	**hair**
A1220	Every day the **chicken lays** an	**egg**
A1221	The **desk** has **four wooden**	**legs**
A1222	People **eat soup** or **cereal** using a	**spoon**
A1223	The **singer** has a **beautiful**	**voice**
A1224	An **architect's job** is to **design**	**buildings**
A1301	For **lunch** I usually **eat** a **cheese**	**sandwich**
A1302	**Asia** is **not** a **country,** it's a	**continent**
A1303	In the **morning** people **eat toast** for	**breakfast**
A1304	**Children ask** their **teachers** lots of	**questions**
A1305	**Money** you **pay** to the **government** is called	**tax**
A1306	The happy **president won** the	**election**
A1307	Really **scary dreams** are called	**nightmares**
A1308	We showed our **passports** when we **crossed** the	**border**
A1309	A **baby cat** is called a	**kitten**
A1310	In the **morning** she **drinks orange**	**juice**
A1311	**Draw** a **straight line** using the	**ruler**

B1210	The **girls** are **talking** about the **new**	**game**
B1211	The **tasty curry** has two types of	**vegetable**
B1212	This **man** has a very **bad**	**habit**
B1213	At **lunchtime I usually drink**	**coffee**
B1214	She has a **small cut** on her	**finger**
B1215	The **team manager** wants **other**	**players**
B1216	If you are **there**, get some **useful**	**directions**
B1217	Next month the **busy woman** will **have** a	**baby**
B1218	Those **weird people** over there are	**strangers**
B1219	The man **loved** his **soft black**	**hair**
B1220	Every day those **people eat** one	**egg**
B1221	That **man** has **very nice**	**legs**
B1222	In some **countries people** never **use** a	**spoon**
B1223	The **lawyer** has a **powerful**	**voice**
B1224	Those **people's job** is to **tidy up**	**buildings**
B1301	On **Monday** I often **have** a **small**	**sandwich**
B1302	This lovely **place** is my **favourite**	**continent**
B1303	In some **countries** people don't **often have**	**breakfast**
B1304	Sometimes **children have** a lot of	**questions**
B1305	Most **people enjoy complaining** about their	**tax**
B1306	The excited **people watched** the	**election**
B1307	**Children** have a lot of **scary**	**nightmares**
B1308	We showed our **tickets** when we **reached** the	**border**
B1309	I used to **have** a **little**	**kitten**
B1310	In the **morning** she **drinks tasty**	**juice**
B1311	The **designer bought** a **new**	**ruler**

C1210	The **children** are **playing** a **fun**	**ride**
C1211	**Carrots** and **potatoes** are types of	**lemonade**
C1212	**Smoking** is a very **bad**	**review**
C1213	In the **morning** we **drink tea** or	**presents**
C1214	She has a **gold ring** on her	**market**
C1215	**Football teams** always have **eleven**	**turnings**
C1216	If you are **lost**, **ask** someone for	**reporters**
C1217	Next month the **pregnant lady** will **have** her	**million**
C1218	**Children** should **never talk** to	**toilets**
C1219	The girl **brushed** her **long blonde**	**bar**
C1220	Every day the **chicken lays** an	**inch**
C1221	The **desk** has **four wooden**	**bands**
C1222	People **eat soup** or **cereal** using a	**film**
C1223	The **singer** has a **beautiful**	**list**
C1224	An **architect's job** is to **design**	**girlfriends**
C1301	For **lunch** I usually **eat** a **cheese**	**jungle**
C1302	**Asia** is **not** a **country,** it's a	**pharmacy**
C1303	In the **morning** people **eat toast** for	**marriage**
C1304	**Children ask** their **teachers** lots of	**brothers**
C1305	**Money** you **pay** to the **government** is called	**rap**
C1306	The happy **president won** the	**arrangement**
C1307	Really **scary dreams** are called	**baseballs**
C1308	We showed our **passports** when we **crossed** the	**fever**
C1309	A **baby cat** is called a	**poster**
C1310	In the **morning** she **drinks orange**	**coast**
C1311	**Draw** a **straight line** using the	**parrot**

