AN EXTENDED BKB SENTENCE TEST APPROPRIATE FOR A WIDE RANGE OF SPEECH PERCEPTION ABILITIES

MEGHNA PATEL

Master of Philosophy

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September 2011

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Thesis summary

Near zero percent performance has been reported for some users of the Bench-Kowal-Bamford (BKB) sentence test. The test is commonly used in the United Kingdom for hearing impaired listeners over eight years old to assess an individual's speech recognition ability, and in particular is used with cochlear implant users. The sentences contain simple and natural vocabulary that are suitable for almost any age range.

The main aim of this thesis was to generate a range of easier BKB sentences that are more appropriate for listeners who achieve these low scores with the standard BKB test. A range of tests were developed, these include: the Easy BKB Sentence Test, the Repeated and Emphasised BKB Sentences and the Closed Set BKB Sentence Test. When presented to either cochlear implant listeners or normally hearing adults in background noise, all of the easier tests were significantly more intelligible than the standard BKB sentence test. The sentences were also presented to normally hearing children between the ages of four and eight, and although there was no significant difference between the easier and original sentences, it was identified that children over five years of age achieve high scores.

The second aim of this thesis was to greatly increase the number of sentences within the BKB sentence test to reduce the learning effect that can be encountered when using the test repeatedly. The new sentences maintained the characteristics of the original BKB sentences, and a total of 1664 new sentences were recorded alongside the original 336 BKB sentences. No significant differences between the new and original sentences were found. Thus, enabling 2000 BKB+ collective sentences to be formed.

The two aims of the thesis were achieved, and an extensive collection of BKB sentence tests have been developed for clinical use.

KEYWORDS: Speech perception testing; Bench-Kowal-Bamford (BKB); The BKB+ Sentences; The Easy BKB Sentence Test; The Closed Set BKB Sentence Test; Repetition and Emphasis.

Acknowledgements

I wish to express my sincere gratitude to all who have supported and helped me with my studies.

In particular, I would like to thank:

My supervisor, Dr. Robert Morse, for his invaluable knowledge, enthusiasm and patience. I would also like to thank him leading me into the field of research and providing me with this great opportunity. I also thank him for developing the Aston Speech Test, which has laid the foundation for the experiments reported in this thesis.

I am grateful to Dr. Stephen Holmes for his continuous support and encouragement throughout this thesis.

I thank Mr Derek Hartley for the recordings of the emphasised BKB sentences.

I am thankful to Professor Stuart Rosen for providing me with the opportunity to carry out the BKB recordings at the University College London. I am grateful for the technical support of Mr Stephen Nevard during these recordings.

Special thanks go to Professor Quentin Summerfield for the excellent recordings of the New BKB+ sentences. I am appreciative of his time and effort spent during the recordings; it was a truly invaluable experience.

Professor David Crystal for his valuable advice and knowledge. His expertise in linguistics provided me with support in analysing the BKB sentences.

This research was financially supported by Advanced Bionics (Ltd). Particular thanks go to Mr Patrick Boyle and Ms Yvonne James.

I thank the final year BSc Audiology students, in particular Miss Sharon Sidhu and Miss Louisa Hughes for pilot studies that were carried out as their final year projects. These pilot studies were extremely useful to guide the direction of the experiments in this thesis. The data collected by Miss Sharon Sidhu was included in the first experiment.

I must acknowledge all the participants who took part in the experiments described in this thesis.

I would like to thank my friends and family who have supported me continuously throughout this thesis. In particular, I thank my parents for their continuous support, my sister for her immense encouragement and my husband for his love and support. Thank you for believing in me.

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1 Preface

1.1 Rationale

Speech perception testing is an essential part of cochlear implant provision; it is considered when considering the candidacy for an implant (Cooper, 2006) and can demonstrate the benefits of cochlear implantation. The Bench-Kowal-Bamford (BKB) sentence test (Bench et al, 1979) is commonly used in the United Kingdom, and consists of 336 meaningful sentences (21 lists each with 16 sentences) each containing an average of five words (Bench and Bamford, 1979). The sentence test has many advantages for the use with hearing impaired children, for instance it contains meaningful sentences with natural vocabulary.

However, one problem with the standard BKB test is that some listeners perform near 0% or near 100%, implying that there can be floor and ceiling effects of the test. Speech tests can be performed in noise to make the test more difficult, but there are currently no methods of making the test easier for subjects performing near 0%. The main aim of this thesis was to develop a range of test materials for the BKB sentence test to overcome this limitation.

Another problem with the standard BKB test is that there are only 336 sentences and listeners can become familiar with the test material. Due to this familiarity, it is difficult to identify whether a listeners increase in speech performance is due to improved listening or increased familiarity of the test materials. Clinically, when appropriate, the BKB sentences are presented in lists of 16 or 32 sentences, this presentation method can further increase the learning effect. A further aim of this thesis was to extend the number of standard BKB sentences whilst maintaining the vocabulary and syntax of the original materials.

1.2 Thesis outline

The eight chapters of the thesis are outlined below. The chapters that describe experimental results are largely self-contained, in that each includes a separate introduction, discussion and summary.

An introduction to speech production and perception is given in Chapter 2 to aid the understanding of the effects of speech in hearing loss. The objectives of speech perception testing and examples of speech tests are discussed in greater detail. The standard BKB sentence test is the speech test used in earlier experiments in this thesis, and the background of this particular test is therefore given.

The aim of the first experiment in Chapter 3 was to identify the easiest BKB sentences with normal hearing adults. 32 of the easiest BKB sentences were identified, and these sentences were used to form an Easy BKB sentence test. The aim of the second experiment was to identify if the easier sentences were more intelligible with cochlear implant users who achieve low scores with the standard BKB test.

The BKB sentences are recommended for use with children over eight years; however, the test is not routinely used in paediatric assessments and rehabilitation. The experiment in Chapter 4 aimed to identify if the Easy BKB sentence test can be used with children younger than eight, therefore, 20 normally hearing children were presented with the easier and original sentences. There were no significant differences between the original and easier sentences; however, there was an effect of age. The vocabulary within the BKB sentences is suitable for normally hearing children over the age of five years.

The results of the second experiment in Chapter 3 suggested that some profoundly deaf listeners still achieve near 0% with the Easy BKB sentence test, as a result new test materials were developed and are detailed in Chapter 5. Listeners with hearing impairments use hearing strategies to improve listening conditions; and two of these strategies were used to adapt the BKB sentences. In Chapter 5, the development of repeated and emphasised BKB sentences is described. Normal hearing listeners were presented with these sentences in two levels of background noise that simulated a moderate and severe hearing loss, and the new sentences were more intelligible in both noise levels.

As mentioned above, one aim of this thesis was to reduce learning effects that can be encountered with the standard BKB sentence test. The generation of 1664 new BKB sentences is described in

Chapter 6. Alongside the 1664 new BKB sentences, the original 336 sentences were recorded to maintain consistency with the recordings. To ensure a further constant, Professor Quentin Summerfield, the speaker for the original BKB sentences recorded the new BKB sentences. The new sentences provide a wider selection of BKB sentences that can be used in clinical practice on a daily basis with a reduced learning effect. It was identified in Chapter 7 that no significant difference was found between the new and re-recorded original sentences; therefore, they were combined to form 2000 BKB+ sentences. Due to the quality of the recordings, a difference was found between the original and re-recorded original BKB sentences.

The use of hearing strategies in Chapter 5 increased the intelligibility of the BKB sentences, however, there was still a need for an even easier test. In Chapter 7, the development of a closed set BKB sentence test is described. A closed set test can be more intelligible than an open set test, due to the multiple-choice selection. 16 templates were created which maintained the characteristics of one standard BKB list with 16 sentences. The 2000 BKB+ sentences were used to generate the materials of the closed set BKB sentence. For normally hearing listeners, the closed set sentences were more intelligible than the open set sentences, consequently, providing another easier sentence test.

Chapter 8 also contains a general summary of the complete thesis, recommendations for future work and general conclusions.

2 The nature of speech and language

Understanding speech is essential for verbal communication (Lutman, 1997). Speech can be described in terms of: acoustics, speech production and speech perception; speech perception, is the most relevant to this thesis. Acoustics concerns the physical properties of sound waves, which includes the amplitude, period, spectrum and duration of the speech signal; the perceptual correlates of these properties are loudness, pitch, quality and length respectively (Wright, 1997). Speech production describes the physiology of how speech is generated, whereby the specific movements in our vocal organs produce different sound waves (Denes and Pinson, 2007). Following the production of speech, speech sounds can be further processed to extract acoustic cues and linguistic elements such as phonetic information. Speech perception refers to the processes by which humans are able to identify, distinguish and understand these speech sounds (Wright, 1997).

The speech chain shown in Figure 2.1 shows the three processes involved with verbal communication: the linguistic, physiological and acoustic level (Denes and Pinson, 2007; Wright, 1997).

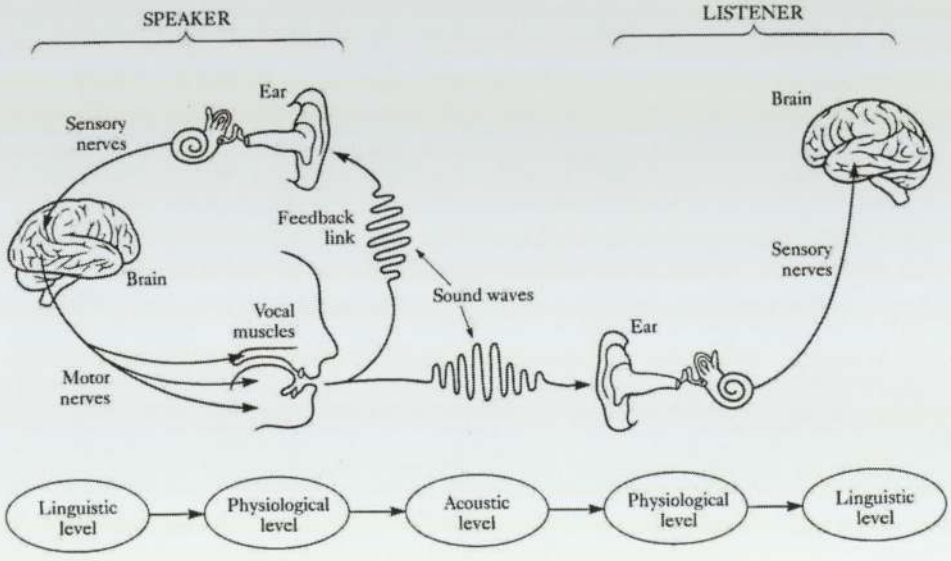

Figure 2.1. The speech chain (Denes and Pinson, 2007)

2.1.1 Linguistic organisation

Denes and Pinson (2007) describe the first part of the speech chain as a linguistic level, it is at this stage where the speaker must arrange his thoughts into language to initiate the communication process with another person, i.e. the listener. Speech and language is used to share and communicate thoughts, ideas and emotions, where language is a socially agreed code, shared by the individuals who are communicating (Owens, 2001). Language is the set of rules for representing concepts through the use of symbols; these symbols can be sounds, gestures, pictures or written characters (Raczaszek-Leonardi and Kelso, 2008). For verbal communication, the knowledge of a language is required, and language development is discussed in the next section. Speech sounds alone have no meaning, however, a sequence of sounds or phonemes can be combined to form syllables, and a combination of these can form words, resulting in the smallest units of language (Denes and Pinson, 2007). Words can then further be combined to produce lengthier linguistic units in the form of phrases and sentences.

Crystal (1979) described the three distinct aspects in the study of language: pronunciation (phonetics and phonology), grammar (syntax and morphology) and meaning (semantics). Phonetics deals with the production of speech sounds made by humans, and phonology refers to the patterns of sounds, which can be further split into two sections: segments (vowel and consonant patterns) and prosody (pitch, intonation, rhythm etc.) For grammar, syntax is the study of sentence structure and morphology is the study of word structure. Semantics are concerned with the meaning of words, expressions and sentences.

2.1.2 Language development

The first three years of life are an essential for acquiring speech and language skills, this is a period where the brain is developing and maturing (Sharma et al, 2002; McCormick, 2004; Nicholas and Geers, 2006; Watkin et al, 2007). Speech and language skills are best developed in surroundings that are rich with sounds, sights, and continuous exposure to speech and language of others (Alan,

2003). Newborns can quickly learn to locate sounds and recognise words (Northern and Downs, 2002), and although children vary in their development of speech and language, typically, children tend to grasp the complexities of spoken language by six to seven years of age (Stromswold, 2008).

Language development can be receptive or expressive; where receptive language development is the ability to comprehend and understand language, and expressive language development is the ability to communicate language. Delays in developing language can be due to a number of causes, for example, maturation delays, hearing impairments, or learning disabilities. For children who have delays in language development there are several measures of language acquisition, which can assess a range of skills, for instance, expressive and receptive language, phonological awareness, memory and comprehension. Several tests are available to measure these abilities, e.g. the Clinical Evaluation of Language Fundamentals (Semel et al, 2011), the British Picture Vocabulary Scales (Dunn et al, 2011), Comprehensive Test Of Phonological Processing (Rashotte et al, 1999), Test Of Word Reading Efficiency (Rashotte et al, 1999), the Wechsler Abbreviated Scale of Intelligence (Wechsler, 2011), and the Renfrew Action Picture Test (Renfrew, 1997). The Renfrew Action Picture Test is described in detail in Chapter 4. The tests can measure for a range of ages and abilities, and provide standardised norms to compare. The tests vary in length and the time taken to administer, and additionally, some tests can only be administered by registered health care professionals.

2.1.3 Speech production and perception

One of the first links in the speech chain is speech production (Denes and Pinson, 2007). Speech production is a complex mechanism which involves the vocal organs and the way in which these organs specifically move to produce speech sounds. The production of speech sounds involve four components: the air stream process, the phonation process, the oro-nasal process and the articulation process (Ladegoged and Johnson, 2010). When we exhale, air from the lungs passes through the trachea to the vocal tract. The air flow can pass through to the trachea when the vocal cords are open, and when the vocal cords are closed the air flow is shut off (Denes and Pinson,

2007). The phonation process refers to the actions of the vocal tract, which can generate voiced sounds when the tract is vibrating, and voiceless sounds when the vocal tract is open. The air stream can release sounds through either the nose (e.g. 'm' and 'n') or through the mouth (e.g. 'v' or 'z') and this is the oro-nasal process (Ladegoged and Johnson, 2010). During speech sounds, the vocal tract can be altered by moving the throat, tongue, lips and the roof of the mouth, creating different speech sounds and this process is called articulation (Denes and Pinson, 2007; Ladegoged and Johnson, 2010).

The speech sounds of English language can be classified as vowels or consonants. Vowels sounds are voiced, and are produced with an open vocal tract, consonants however, can be either voiced or unvoiced, and are produced with a partial or complete constriction in the vocal tract. Place of articulation is where the constriction is. Manner of articulation is how the constriction is formed. Vowels are described in terms the tongue and lip positions e.g. high or low tongue placements. In contrast, consonants are described by their place of articulation e.g. lips, hard or soft palette and manner of articulation e.g. plosives, fricatives or affricates. Three types of the manner of articulation are defined further: plosives (stops) are 'blocking' sounds and are made by temporarily blocking the vocal tract with the tongue or lips and then rapidly releasing the pressure, e.g. 'p' or 'b'. Fricatives are 'hissing' sounds and are produced by placing the tongue close to the palette which creates turbulence in the air stream, e.g. 'sh', and affricates are sounds that are generated by a complete stop followed by a fricative (Denes and Pinson, 2007).

Speech sounds are not produced independently of each other (Borden et al, 2003). When speaking, words tend to merge into one another; this is known as assimilation, where the end of one word assimilates into the beginning of the following word (Crystal, 1997). The articulators involved in the first word begin to form the second word before the last sound has been completed. As well as assimilation, co-articulation is involved, by which two sounds overlap and the final sounds of the first word are lost in the beginning of the second word (Crystal, 1997)

The individual features of speech are referred to as segmental elements of speech. Suprasegmental elements are those elements that deal with greater units of speech sounds, such as syllables, words

and sentences and include aspects such as stress and intonation (Denes and Pinson, 2007), such aspects are also known as prosodic aspects (Wright, 1997).

For speech perception, there are three main sources that are normally used: acoustic cues, which were described above; where the listener can use features such as prosody and voicing to help identify speech. Contextual information, is another main source of speech information, and refers to the cognitive aspects that an individual uses (Hazan, 2001), for instance, the knowledge of vocabulary and grammar knowledge, and general knowledge of the world. As described by Hazan (2001), if a listener heard "For your birthday I baked a ___", they would be able to identify the missing word that would complete the sentence, i.e. "cake". Contextual information is very useful when acoustic cues are not available or degraded. Speech communication relies not only on acoustic information but also on visual information, and visual cues when available can improve the intelligibility of speech understanding. Some speech sounds are easier to lip-read than others, as the place and manner of articulation can contribute to this (Hazan, 2001).

The 'speech banana' model shown in Figure 2.2 is a representation of English sounds in respect to their level and frequency, the model summarises many of the aspects discussed above. Figure 2.2 further identifies that consonant sounds represent the higher frequency components of speech which provide the intelligibility in speech, and the vowel sounds represent the lower frequency components which provide the intensity in speech.