A1312	Lots of **teachers work** in that	**school**
A1313	**Children love playing** with noisy	**toys**
A1314	**Tablets** and **pills** are types of	**medicine**
A1315	A **jacket** isn't as **warm** as a **long**	**coat**
A1316	The **bride** and **groom** had a **traditional**	**wedding**
A1317	Your **eyes** and **mouth** are part of your	**face**
A1318	He loves **driving fast** in his	**car**
A1319	**In Asia** people **eat** a lot of	**rice**
A1320	You can **get fit** by **working out** at the	**gym**
A1321	The **largest animal** in **Africa** is the	**elephant**
A1322	The **tourists** are **visiting** the **capital**	**city**
A1323	Keep your **neck warm** with a **long**	**scarf**
A1324	**Sweet honey** is made by	**bees**
A1401	**Tourists** often **send** their **friends** a	**postcard**
A1402	In some **countries schoolchildren wear** a	**uniform**
A1403	I **paid** the **money** into his **bank**	**account**
A1404	After **dinner** we **left** the **waiter** a small	**tip**
A1405	**Children** enjoy seeing **clowns** at the	**circus**
A1406	Some **children** go to **school** on a **yellow**	**bus**
A1407	The **musician plays** the **piano** and other	**instruments**
A1408	Please **put** the **flowers** in a	**vase**
A1409	A **kitten** is a **baby**	**cat**
A1410	The **painting** is in a **wooden**	**frame**
A1411	**Cars** and **buses** are types of	**vehicle**
A1412	I take **sandwiches** to work to **eat** for	**lunch**

B1312	Lots of **people work** in that	**school**
B1313	**People like shopping** for lovely	**toys**
B1314	The **man takes** many types of	**medicine**
B1315	This **thing** isn't as **useful** as a **nice**	**coat**
B1316	The **man** and **woman** went to a **horrible**	**wedding**
B1317	These **important things** are part of your	**face**
B1318	She loves **eating chips** in her	**car**
B1319	In that **country** they **eat** a lot of	**rice**
B1320	You can have **fun** by **going** to the	**gym**
B1321	My **favourite animal** in **Africa** is the	**elephant**
B1322	The **people** are **visiting** the **famous**	**city**
B1323	Keep **yourself warm** with a **long**	**scarf**
B1324	Some **children** are really **scared** of	**bees**
B1401	**People** sometimes **send** their **friends** a	**postcard**
B1402	In some places **people wear** a	**uniform**
B1403	I **asked** the **man** about his **other**	**account**
B1404	My father doesn't **usually leave** a	**tip**
B1405	**Children enjoy** having **fun** at the	**circus**
B1406	Some **people** go to **work** on the **crowded**	**bus**
B1407	Some **people have** a lot of **different**	**instruments**
B1408	Please be **careful** with that **old**	**vase**
B1409	The old **lady** has a very **cute**	**cat**
B1410	The nice **present** is a **beautiful**	**frame**
B1411	The **man** will **have** three types of	**vehicle**
B1412	Every day I **drink chocolate milk** with my	**lunch**

C1312	Lots of **teachers work** in that	**chance**
C1313	**Children love playing** with noisy	**ports**
C1314	**Tablets** and **pills** are types of	**video**
C1315	A **jacket** isn't as **warm** as a **long**	**lake**
C1316	The **bride** and **groom** had a **traditional**	**army**
C1317	Your **eyes** and **mouth** are part of your	**dad**
C1318	He loves **driving fast** in his	**sir**
C1319	**In Asia** people **eat** a lot of	**caves**
C1320	You can **get fit** by **working out** at the	**flag**
C1321	The **largest animal** in **Africa** is the	**orange**
C1322	The **tourists** are **visiting** the **capital**	**power**
C1323	Keep your **neck warm** with a **long**	**bulb**
C1324	**Sweet honey** is made by	**huts**
C1401	**Tourists** often **send** their **friends** a	**classroom**
C1402	In some **countries schoolchildren wear** a	**location**
C1403	I **paid** the **money** into his **bank**	**extra**
C1404	After **dinner** we **left** the **waiter** a small	**bone**
C1405	**Children** enjoy seeing **clowns** at the	**district**
C1406	Some **children** go to **school** on a **yellow**	**clock**
C1407	The **musician plays** the **piano** and other	**announcements**
C1408	Please **put** the **flowers** in a	**grill**
C1409	A **kitten** is a **baby**	**board**
C1410	The **painting** is in a **wooden**	**tube**
C1411	**Cars** and **buses** are types of	**prisoner**
C1412	I take **sandwiches** to work to **eat** for	**front**