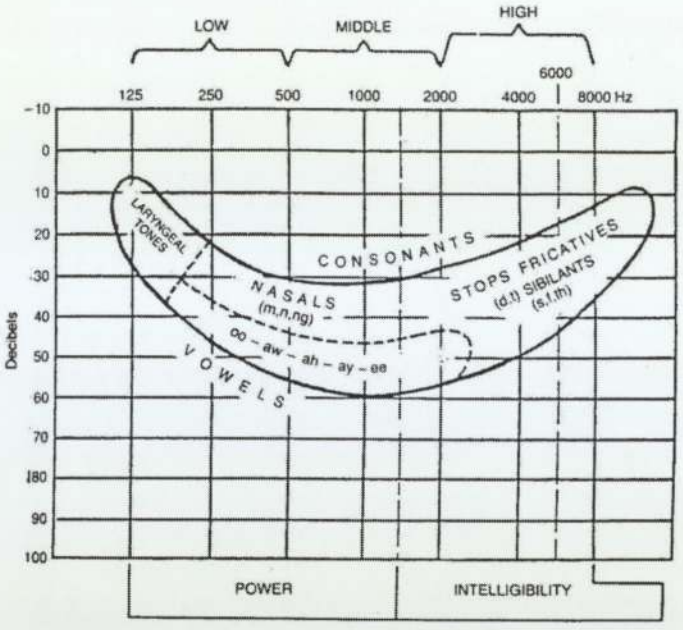

Figure 2.2. The speech banana model, showing the frequency components of English sounds (Martin, 1997)

2.1.4 Hearing

The ability of hearing is a complex process, and is an essential part of the speech chain for the listener (Denes and Pinson, 2007). An understanding of how speech perception is affected by hearing impairment requires an understanding of hearing in the normal ear. As shown in Figure 2.3, the normal ear is divided into three major sections: the outer ear, the middle ear and the inner ear (Moore, 2007). The outer ear consists of the external ear (pinna) and the ear canal, which is closed off by the tympanic membrane (eardrum). The middle ear is the space behind the tympanic membrane and contains the three smallest bones in the body which are known as the auditory ossicles, and the inner ear contains the cochlea which is fluid filled (Denes and Pinson, 2007; Northern and Downs, 2002).

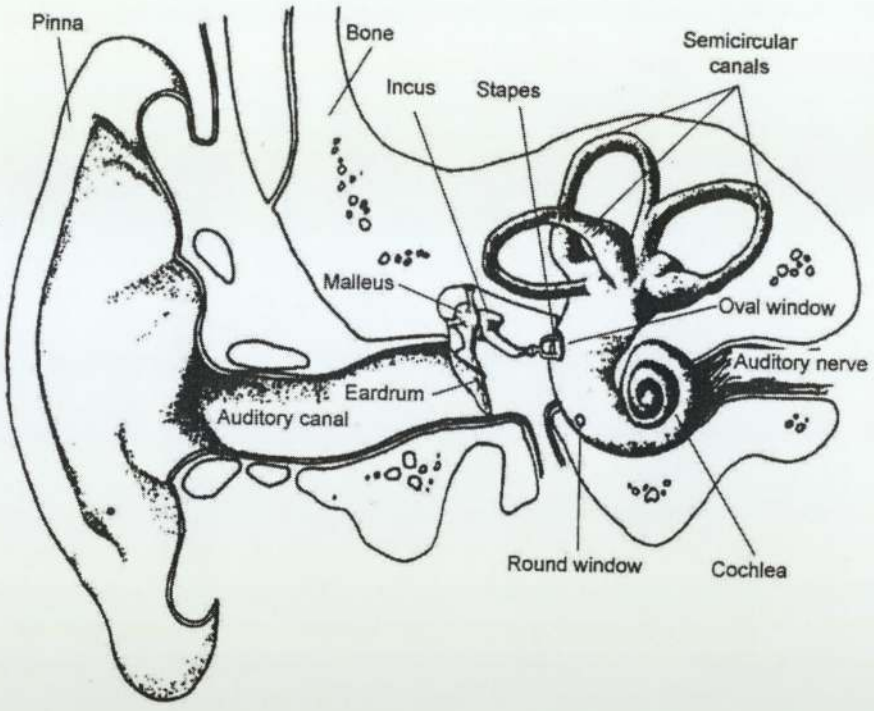

Figure 2.3. The structure of the normal ear showing the outer, middle and inner ear (Moore, 2007).

Sound reaching the outer ear causes the tympanic membrane to vibrate. The vibration of the tympanic membrane causes motion of the ossicles in the middle ear, which transfers the sound energy to the inner ear. The cochlea transform the acoustic vibrations into electrical signals that are transmitted to the brain by auditory nerves (Denes and Pinson, 2007; Northern and Downs, 2002), thus creating the sensation of hearing. The speech chain ends when the speaker decodes this information at a linguistic level.

The speech signal consists of many rapid changes in intensity, frequency and time. The auditory system, when functioning normally, processes many aspects of speech which are essential for the perception of speech. Lutman (1997) described these as frequency resolution, temporal resolution, suppression and intensity discrimination. Frequency resolution (also known as frequency selectivity or frequency analysis) is the ability of the auditory system to detect a signal from a complex sound containing different frequencies (Moore, 2007; Moore, 2008; Lutman, 1997), and is particularly useful in speech communication to ensure the listener can identify speech in noise (Dillon, 2001). Temporal resolution refers to the ability to detect changes in a sound over time

(Moore, 2007). Suppression is ability to reduce the threshold at one frequency in the presence of sound at neighbouring frequencies (Moore, 2007), and intensity discrimination is the ability of the auditory system to differentiate between sounds with varying intensities (Lutman, 1997).

Pure tone audiometry is the standard method used to identify a listeners hearing threshold, and these hearing thresholds are usually presented on an audiogram, which show a listeners hearing threshold at each frequency tested. The audiogram shown in Figure 2.4 is a standard audiogram used in Audiology. It contains the approximate level for familiar sounds; in addition, the shaded area represents the speech banana displayed in Figure 2.2, which identifies the effects on speech sounds caused by a hearing loss. For those with normal hearing, sounds quieter than 20 dBHL are identified, however for those with a profound deafness sounds that are louder than 90 dBHL may not be heard.

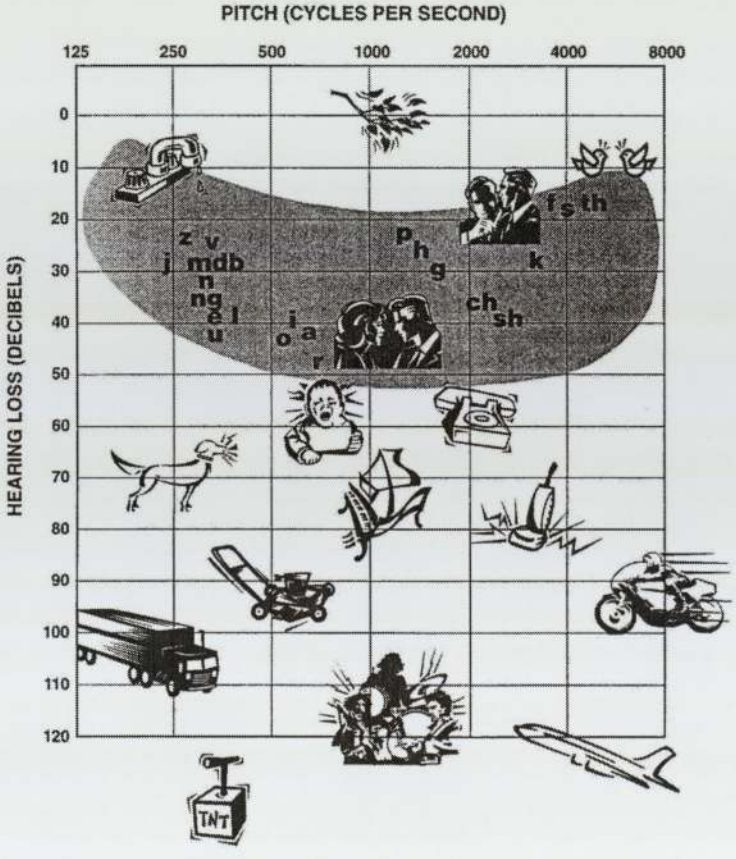

Figure 2.4. Standard audiogram used in Audiology, which displays the loudness levels of familiar sounds. The grey shaded area is the 'speech banana' which can be used to identify the effects of hearing loss on speech sounds (Northern and Downs, 2002).

2.1.5 Effects of hearing loss on speech perception

A hearing loss can disrupt the perception of speech, and depending on the type and degree of hearing loss, an individual can encounter many difficulties with speech communication. Hearing loss can decrease the audibility of speech, and listeners with profound deafness may not perceive speech at all (Dillon, 2001). Even when the speech is audible, hearing loss may cause degraded speech quality due to the decreased frequency and temporal resolution of the auditory system.

Hearing impaired listeners have reduced audibility of sounds, where some sounds are completely inaudible (Dillon, 2001). Individuals with a sensorineural hearing loss have a reduced dynamic range (i.e. the level difference between their hearing threshold and an uncomfortably loud sound) compared to normally hearing listeners (Dillon, 2001; Moore 2007). As the severity of loss increases, the dynamic range can become very small. For hearing impaired listeners, this can impact speech perception as the range of many sounds exceed the dynamic range (Dillon, 2001). Certain hearing impaired individuals may be sensitive to loud sounds that are comfortable to normally hearing listeners, and this is known as recruitment. Loudness recruitment is defined as the abnormally rapid growth of loudness as the level of a stimulus is increased (Moore, 1996; 2008). Thus, hearing impaired listeners can lose the ability to perceive soft sounds, but may still detect intense sounds in the same loudness level as normally hearing listeners (Moore, 2008).