A1413	Use the **lift** or **walk up** the	**stairs**
A1414	**People** you **work with** are your	**colleagues**
A1415	A **baby dog** is called a	**puppy**
A1416	Those **bees** make **delicious sweet**	**honey**
A1417	When you **eat, food** goes **down** into your	**stomach**
A1418	The **Italian restaurant** sells **slices** of	**pizza**
A1419	Your **hand** is **connected** to your	**arms**
A1420	The **tourists** are **staying** in an **expensive**	**hotel**
A1421	I **drink coffee** with **sugar** and	**milk**
A1422	I often **borrow books** from the	**library**
A1423	You can't **control** the **beating** of your	**heart**
A1424	**Meat** from a **cow** is called	**beef**
A1501	Managers often **earn** a **high**	**salary**
A1502	In the **past teachers wrote** on the	**blackboard**
A1503	People with **toothache** should **visit** the	**dentist**
A1504	There are **sixty minutes** in an	**hour**
A1505	The **rock musician plays** the	**guitar**
A1506	**Carrying** a **heavy** bag can **hurt** your	**back**
A1507	To **visit** some **countries** you **need** a	**visa**
A1508	I prefer **typing** to **writing** with a	**pen**
A1509	He's **drinking water** out of the **tall**	**glass**
A1510	**After lunch** I work all	**afternoon**
A1511	My **dentist looks after** my	**teeth**
A1512	A **puppy** is a **baby**	**dog**
A1513	The **traditional furniture** is **made** of	**wood**
A1514	**Mice** love to eat ***smelly***	**cheese**

B1413	Turn **right** and then **walk up** the	**stairs**
B1414	I often **have meetings with** my	**colleagues**
B1415	The children **love** their **cute**	**puppy**
B1416	The **children** eat **tasty sweet**	**honey**
B1417	When you **eat** too **much** you get a **fat**	**stomach**
B1418	The **expensive** restaurant sells **pieces** of	**pizza**
B1419	Your **ears** aren't **connected** to your	**arms**
B1420	The **receptionist works** at a **famous**	**hotel**
B1421	**Kids** sometimes **drink** a **lot** of	**milk**
B1422	I don't **read newspapers** at the	**library**
B1423	You can't **change** the **action** of your	**heart**
B1424	My **favourite food** is called	**beef**
B1501	He doesn't **have** a very **good**	**salary**
B1502	In the **past people used** a	**blackboard**
B1503	Every six **months** I **visit** my	**dentist**
B1504	We are **going home** in one	**hour**
B1505	The **old scientist plays** the	**guitar**
B1506	The man **fell** and **really hurt** his	**back**
B1507	**Before** his **holiday** he **got** a	**visa**
B1508	At **work** I often have to **find** a	**pen**
B1509	He's **pouring water** into the **small**	**glass**
B1510	I **only work** here in the	**afternoon**
B1511	I **always look after** my	**teeth**
B1512	The **children** have a nice **little**	**dog**
B1513	The very **pretty jewellery** is **made** of	**wood**
B1514	**I** really like **sandwiches** that have	**cheese**

C1413	Use the **lift** or **walk up** the	**term**
C1414	**People** you **work with** are your	**painters**
C1415	A **baby dog** is called a	**sweater**
C1416	Those **bees** make **delicious sweet**	**matter**
C1417	When you **eat, food** goes **down** into your	**machine**
C1418	The **Italian** restaurant sells **slices** of	**football**
C1419	Your **hand is connected** to your	**east**
C1420	The **tourists** are **staying** in an **expensive**	**system**
C1421	I **drink coffee** with **sugar** and	**staff**
C1422	I often **borrow books** from the	**chocolate**
C1423	You can't **control** the **beating** of your	**side**
C1424	**Meat** from a **cow** is called	**zone**
C1501	Managers often **earn** a **high**	**festival**
C1502	In the **past teachers wrote** on the	**checkout**
C1503	People with **toothache** should **visit** the	**sunset**
C1504	There are **sixty minutes** in an	**air**
C1505	The **rock musician plays** the	**reward**
C1506	**Carrying** a **heavy** bag can **hurt** your	**set**
C1507	To **visit** some **countries** you **need** a	**topic**
C1508	I prefer **typing** to **writing** with a	**duck**
C1509	He's **drinking water** out of the **tall**	**breath**
C1510	**After lunch** I work all	**engineer**
C1511	My **dentist looks after** my	**lamps**
C1512	A **puppy** is a **baby**	**fact**
C1513	The **traditional furniture** is **made** of	**golf**
C1514	**Mice** love to eat ***smelly***	**views**