Frequency resolution was introduced in Section 2.1.4, and can contribute to speech perception (Moore, 2008). Moore (2008) suggests that frequency resolution is reduced by damage to the cochlea. For listeners with normal hearing, i.e. those who have normal cochlea functioning, they have the ability to use auditory filters within the basilar membrane of the cochlea to distinguish between sounds of different frequencies (Moore, 2008), and can therefore separate speech from noise (Dillon, 2001). Listeners with a sensorineural hearing impairment, have wider auditory filters due to cochlea damage, this enables more noise to pass through the filter, particularly the low-frequencies sounds (Moore, 2008). When several competing sounds of similar frequencies are heard, the cochlea has one wide region of activity, instead of smaller individual regions of activity

for each frequency (Dillon, 2001). Due to this, discrimination between sounds is reduced and listeners can face difficulties separating sounds of different frequencies (Dillon, 2001). This reduction in frequency resolution for listeners with a sensorineural hearing loss can cause difficulties when identifying speech in noise or understanding one speaker from a group of speakers (Dillon, 2001; Moore, 2008).

Listeners with hearing impairments also have difficulties with speech perception due to reduced temporal resolution abilities. Temporal resolution was also introduced in Section 2.1.4, and is the ability to detect changes in sound over time (Moore, 2007). This is particularly important for speech perception and understanding, as speech is a constantly fluctuating noise (Dillon, 2001). Normally hearing listeners are able to identify the gaps in noise, and are able to extract the important elements such as speech, whereas, listeners with hearing impairments lose this ability (Dillon, 2001). Due to the reduced temporal resolution, hearing impaired listeners can again face difficulties in general communication, but in particular have difficulties with speech in the presence of background noise and music.

A combination of decreased audibility, reduced dynamic range, loudness recruitment and reduced frequency and temporal resolution can effect speech perception for hearing impaired individuals. Some of these factors can be controlled with by hearing aids and/or cochlear implants, but the benefits vary with each factor. For example, hearing aids with compression can reduced the dynamic range of a signal (Dillon, 2001) so that low level sounds are more amplified than high level sounds (Moore, 2008), this can ensure that loud sounds do not exceed the uncomfortable loudness levels. Hearing aids with directional microphones can reduce background noise and focus on speech sounds, this can help with frequency resolution (Dillon, 2001), so that the listener is able to differentiate between unwanted and wanted sounds, such as speech in background noise. Compression can also help with temporal resolution, whereby the gain is rapidly increased for quiet sounds, and decreased for loud sounds (Dillon, 2001). This can make the softer sounds more intelligible in the presence of louder sounds, but can also cause a problem as soft background noises would also be more audible (Dillon, 2001). These features of hearing aid, e.g. compression

and digital microphones can help to overcome the effects of hearing loss on speech perception (Moore, 2008). Hearing aids can offer reasonable compensation for the effects of hearing loss on speech perception, but hearing impaired listeners can still face difficulties, especially in complex listening situations such as speech in noise.

2.2 Speech perception testing

Pure tone audiometry provides only a partial picture of the auditory function but is useful in determining the degree and type of hearing loss. However, it does not give any information regarding a person's ability to hear and understand speech. These abilities can be accessed using speech perception tests, where standardised language samples are presented through a calibrated audio system. Speech perception testing is a technique by which speech material is presented to measure some aspect of hearing ability (Carhart, 1951), and its objective is to determine the intelligibility of speech. Speech perception tests can provide an estimate of the level of difficulty that a listener with a hearing impairment may have in daily communication, and is a direct way of assessing how much a person can understand speech.

Speech perception testing involves asking the patient to say what they heard immediately following the presentation of an utterance. As described by Ballantyne & Martin (2001), speech perception tests can measure several aspects of a person's understanding of speech. It can be used to determine a person's ability to identify speech (speech detection) and their ability to differentiate between words (speech discrimination). It is also used to assess how well a person can recognise a word and say what that word is (speech recognition). Additionally, it can establish how well a person understands the meaning of speech and sentences (speech comprehension).

The results of speech perception tests are presented as a speech audiogram (Evans, 1997). The test results assess the individual's ability to detect the presence of speech and also their ability to recognise words. The speech detection threshold is the lowest level where speech is heard, where the speech does not need to be understood.

Speech perception tests have been clinically used for many years to investigate an individual's ability to hear speech (Tye-Murray, 2004). There are many ways that the results from speech perception tests can be used. In the 1970s to 1980s, results were used to diagnose the cause of sensorineural hearing loss (Ballantyne & Martin, 2001). In addition, speech perception tests can clinically provide support for diagnostic purposes, as it can be used to confirm pure tone audiometry thresholds, or identify a non-organic hearing loss or enable diagnosis of central auditory disorders (Ballantyne and Martin, 2001; Evans, 1997). Other audiometry tests such as pure tone audiometry (PTA) and evoked response audiometry (ERA) can assess the functioning of the auditory system by providing computer responses such as waveforms and electrical responses. These can identify how well a patient should be hearing, but cannot identify how well a person can actually recognise speech (Ballantyne and Martin, 2001).

Speech testing is not normally used within the UK in routine adult audiology clinics for hearing aid provision, although it is sometimes used within paediatric services to assess a child's performance with hearing aids (Markides, 1997; Martin, 1997; Northern and Downs, 2002; Watson, 1957). The Modernising Children's Hearing Aid Services recommend that speech testing should be used as a tool for evaluating children's hearing aids (MCHAS, 2009). Speech perception tests are not routinely used when fitting hearing aids because of the additional time required (Gatehouse & Robinson, 1997). Speech perception testing is regularly used in cochlear implant centres for both adults and children (Cooper, 2006; Fielden, 2006; Osberger et al, 2006). For cochlear implant provision, speech testing with the Bench-Kowal-Bamford (BKB) sentence test (Bench and Bamford, 1979) is required and the results are an essential component when considering candidacy for an implant (Cooper, 2006), and are also performed as an outcome measure.

2.2.1 Variations in speech perception tests

A wide variety of speech materials have been developed for speech perception testing, and these can be used to assess all areas of speech; detection, recognition and understanding. The choice of material depends on the purpose of the test and is selected in order to suit the individual needs

(Elphick, 1984; Markides, 1978). Variations in speech perception testing include the test materials (phonemes, syllables, words, or sentences), response methods (closed-set or open-set), presentation level (dB SPL), test condition (audio, audio-visual or visual alone) and presentation mode (live voice or pre-recorded).

2.2.1.1 Test materials

The stimuli used in speech perception testing can be phonemes, syllables, words or sentences. Tests of phonemes and syllables are useful as they are quick to administer, and do not need much linguistic knowledge. Meaningful sentences, however, have a higher 'face validity' as they are more representative to everyday speech (Niemeyer, 1976; Rosen & Corcoran, 1982). But more complex stimuli, such as sentences, require greater cognitive function, for example more working memory and greater linguistic knowledge, thus tests with sentences can assess many aspects of auditory ability in a single assessment. In speech perception testing, redundancy refers to the effect of context on intelligibility; a word is harder to understand in isolation because of the fewer contextual cues available. It was also introduced in Chapter 2 (Section, 2.1.3) that listeners can use contextual information to identify the missing parts of speech. Therefore, the most important factor for the choice of stimuli is the amount of redundancy in the speech material. Phonemes are the least redundant type of stimulus and sentences the most redundant, as there is more choice in alternatives with sentences and less with phonemes (Lyregaard, 1997). As shown in Figure 2.5, when a word is contained within a sentence it is more intelligible than the word alone, as the possibilities are considerably reduced (Miller et al, 1951). In addition to this, when a word is embedded within a sentence, the natural speech properties such as assimilation and co-articulation as discussed in Section 2.1.3, can enable further acoustic cues to the listener.

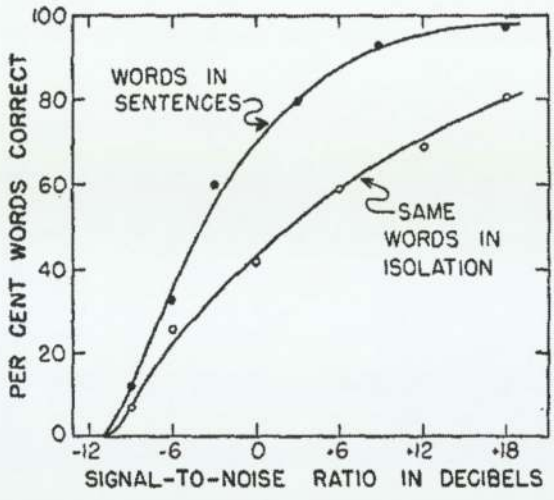

Figure 2.5. The effect of context on the intelligibility of words (Miller et al, 1951)

There are however some shortfalls to using sentence tests, as they are more time consuming and the additional time spent on such tests may not be feasible within clinics due to waiting lists and staff shortages (Gatehouse & Robinson, 1997; Boothroyd, 1968). Speech tests can be extremely dependent on language and intelligibility, and patients must be able to recognise the test material and be able to follow test instructions (Ballantyne and Martin, 2001). There can be a limitation with speech tests where English is an additional language, and speech tests would be beneficial in a wider range of languages. Also, learning effects can influence the results if patients become familiar with the material from repeated use. When repeating the test, the scores may improve due to the learning effect, meaning that listeners get familiar with the speech they hear and they understand it better after every listening session. The test material, regardless of time between presentations, should ideally not be presented more than once to the same patient (Foster et al, 1993; Fry, 1961).

2.2.1.2 Response methods

When responding to an utterance in speech perception testing, listeners can be required to repeat back what was heard (open set tests) or select a response from a range of choices (closed set tests) (Dillon and Ching; 1995). With an open set test, the listener's full response is known. The open set tests can therefore provide more information about speech ability than closed set tests. Whereby, in

the closed set test, only the listener's correct response is noted and all that is known is whether the listener made the correct response; open set tests are thus considered to be the "gold standard" (Chute and Nevins, 2008). A consideration for closed set tests is that through chance alone listeners will correctly select the response to some stimuli even if they are completely unintelligible; an important factor for closed set tests is therefore the number of possible options for each stimuli. These chance scores however can be easily monitored with a closed set test as responses are recorded, and can later be analysed to identify any patterns of error with the responses. Nonetheless, closed set tests are useful when open set tests cannot be performed, i.e. when listeners have limited vocabulary or poor verbal communication. Due to the large number of permutations available with some closed set tests, it can be noted that closed set tests are therefore beneficial in reducing learning effects. However, this benefit of the closed set tests can be overcome by obtaining a large set of stimuli with open set tests and ensuring that materials are not repeated.

Generally, responses in speech perception testing are made verbally; there may be cases when listeners are required to write down responses. There are some tests which may require the listener to point or select to an item or a picture, this is useful with children who are developing language and vocabulary skills.

2.2.1.3 Speech testing in noise

Everyday communication generally occurs in the presence of noise, which normally results in poorer intelligibility than in quiet. It is sometimes useful, however, for speech tests to deliberately be performed in background noise. When tests are performed in quiet, some listeners can score near 100% and therefore be subject to ceiling effects. With such high scores, it becomes difficult to distinguish between benefits of rehabilitation and technology. When noise is added to the speech test, the conditions become more challenging and thus the ceiling effects can be reduced and results can be more sensitive to changes to rehabilitation and different hearing devices.

For normally hearing listeners, a masking noise can be presented over speech stimuli to simulate hearing impairment (Moore, 2008), and this method can be beneficial for investigations with

speech perception. The masking noise used in speech perception testing should have significant energy at all speech frequencies (Lutman, 1997). The critical bandwidth is the measure of the effective bandwidth of the auditory filter (Moore, 2008) can determine the efficiency and effectiveness of a masking signal (Roeser and Clark, 2000). There are several types of masking noises available for speech perception tests, for instance, continuous noises such as white or pink noise, and more realistic noises such as multitalker babble. The spectrum level of white noise does not vary as a function of frequency whereas the spectrum level for pink noise decreases by 3dB for each doubling of frequency (Moore, 2008). Multitalker babble noises are realistic of everyday situations, however, this is not the most effective form of masking due to the fluctuating signal which can enable listeners to identify cues in the gaps.

The use of a masking noise to simulate a hearing loss may not be as effective as investigations with hearing impaired listeners because normally hearing listeners do not having the same decreased dynamic range or reduced temporal and frequency resolution abilities. However, the use of a suitable masking noise (such as pink noise) can be beneficial for research, as the individual differences encountered with hearing impaired listeners are overcome. The experiments described throughout this thesis use pink noise when using participants with normal hearing listeners, as the spectral content of pink noise has very much identical masking properties to the frequency range of speech (Rao & Letowski, 2006).

2.2.1.4 Test conditions

Normal speech communication relies not only on acoustic information but also on visual information. When the acoustic information has become poor, e.g. background noise or a hearing impairment, a persons' understanding of speech can be seriously affected. These difficulties, however, can be reduced by seeing the speakers face (Lidestam and Beskow, 2006; MacLeod and Summerfield, 1987; 1990;). To assess the contributions of audio and visual information to speech intelligibility, speech materials can be presented either in audio-only, audio-visual or visual only conditions.

Auditory stimuli can assess a listener's true acoustic ability, where visual alone conditions can measure a listener's lip-reading ability can be assessed. Audio-visual testing, which combines both conditions can represent real-life situations to a very good extent. However, audio only conditions are more commonly used so that a listener's auditory functioning can be assessed.

2.2.2 Currently available speech tests

Several criteria need to be strictly followed when creating such tests, for instance, the vocabulary must be within the range of the patient, and any lists should be phonetically balanced and equal in terms of difficulty (Fry, 1961; Watson, 1957).

One of the most common speech tests in UK clinics was created by Arthur Boothroyd (Boothroyd, 1968). This test is commonly known as the AB word lists and consists of 15 lists, each with 10 words containing the same 30 phonemes; 10 vowels and 20 consonants (Boothroyd, 1968). The stimuli are short and the test is therefore quick to administer. Because of the large number of lists there is not a substantial learning effect.

A common used speech test for children is the McCormick Toy Test (McCormick, 2004), which consists of 7 pairs of words, where each word has an associated toy. Each word pair has similar sounding word, for instance "tree" and "key". The test is very useful in determining how well a child can differentiate between words, and is often used clinically as it is a short test to administer

Another speech test is the Four Alternative Auditory Filter (FAAF) test. The test consists of 20 sets of 4 similar words, giving an 80 item test, for example: 'mail, bail, nail and dale.' Each of the 80 words are ranked in order of difficulty, for the above example, the rankings are: '34, 58, 48, 45' with 1 being most difficult and 80 is the easiest (Foster and Haggard, 1987).

An additional test is the Bench-Kowal and Bamford (BKB) sentence test (Bench et al, 1979). The test consists of 21 lists, each with 16 sentences and each sentence has 3 or 4 keywords used for scoring purposes. The test has similar advantages to the AB word lists, as there are many sentences. More importantly the test uses sentences, which provide a greater resemblance to speech. The test

is recommended for individuals over the age of eight years (Bench and Bamford, 1979), and contains natural meaningful sentences with simple vocabulary and language structures, which enable the sentences to be used for almost any age range. The Institute of Hearing Research (IHR) audio–visual sentences were adapted from the BKB sentence test, and consist of 10 lists with 15 sentences each (MacLeod and Summerfield, 1990). The BKB sentence test is discussed in greater detail in Section 2.2.3, and this speech test forms the focal part of the later chapters described in this thesis.

Another common sentence test is City University New York (CUNY) test (Boothroyd et al, 1995). The audio-visual test consists of 26 lists and each list has 12 topic related sentences. Each sentence ranges from 3 – 15 words and subjects are scored on each correct word identified. Examples of CUNY sentences include 'take an umbrella' and 'don't try to run unless you have good shoes' (Plant, 1997). Each sentence has a wide range of words which influences the difficulty levels between sentences. The examples show that the two sentences are very different regarding the complexity of word structure, the BKB sentences however, have an average of 5 words per sentence, which allows the difficulty between the sentences to be controlled.

Most of the speech tests were created over 40 years ago and the vocabulary or phrases in some tests may no longer be familiar to all listeners. For example, one sentence within the BKB sentence test is 'The bread van's coming' and younger children may not be familiar with this concept, and therefore not perceive this naturally.

2.2.3 The Bench, Kowal & Bamford (BKB) sentence test

The BKB sentences were created by Bench, Kowal and Bamford in 1979, and are used as a test for measuring speech recognition.

Bench, Kowal and Bamford visited schools for deaf and hearing-impaired children aged 8-15 years of age to collect test samples. A total of 263 children were seen (140 boys and 123 girls) with a mean age of 11.6 years. All children had a hearing impairment and the pure tone hearing threshold

was less than 40 dB in the better ear. Children who did not meet the hearing level and intelligence criteria did not perform the procedure (Bench and Bamford, 1979). Natural language samples were taken from this population as this was the population for who the test had been designed for. It was assumed that as the language samples were taken from hearing impaired children the vocabulary should be within their understanding.

The children were shown images, such as that shown in Figure 2.6, and they were prompted to describe what was happening in the picture. The interview was tape recorded for data analysis at a later stage. Transcribers were used to analyse the data and specific instructions were given, for instance, they were told not to expand or abbreviate contractions, e.g. 'she'll' does not equal 'she will.' The words were categorised as nouns, verbs and adjectives etc. One aim of the data analysis process was to determine how many times each word had been used, therefore, words familiar to the majority of the children could be identified (Bench and Bamford, 1979).

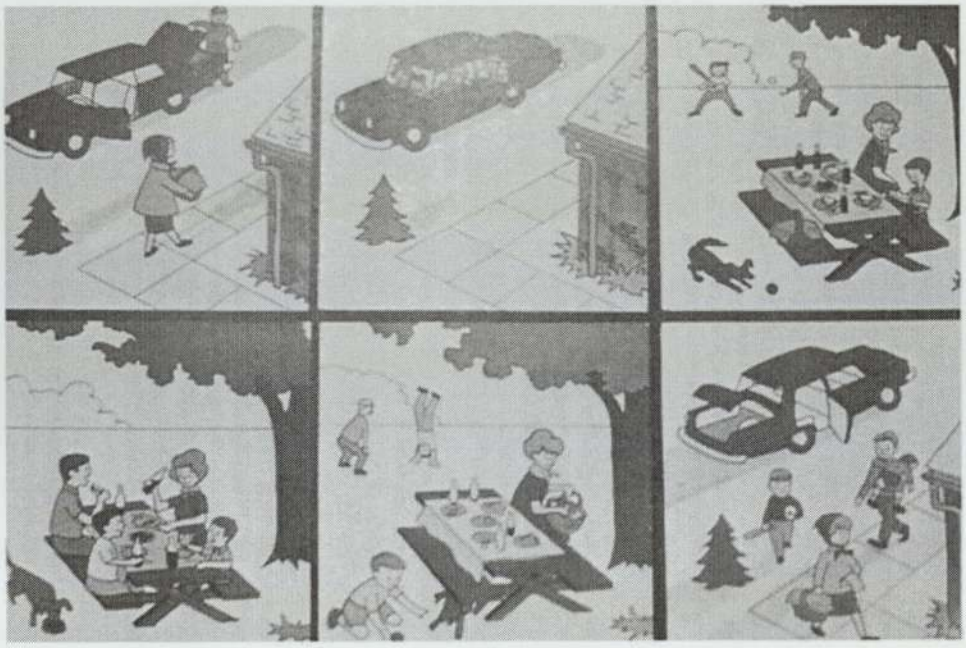

Figure 2.6. One of the pictures presented to the hearing impaired children to collect samples of natural language for the BKB sentence test (Bench and Bamford, 1979).