A1515	**Eggs taste better** with a little	**salt**
A1516	The **tour guide** is talking to a **group** of	**tourists**
A1517	We used the **bridge** to **cross** the	**river**
A1518	A **holiday after** your **wedding** is called a	**honeymoon**
A1519	She's **cutting** the **paper** using **sharp**	**scissors**
A1520	Keep your **feet warm** with **wool**	**socks**
A1521	People in **England** and **China speak** different	**languages**
A1522	In the **morning** father always **reads** the	**newspaper**
A1523	A **pilot's job** is to **fly** a	**plane**
A1524	The **child loves** his **mother** and	**father**
A1601	The **mother loves** her **son** and	**daughter**
A1602	Her **wedding ring** is made of	**gold**
A1603	The **funniest people** at the **circus** are the	**clowns**
A1604	**Forests** have many **tall green**	**trees**
A1605	The **teacher helps** the **children** in her	**class**
A1606	We **hear sound** using our	**ears**
A1607	**Children** between **thirteen** and **nineteen** are	**teenagers**
A1608	Some **women wear** very ***high-heeled***	**shoes**
A1609	He called the **restaurant** to **book** a	**table**
A1610	The **doctor** told me to **quit**	**smoking**
A1611	My favourite **fish** is **grilled pink**	**salmon**
A1612	In the **summer** we go to the **swimming**	**pool**
A1613	At the **gym** I **put** my **things** in the	**locker**
A1614	I **buy** all my **food** at the **big**	**supermarket**
A1615	**Cars** and **buses** have **four**	**wheels**

B1515	**It is better** with a little	**salt**
B1516	The **woman** is talking to a **group** of	**tourists**
B1517	Many **cities** have a **big**	**river**
B1518	We really **enjoyed planning** our **special**	**honeymoon**
B1519	She's **making** some **trousers** using **old**	**scissors**
B1520	Keep **your hands** off my **new**	**socks**
B1521	The clever **students** are **learning** some **new**	**languages**
B1522	In the **evening** I usually **buy** a	**newspaper**
B1523	**Their job** is to **fix** the	**plane**
B1524	On **Mondays** the **child helps** his	**father**
B1601	The **nurse plays** with her **little**	**daughter**
B1602	The **small statue** is made of	**gold**
B1603	The **saddest people** at the **theatre** were some	**clowns**
B1604	**People** like to **walk** near **nice**	**trees**
B1605	The **man talked** to the **children** in the	**class**
B1606	Some **kids** have very **big**	**ears**
B1607	The **kittens** are **playing** with the **group** of	**teenagers**
B1608	Some **men like** very **expensive**	**shoes**
B1609	He **asked** the **waiter** about the	**table**
B1610	My **mother** told me to **stop**	**smoking**
B1611	My favourite **food** is **nice fresh**	**salmon**
B1612	At the **weekend** we **often** go to the	**pool**
B1613	At **work** I **put** my **things** in my	**locker**
B1614	I **saw** all this **stuff** at the **new**	**supermarket**
B1615	**Trains** and **buses** have big	**wheels**