Bench and Bamford (1979) also analysed the sentences for grammatical structure according to the seven development stages identified by Crystal et al (1976). At each stage, the complexity of the utterances increases. The first three stages are relevant to this thesis and they are:

- Stage 1. Word statements such as "Car," "Mum" or "Dad".
- Stage 2. Clauses that contain two elements; for example a subject and verb (SV) e.g. ("he cried") or a subject with complement or object (SC/O) e.g. ("eat biscuit").
- Stage 3. Clauses that contain three elements; for example a subject – verb - complement/object (SVC/O) e.g. ("man throwing ball") or a subject-verb-adverb (SVA) e.g. ("daddy drives fast").

From their analysis, Bench and Bamford determined the most common stage of the childrens' utterances and the most common grammatical structures. For stage 2 utterances subject-verb (SV) clauses were most frequent. Most utterances at stage 3 had a sentence-verb-object (SVO), a sentence-verb-adverbial (SVA) or a sentence-verb-complement (SVC) structure.

The sentences were compiled into 21 lists each with 16 sentences, as shown in Appendix A. Based on a Language Acquisition Remediation Screening Profile, (Crystal, 1979), it was decided that each list should contain a set number of clauses from each stage: seven SVO structures, six SVA structures, two SVC structures and one SV structures.

Bench and Bamford also identified that it was important that each child has an equal chance of correctly identifying the first word of each sentence. Each sentence therefore, was to begin only with a determiner e.g. ("the" or "a"), personal pronoun e.g. ("she", "he" or "they") or a noun e.g. ("father" "baby" or "people").

To try and make the lists equally difficult, Bench and Bamford had the following criteria for the sentences and lists:

- No sentence should exceed a total of 7 syllables
- The sentences should have an average of 5 words

- Each list should contain 7 SVO word structures, 6 SVA word structures, 2 SVC word structures and 1 SV word structure.
- 11 sentences of each list should begin with a determiner, 4 with a personal pronoun and 1 with a noun
- 14 sentences of each list should contain 3 keywords and 2 sentences containing 4 keywords (for scoring purposes)
- Each keyword should appear in the total vocabulary at least twice throughout the entire test material

Despite these criteria, an analysis as part of this thesis showed that three of the 336 sentences had eight syllables.

  - The driver waits by the corner (List 11; sentence number 5)
  - The tiny baby was pretty (List 15; sentence number 11)
  - The egg cups are on the table (List 21; sentence number 10)

This analysis of the BKB sentences also showed that not all the lists contain the correct number of each type of grammatical structures. The original test actually had 162 SVOs, 103 SVAs, 42 SVCs and 29 SVs (it should have had 147 SVOs, 126 SVAs, 42 SVCs and 21 SVs structures in the 21 lists). Some of these differences were because of the ambiguity of the structures e.g. for the BKB sentence "They're looking at the clock" is more likely to be considered as an SVO structure (i.e. *what* they are looking at) but can also be considered as an SVA structure (i.e. *where* they are looking). In the analysis, the sentences were categorised according to which interpretation would be most likely, and Professor David Crystal, a linguistics expert confirmed these categorisations.

The analysis also showed that, contrary to the criteria, 19 keywords appeared only once ("ambulance", "clouds", "clown", "dragon", "fetches", "finger", "green", "handstand", "lemons", "melted", "pepper", "pond", "rice", "scissors", "shave", "straw", "stuck", "sucking" and "tiny").

2.2.4 The Institute of Hearing Research (IHR) Sentence Test

The Institute of Hearing Research (IHR) Audio-Visual Sentences were adapted from BKB sentences to test lip-reading ability (MacLeod and Summerfield, 1990). Rosen and Corcoran (1982) developed audio-visual recordings of the BKB sentence test; however, they are no longer available for use. The IHR sentences intended to have similar criteria to the BKB sentences. The BKB and IHR sentences were recorded with the same speaker (Professor Quentin Summerfield) and it has been suggested that the tests could be combined to reduce learning effects (Parfect and Lutman, 2002).

The IHR sentence test contains 150 sentences (10 lists with 15 sentences each), as shown in Appendix B. Each sentence contains three keywords and these keywords are used for scoring purposes in the same way as the BKB sentences. The new sentences had predominantly new vocabulary for instance "neighbour", "raspberries" "mountain" are all words that are not included in the BKB sentences. As the vocabulary for the BKB sentences were collected from language samples of hearing impaired children, it was thus ensured that the vocabulary was suitable for individuals over the age of eight. Because of the inclusion of new vocabulary within the IHR sentences, it cannot be assumed that the vocabulary is suitable for the same age range. Given this and the below analysis, it was decided to not combine the sentence tests for any of the experiments described in this thesis.

As the IHR sentences were to only include three keywords, they were therefore intended to match the syntactic structures of those BKB sentences with three keywords, as shown in Table 2.1.

Number of sentences		
BKB Lists	IHR Lists	
		Syntactic form
7	7	Subject—verb—object
6	6	Subject—verb—adverb
2	1	Subject—verb—complement
1	1	Subject—verb
		Initial word
11	10	Determiner
2	2	THEY
1	1	HE
1	1	SHE
1	1	Noun

Table 2.1. The comparison of the grammatical structure of sentences in the BKB lists and IHR lists (MacLeod and Summerfield, 1990).

The analysis of the IHR sentences for this thesis showed:

- The average sentence had 5 words, which is the same as the BKB sentences
- The average sentence had 6 syllables, which is the same as the BKB sentences.
- 13 of the 150 IHR sentences did not meet the BKB criterion that no sentence must have more than 7 syllables. In the IHR sentences: 10 sentences had 8 syllables and 3 sentences had 9 syllables
- The proportion of the grammatical structures in the tests differed. Following the BKB criteria and the above intentions in Table 2.1, the 150 sentences should have 70 SVOs, 60 SVAs, 10 SVCs and 10 SVs sentence structures. However, the IHR sentences actually have 85 SVOs, 34 SVAs, 24 SVCs and 7 SVs sentence structures.
- From the BKB criteria and the above intentions, there should have been 100 sentences beginning with a determiner, 40 beginning with a personal pronoun and 10 beginning with

a noun. The IHR sentences however, actually have 106 sentences beginning with a determiner, 42 beginning with a personal pronoun and 2 beginning with a noun.

- The majority of the keywords within the IHR test only appear once throughout the total vocabulary. Each keyword should have been in at least two sentences. As described above, however, this criteria was only loosely followed for the BKB sentences

2.2.5 The use of the BKB sentence test in this thesis

The BKB sentence test had been described in detail, and will be the sentence test used in the experiments described in this thesis. The aim of the first experiment described in Chapter 3 was to look at the intelligibility of the individual sentences and identify whether they are approximately equal in difficulty.

3 The development of an Easy BKB Sentence Test

3.1 Introduction

The importance of speech perception testing is discussed in Chapter 2. Speech perception testing is an essential part of cochlear implant provision; it is required when assessing the candidacy for an implant (Osberger et al, 2006; Cooper, 2006) and is an extremely valuable tool during the rehabilitation of cochlear implant users (Fielden, 2006). The BKB sentence test is one of the most frequently used sentence tests in the UK and is part of the POCIA system (Predicting and monitoring Outcomes from Cochlear Implantation in Adults), which was developed by the MRC Institute of Hearing Research (Nottingham, UK). This system includes a series of auditory tests and questionnaires, and is used in most cochlear implant departments in UK. To assess a profoundly deaf adult for the suitability of a cochlear implant, The National Institute of Clinical Excellence (NICE) guidelines recommend the measurement of speech recognition using the BKB sentence test. Alongside other assessments such as lifestyle questionnaires and language assessments, the NICE guidelines suggest that profoundly deaf adults who identify less than 50% of the keywords correct with the BKB sentences are considered for a cochlear implant. These guidelines are supported by the British Cochlear Implant Group who state that an adult who identifies 50% or more of the keywords at a sound intensity of 70 dB(A) in quiet conditions with the BKB sentences is considered to be obtaining adequate benefits from their hearing aid provisions (NICE, 2009).

The BKB sentences are used clinically because the short meaningful sentences with a simple and natural vocabulary make the test suitable for most adults and young children (Rosen and Corcoran, 1982). In addition, because there are a large number of sentences (336), there are less practice effects than in tests with fewer materials (Bench et al, 1979; Bench and Bamford, 1979; Foster et al, 1993; Rosen and Corcoran, 1982). There are, however, some adult cochlear implant users who receive benefit from cochlear implantation and wear them daily but nonetheless obtain poor scores with the BKB sentence test in quiet (Cooper, 2008). The wide range of performance in cochlear

implant listeners is shown in Figure 3.1, for example, 10% of the cochlear implant users from the University Hospital Birmingham NHS Trust (Birmingham, UK) identify less than about 10% of the keywords in the BKB sentences. For such patients, it is difficult to assess the benefits of implantation objectively: changes to the cochlear implant technology, to the fitting, or to the rehabilitation provided lead to reported changes in the quality of life but to insubstantial changes to the speech scores. As shown in Figure 3.1, there are also listeners who score almost 100% on the BKB sentences in quiet. For these patients too, it becomes difficult to distinguish between the performance of different strategies and devices. To overcome the ceiling effects, the BKB test can be performed in noise to make the test more difficult, however there is no standard method to overcome the floor effects and make the test easier for audio only conditions.

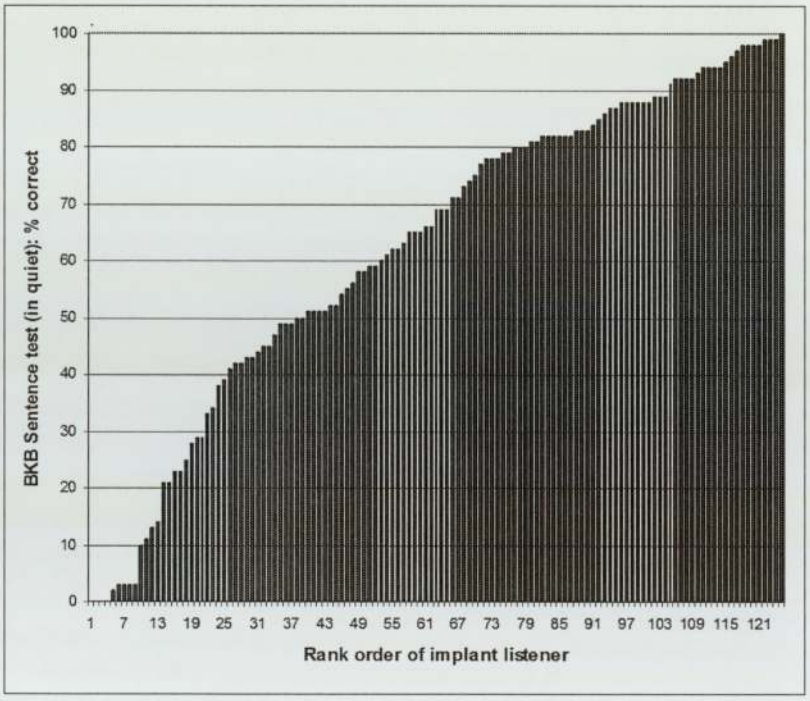

Figure 3.1. Speech recognition scores for 125 cochlear implant users 9 months post surgery with the Nucleus CI24 device. The listeners were able to adjust the volume settings if required. 30 BKB sentences were presented at 70 dB(A) to each listener. The graph shows the percentage correct keyword score against the listeners' rank order of performance (Cooper, 2008).

The BKB test is clinically used in list forms, where each list contains 16 sentences. Typically, a patient is presented with up to two lists, and duplicate lists are avoided. Each of the 21 lists should

ideally be equally difficult to ensure that clinical decisions are based on the ability of the patient and not variations in list difficulty.

Research, however, suggests that the BKB lists vary greatly in difficulty (Rosen and Corcoran, 1982; Hazan, 1997; Foster et al, 1993). The balancing of lists was attempted when the sentence test was developed, as the authors compiled the sentences into 21 lists, each containing the same criteria. The list criteria are discussed in detail in Chapter 2 (Section 2.2.3).

The BKB sentences were carefully analysed as part of this thesis and some ambiguity was found between the grammatical structures of the sentences, particularly between the classification of subject-verb-object sentences and subject-verb-adverbial sentences. Moreover, some of the simpler criteria were not met; for example, three sentences contained eight syllables where no sentence was to exceed seven syllables. Although the sentences were thought by Bench and Bamford (1979) to be of similar difficulty, the authors made no specific attempt to ensure approximately equal intelligibility (Bench et al, 1979; Bench and Bamford, 1979).

Rosen and Corcoran (1982) video-recorded the BKB sentences to create test material for assessing the lip-reading ability of hearing impaired individuals. An objective of the study was to identify any lists that were substantially more difficult than average. 22 subjects were used with both normal hearing and vision. Each subject viewed all 21 BKB lists in a random order and their responses were assessed with a range of methods, the loose scoring method was used in the data analysis, i.e. where word tenses and plural forms were not essential for a correct score. The analysis showed that only 12 of the 21 BKB lists were approximately equal in difficulty. The authors calculated a correction factor for each list, which enabled the scores across the lists to be normalised. These correction factors, however, are only applicable for lip-reading conditions.

Foster et al, (1993) stated that an improved set of audio-visual recordings were created in 1986 by Rosen and his colleagues using the same female speaker of the original audio-visual recordings. One aim of the study by Foster et al (1993) was to generate appropriate correction factors based on the new recordings. In this study, two test conditions were used: lip-reading only (LR) and lip-

reading with the addition of a larynographic signal (LR&Lx) to give voicing information. This study used 42 subjects each having normal hearing and vision. The 42 subjects were divided into two groups, and 21 subjects were used in each condition. Each subject was presented with the 21 BKB lists and their responses were scored using both loose and tight keyword scoring. Correction factors for each list were provided for both conditions: LR and LR&Lx. For the LR condition, the analysis revealed 18 lists were about equally difficult for both the loose and tight scoring methods.

Using the loose scoring values, Foster et al (1993) compared the mean values for each list with those obtained by Rosen and Corcoran (1982); Table 3.1 shows this comparison and, the lists marked with an asterisk were found approximately of equal difficulty. The correction factors for each list are also provided, however, they are only relevant for lip-reading conditions. Foster et al (1993) found an overall average keyword score for the BKB lists was 14.9 (29.8%), and Rosen and Corcoran (1982) found an average keyword score of 15.1(30.2%) for each list. These average scores between the studies were not found to be significantly different, which would suggest that the new quality of recordings did not alter the findings by Rosen and Corcoran (1982). Rosen and Corcoran (1982) and Foster et al (1993) found a range of 7-10 % between the least and most intelligible list.

Rosen and Corcoran (1982). *N=22/LR only/Loose scoring.*			**Foster et al (1993).** *N=21/LR only/Loose scoring.*		
List number	Mean score (keywords/50)	Correction factor	List number	Mean score (keywords/50)	Correction factor
1	12.2	1.23	1	10.86	1.37
2	13.0	1.16	2	9.57	1.55
3	18.7	0.8	3*	12.57	1.18
4	13.5	1.12	4*	12.05	1.23
5*	15.3	0.99	5*	14.52	1.02
6	12.7	1.19	6*	12.05	1.23
7*	15.0	1.0	7*	14.67	1.01
8*	13.8	1.09	8*	14.67	1.01
9*	14.5	1.04	9*	15.95	0.93
10*	14.7	1.03	10*	14.81	1.00
11	18.9	0.8	11*	18.48	0.80
12*	15.9	0.95	12*	16.00	0.93
13*	16.7	0.9	13*	18.29	0.81
14*	15.8	0.95	14	19.71	0.75
15*	17.0	0.89	15*	16.90	0.88
16*	15.4	0.98	16*	16.10	0.92
17	17.5	0.86	17*	16.57	0.90
18	11.6	1.3	18*	12.57	1.18
19*	14.8	1.02	19*	17.38	0.85
20*	16.6	0.91	20*	16.52	0.90
21	12.7	1.19	21*	11.67	1.27

Table 3.1. Comparison of the mean scores collected by Rosen and Corcoran (1982) and Foster et al (1993) for each BKB list when presented in lip-reading conditions to 22 and 21 subjects respectively. The lists marked with an asterisk are of equal difficulty. The correction factor enables the differences in the lists to be normalised.

The findings of Rosen and Corcoran (1982) and Foster et al (1993) may not be relevant for hearing impaired listeners when identifying speech recognition scores as the visual cues provided will not reveal the auditory only performance. Moreover, the studies by Foster et al (1993) and Rosen and

Corcoran (1982) investigated only the intelligibility of individual BKB lists and not the intelligibility of individual sentences.

The audio-visual recordings of the BKB sentences are no longer available. Currently, the BKB sentences that are available are those provided by the Institute of Hearing Research (Nottingham, UK), which use a male speaker and the recordings were made at the University College of London (London, UK).

A similar study to that of Rosen and Corcoran (1982) and Foster et al (1993) would be useful with the audio recordings of the BKB lists and sentences, thus, more suitable recommendations can be made for hearing impaired listeners. Individuals with hearing impairments will process speech differently to those with normal hearing; listeners with normal hearing can identify both vowel and consonant sounds adequately; however, for those with hearing impairments, many speech sounds are often inaudible, as discussed in Chapter 2, (Section 2.1.5).