C1515	**Eggs taste better** with a little	**league**
C1516	The **tour guide** is talking to a **group** of	**biscuits**
C1517	We used the **bridge** to **cross** the	**summer**
C1518	A **holiday after** your **wedding** is called a	**champion**
C1519	She's **cutting** the **paper** using **sharp**	**pirates**
C1520	Keep your **feet warm** with **wool**	**tins**
C1521	People in **England** and **China speak** different	**characters**
C1522	In the **morning** father always **reads** the	**studio**
C1523	A **pilot's job** is to **fly** a	**fool**
C1524	The **child loves** his **mother** and	**running**
C1601	The **mother loves** her **son** and	**surprise**
C1602	Her **wedding ring** is made of	**stores**
C1603	The **funniest people** at the **circus** are the	**dust**
C1604	**Forests** have many **tall green**	**kicks**
C1605	The **teacher helps** the **children** in her	**fault**
C1606	We **hear sound** using our	**halls**
C1607	**Children** between **thirteen** and **nineteen** are	**calendars**
C1608	Some **women wear** very ***high-heeled***	**pies**
C1609	He called the **restaurant** to **book** a	**middle**
C1610	The **doctor** told me to **quit**	**drama**
C1611	My favourite **fish** is **grilled pink**	**cola**
C1612	In the **summer** we go to the **swimming**	**cream**
C1613	At the **gym** I **put** my **things** in the	**tiger**
C1614	I **buy** all my **food** at the **big**	**graduation**
C1615	**Cars** and **buses** have **four**	**pots**

A1616	Please help me to **open** the **jam**	**jar**
A1617	The **sports centre** has a new **basketball**	**court**
A1618	When it is **hot** you should **drink** lots of	**water**
A1619	Before we **ordered** we **looked at** the **restaurant**	**menu**
A1620	The model **looked at herself** in the	**mirror**
A1621	My **car** was **fixed** by a	**mechanic**
A1622	She **called** the **doctor** to **make** an	**appointment**
A1623	The **postman delivered** the important	**letter**
A1624	The **student studied** and got **good**	**grades**
A1701	**Penguins eat** a lot of	**fish**
A1702	On **sunny** days there are no **clouds** in the	**sky**
A1703	**Silver, gold** and **iron** are different types of	**metal**
A1704	***Wine*** is usually **made** from	**grapes**
A1705	The **tea** is in a **small white**	**cup**
A1706	**Cars** are **made** in a	**factory**
A1707	**History** is **learning** about what **happened** in the	**past**
A1708	If you are **hot** you can **open** the	**window**
A1709	He is **driving faster** than the **speed**	**limit**
A1710	Your **father's brother** is your	**uncle**
A1711	I called the **hotel** to **book** a	**room**
A1712	***Sweets*** and **biscuits** have **a lot of**	**sugar**
A1713	Keep your **head warm** by **wearing** a	**hat**
A1714	***Login*** using your ***username*** and	**password**
A1715	I like **driving instead** of	**walking**
A1716	**Children** are **punished** for their **bad**	**behaviour**

B1616	Please **help** me with this **big**	**jar**
B1617	The **sports team** is **playing** on the new	**court**
B1618	When you get **home** you should **have** some	**water**
B1619	Before we **decided** we **looked at** the **long**	**menu**
B1620	The **designer bought** an **expensive**	**mirror**
B1621	My **son** was **helped** by a	**mechanic**
B1622	She **asked** the **woman** to **change** the	**appointment**
B1623	The **scientist opened** the important	**letter**
B1624	The **professor rarely** gives **good**	**grades**
B1701	Those **people** like to **eat** lots of	**fish**
B1702	On **winter** days there are some **birds** in the	**sky**
B1703	This **company uses** different types of	**metal**
B1704	**Dishes** are sometimes **made** with	**grapes**
B1705	The **stuff** is in a **small clean**	**cup**
B1706	Those **men work** in a	**factory**
B1707	**Students** like this **subject** because they **learn** about the	**past**
B1708	If you are **bored** you can **clean** the	**window**
B1709	The **driver** is **going over** the	**limit**
B1710	My **father** often **meets** my	**uncle**
B1711	I called the **place** to **ask** about a	**room**
B1712	He **enjoys food** with **a lot of**	**sugar**
B1713	You can **look nice** by **wearing** a	**hat**
B1714	It's **hard** for me to **remember** my	**password**
B1715	I like **football, swimming** and	**walking**
B1716	**Children** are **admired** for their **good**	**behaviour**

C1616	Please help me to **open** the **jam**	**phrase**
C1617	The **sports centre** has a new **basketball**	**date**
C1618	When it is **hot** you should **drink** lots of	**trouble**
C1619	Before we **ordered** we **looked at** the **restaurant**	**bucket**
C1620	The model **looked at herself** in the	**section**
C1621	My **car** was **fixed** by a	**translation**
C1622	She **called** the **doctor** to **make** an	**example**
C1623	The **postman delivered** the important	**kisses**
C1624	The **student studied** and got **good**	**shocks**
C1701	**Penguins eat** a lot of	**guards**
C1702	On **sunny** days there are no **clouds** in the	**firm**
C1703	**Silver, gold** and **iron** are different types of	**cable**
C1704	***Wine*** is usually **made** from	**wool**
C1705	The **tea** is in a **small white**	**roll**
C1706	**Cars** are **made** in a	**performance**
C1707	**History** is **learning** about what **happened** in the	**break**
C1708	If you are **hot** you can **open** the	**future**
C1709	He is **driving faster** than the **speed**	**pattern**
C1710	Your **father's brother** is your	**picture**
C1711	I called the **hotel** to **book** a	**case**
C1712	***Sweets*** and **biscuits** have **a lot of**	**monkeys**
C1713	Keep your **head warm** by **wearing** a	**park**
C1714	***Login*** using your ***username*** and	**bracelet**
C1715	I like **driving instead** of	**duty**
C1716	**Children** are **punished** for their **bad**	**departure**

A1717	Most **vegetables** are **grown** on a	**farm**
A1718	The **area close** to your **house** is your	**neighbourhood**
A1719	People enjoy **reading** their **birthday**	**cards**
A1720	**Chefs** are very **good** at	**cooking**
A1721	**Reading** and **photography** are **common**	**hobbies**
A1722	He **carefully filled out** the **job**	**application**
A1723	**Russia** is the **world's largest**	**country**
A1724	**Clothes fit** best if they are the **right**	**size**
A1801	Some people **wear blue trousers** called	**jeans**
A1802	Housewives **carry** food in a **plastic**	**bag**
A1803	I like **jewellery** made of **gold** more than	**silver**
A1804	**Doctors** and **nurses work** in a	**hospital**
A1805	The **criminal** was **caught** by the	**police**
A1806	**Kind** people give **money** to	**charity**
A1807	**Children's films** made of **drawings** are called	**cartoons**
A1808	There are **books** and **CDs** on the	**shelf**
A1809	Your **heart** moves **blood around** your	**body**
A1810	**Children** quickly **grow up** and **become**	**adults**
A1811	**Babies drink** from a **plastic**	**bottle**
A1812	**Schoolchildren wear** trousers and a **white**	**shirt**
A1813	He **called** the **restaurant** to **make** a	**reservation**
A1814	Eating **fruit** and **exercising** are **good** for your	**health**
A1815	In **summer** we always go **abroad** on	**holiday**
A1816	In **India** we ate **rice** and **chicken**	**curry**

B1717	Most **weekends I work** on a	**farm**
B1718	My **house** is in a very **quiet**	**neighbourhood**
B1719	People enjoy **receiving** a **lot** of	**cards**
B1720	His **father** is really **good** at	**cooking**
B1721	**People** often **have** a lot of **different**	**hobbies**
B1722	He **quickly finished** the very **boring**	**application**
B1723	**Tourists** like **going** to that **small**	**country**
B1724	Make **sure** that you **get** the **correct**	**size**
B1801	Some people **enjoy wearing clothes** called	**jeans**
B1802	The housewife couldn't **find** her **favourite**	**bag**
B1803	I like **sculptures** made of **wood** more than	**silver**
B1804	The **cleaners work** in the **big**	**hospital**
B1805	The **man** was **interviewed** by the	**police**
B1806	The **people talked** about the	**charity**
B1807	Some **popular films** are **amazing**	**cartoons**
B1808	There are **lots** of **things** on the	**shelf**
B1809	Some **people do not like** their	**body**
B1810	**Children** often do not **want** to **become**	**adults**
B1811	He **threw away** the **old**	**bottle**
B1812	**Office workers** usually **wear** a	**shirt**
B1813	She **told** her **husband** to **make** a	**reservation**
B1814	**Teenagers** don't know how to **look after** their	**health**
B1815	In **summer** we always have a **relaxed**	**holiday**
B1816	At the **weekend** I like to **eat chicken**	**curry**

C1717	Most **vegetables** are **grown** on a	**speech**
C1718	The **area close** to your **house** is your	**butterfly**
C1719	People enjoy **reading** their **birthday**	**brains**
C1720	**Chefs** are very **good** at	**dollars**
C1721	**Reading** and **photography** are **common**	**candles**
C1722	He **carefully filled out** the **job**	**entertainment**
C1723	**Russia** is the **world's largest**	**moment**
C1724	**Clothes fit** best if they are the **right**	**fear**
C1801	Some people **wear blue trousers** called	**grooms**
C1802	Housewives **carry** food in a **plastic**	**seat**
C1803	I like **jewellery** made of **gold** more than	**talent**
C1804	**Doctors** and **nurses work** in a	**detective**
C1805	The **criminal** was **caught** by the	**watches**
C1806	**Kind** people give **money** to	**happiness**
C1807	**Children's films** made of **drawings** are called	**trumpets**
C1808	There are **books** and **CDs** on the	**drum**
C1809	Your **heart** moves **blood around** your	**reason**
C1810	**Children** quickly **grow up** and **become**	**options**
C1811	**Babies drink** from a **plastic**	**level**
C1812	**Schoolchildren wear** trousers and a **white**	**bunch**
C1813	He **called** the **restaurant** to **make** a	**generation**
C1814	Eating **fruit** and **exercising** are **good** for your	**price**
C1815	In **summer** we always go **abroad** on	**gallery**
C1816	In **India** we ate **rice** and **chicken**	**leisure**

A1817	The **restaurant** has a **famous**	**chef**
A1818	She **invited** all her **friends** to her **birthday**	**party**
A1819	She **speaks** with a **strong Scottish**	**accent**
A1820	The **class listened** to their	**teacher**
A1821	The nervous **fans watched** the **football**	**match**
A1822	You **wear** a **hat** on your	**head**
A1823	A **small mountain** is called a	**hill**
A1824	The mother made her **sick** child some **chicken**	**soup**
A0001	**Doctors** choose **medicine** and then **write** a	**prescription**
A0002	In **maths class** we do **sums** using a	**calculator**
A0003	**Call** the **police** or an **ambulance** in an	**emergency**
A0004	She wants to get a **degree** from a **famous**	**university**
A0005	**Studying animals** and **plants** is called	**biology**
A0006	The **scientist** is in the **lab** doing the	**experiment**
A0007	Someone who **doesn't eat meat** is called a	**vegetarian**

B1817	The **woman** knows a very **famous**	**chef**
B1818	She **arrived** with her **friends** at the **fantastic**	**party**
B1819	She **likes** his **lovely pleasant**	**accent**
B1820	The **students** always **listen** to their	**teacher**
B1821	The **children watched** the **important**	**match**
B1822	He **put** the **book** on his	**head**
B1823	My **town** is close to a **big**	**hill**
B1824	The mother made her **child** some **delicious**	**soup**
B0001	**After** our **discussion** he **gave** me a	**prescription**
B0002	In **some classes** we **need** to use a	**calculator**
B0003	**Call** this **number** if you **have** an	**emergency**
B0004	She will get a **certificate** from the **old**	**university**
B0005	The **scientist studies** a lot of	**biology**
B0006	The **engineer** is in the **room** doing the	**experiment**
B0007	I **don't want** those **things** because I'm a	**vegetarian**

C1817	The **restaurant** has a **famous**	**plug**
C1818	She **invited** all her **friends** to her **birthday**	**sister**
C1819	She **speaks** with a **strong Scottish**	**entry**
C1820	The **class listened** to their	**danger**
C1821	The nervous **fans watched** the **football**	**file**
C1822	You **wear** a **hat** on your	**girl**
C1823	A **small mountain** is called a	**mate**
C1824	The mother made her **sick** child some **chicken**	**tear**
C0001	**Doctors** choose **medicine** and then **write** a	**tomato**
C0002	In **maths class** we do **sums** using a	**millimetre**
C0003	**Call** the **police** or an **ambulance** in an	**operation**
C0004	She wants to get a **degree** from a **famous**	**possibility**
C0005	**Studying animals** and **plants** is called	**facilities**
C0006	The **scientist** is in the **lab** doing the	**ability**
C0007	Someone who **doesn't eat meat** is called a	**documentary**