The main aim of this experiment was to identify the easiest sentences, subsequently enabling them to be combined to form an Easy BKB Sentence Test, which could be used with listeners who score less than 10% with the standard test. A further aim was to identify the factors that affect the intelligibility of the BKB sentences. Identification of these factors would enable more of the easy sentences to be generated, with the same vocabulary and syntax as the originals, thus, extending the Easy BKB Sentence Test.

The factors that were used to balance the BKB sentences were introduced in Chapter 2 (Section 2.2.3), and include: 1) the grammatical structure, 2) the type of first word, 3) the number of words per sentence and 4) the number of syllables per sentence. This section will now look into each of these factors in detail and discuss whether these contribute to the intelligibility of the sentence.

1) The grammatical structures for each list included:

    a. subject-verb-object (SVO),

    b. subject-verb-adverbial (SVA),

c. subject-verb-complement (SVC)

d. subject-verb (SV).

The most common structure used in the BKB test was the SVO and the least being the SV. As discussed earlier in the analysis of the BKB sentences, SVO, SVA and SVC are stage three structures, whereas, SV is a stage two. The BKB sentences consist of stage two and three structures, and as the stages progress the more complex the structure (Bench and Bamford, 1979). Stage three structures provide more content than stage two structures, therefore, listeners would benefit from this extra information. Of these three grammatical structures, the SVC provides most information regarding the subject, and consequently could be the most intelligible grammatical structure.

2) The type of first words used in each list included:

   a. determiner (D),

   b. personal pronoun (PP)

   c. noun (N).

The determiner was the most common first word and a noun was the least common. Nouns are longer words than personal pronouns and determiners, which again offer more context to a word, and therefore sentences beginning with a noun could be more intelligible.

3) The number of words used in each sentence ranged between 3-7 words per sentence, with an average of 5 words per sentence. It would be assumed that more words contribute to the intelligibility of a sentence. For example, the number of words per sentence can affect the intelligibility of a sentence; the more words per sentence could offer the listener more context to that sentence, thus allowing them to piece together the remaining words.

4) The number of syllables used in each sentence ranged from 4-8 syllables per sentence, with an average of 6. It was a strict criterion that no sentence should exceed 7 syllables per sentence, although 3 sentences were found to have 8 syllables.

If the number of words per sentence contributes to the intelligibility of a BKB sentence a relationship may be expected between intelligibility and the number of syllables.

Another factor to consider is the speech properties for natural speech. As introduced in Chapter 2 (Section 2.1.3), certain properties can enable certain words to be more intelligible due to factors such as articulation and co-articulation. The phonetic alphabet is divided in two main categories, vowels and consonants. The speech banana model shown in Chapter 2, Figure 1.4, identified that consonant sounds correspond to the higher frequency components of speech which provide the intelligibility in speech, vowel sounds however, represent the lower frequency components which provide the intensity in speech. Vowels are voiced sounds and consonants may be either voiced (/b/, /d/, /g/) or unvoiced (/k/, /t/, /p/). Sentences with certain speech properties may be easier, and this factor was investigated to identify whether the proportion of voiced and unvoiced consonants affects the intelligibility of a BKB sentence.

The first experiment described in this chapter (Section 3.2) was carried out with normally hearing participants in background noise, with a signal to noise ratio of -8 dB. In a preliminary experiment, this level of background was found to give approximately 50% correct recognition of words from the original BKB sentences (Kaur, 2007), a level in which the test is less sensitive to floor and ceiling effects. A second experiment in this study was carried out with cochlear implant users (Section 3.3) to identify whether the most intelligible sentences for normally hearing listeners are more suitable than the original sentences for profoundly deaf adults. Normal hearing listeners were used in the first experiment as they can use all aspects of their hearing abilities to identify speech; the second experiment was carried out with profoundly deaf adults as their listening abilities vary because of the hearing cues available.

3.2 Experiment 1: The identification of the most intelligible BKB sentences

3.2.1 Methods

3.2.1.1 Calibration and signal presentation

The MRC Institute of Hearing Research (Nottingham, UK) speech test program (vldwav.exe) was used for the presentation of the BKB sentences in this experiment and to score the participant responses. The sentences were presented dichotically through headphones at 65 dB(A) with a -8 dB SNR in pink noise, to enable participants to hear approximately 50% of words correct. Pink noise is the standard masking noise used with BKB sentences and the spectrum of pink noise is very similar to that of speech (Saeki et al, 2004; Rao & Letowski, 2006).

The sentences were calibrated for loudness using a program written in Matlab by Dr Robert Morse (2010) which implements the methods by Foster (1996). The amplitude level dB(A) of each individual sentence was calculated and the amplitude of each waveform was adjusted to match the dB(A) level of a reference signal, which was an octave band of noise centred at 1 kHz. To output the stimuli acoustically, a computer was connected to an Edirol UA-25 (Edirol Europe Limited) USB interface and Sennheiser (HD250 linear II or HD580) headphones, (Sennheiser GmbH). The output level of the Edirol box was adjusted to ensure that the sentences measured 65 dB(A) using a Brüel and Kjaer (BK4153) artificial ear. These levels were measured using a calibrated sound-level meter (BK2250). The sound level meter and the microphone were calibrated using a sound calibrator (BK4231) which produces an accurate 1 kHz tone at 94 dB SPL.

3.2.1.2 Participants

This experiment received Aston University ethics approval. 30 participants, aged from 18 to 25 years of age took part in this study at Aston University (Birmingham, UK) and were either university staff or students.

For each participant, an audiological history, a visual examination of their ear and a hearing screen at 20 dBHL was carried out in accordance with the British Society of Audiology (BSA) recommendations (BSA, 2004) to identify any abnormal otological conditions. None of the participants had a hearing loss greater than -20 dB HL at frequencies of: 250 Hz, 500 Hz, 1 kHz, 2 kHz, 4 kHz and 8 kHz; i.e. all participants had a normal level of hearing. In addition, all participants had English as their first language.

The experiment took place in a soundproof booth at Aston University (Birmingham, UK). The testing was conducted in one session and the total duration of participation per individual, including instructions, familiarisation, intervals and feedback was 90 minutes.

3.2.1.3 Procedure

Each participant was presented with all of the 336 BKB sentences in a completely random order (the original groupings into lists was ignored). For ease of presentation, the BKB sentences were grouped into four lists of 84 random sentences. The orders of the four lists were randomised for each participant. After each list, the participants took a ten minute break and they were encouraged to take additional breaks if required.

To familiarise participants with the experiment they were presented with 20 practice sentences: 10 sentences were presented in quiet and 10 sentences in noise (-8 dB SNR). Each participant was presented with a different set of practice sentences. From the study by Foster et al (1993) the presentation of 20 sentences should familiarise participants with tests and reduce learning effects.

The participants were told that they would hear short sentences through the headphones, and were asked to listen carefully and say what they heard. They were asked to repeat the utterance even if they were unsure or they thought it did not make sense. The focus of the experiment was the intelligibility of complete sentences and whole sentences were therefore scored rather than just the keywords only. The complete scoring of the sentence ensured that the listener had identified all components of the spoken utterance. Furthermore, a tight scoring method was adopted i.e. the

participant had to repeat the sentence exactly, therefore the word tenses and stems of all the words was to be identical to the written word in order to obtain a correct score.

3.2.2 Results

3.2.2.1 Intelligibility of individual lists

The intelligibility of each of the original 21 BKB lists was compiled from the intelligibility of individual sentence (Table 3.2). The mean score for a BKB list was 31.2%, with a standard deviation of 4.6%. There was a range of 17.5% difference in intelligibility between the easiest (list 6) and hardest list (list 3).

List number	Mean score (%)	St Dev	List number	Mean score (%)	St Dev
1	34.6	25.0	11	36.7	19.1
2	31.5	21.2	12	30.0	16.5
3	39.6	20.3	13	36.5	21.8
4	30.2	19.9	14	37.1	20.0
5	30.0	21.0	15	27.3	17.2
6	22.1	15.1	16	29.4	21.4
7	30.8	22.7	17	30.2	21.8
8	31.3	21.8	18	25.4	19.2
9	35.4	19.2	19	24.4	18.0
10	35.4	19.8	20	31.0	16.1
			21	25.4	17.0

Table 3.2. The mean intelligibility for each of the original BKB lists for 30 participants with normal hearing. The BKB sentences were presented at a level of 65 dB(A) in background noise with a -8dB SNR of pink noise. All complete sentences were scored with tight scoring, i.e. each word must be identified exactly.

Assumptions of normality, homogeneity of variance and sphericity were met. A repeated measures ANOVA was carried out on the data collected in this study to determine whether any lists were significantly more different. The analysis revealed that no significant difference was found between the BKB lists, ($F [9, 130]) = 0.0$, $p = 0.543$). An overall effect size of 0.05 showed that 5% of the variation in error scores can be accounted for by the differing levels of lists in the BKB test.

Figure 3.2 shows the order of list difficulty, which can be used to establish the easier and more difficult BKB lists. The easiest four lists were: 13, 11, 14 and 3, and the least intelligible 4 lists were: 6, 9, 18 and 21.

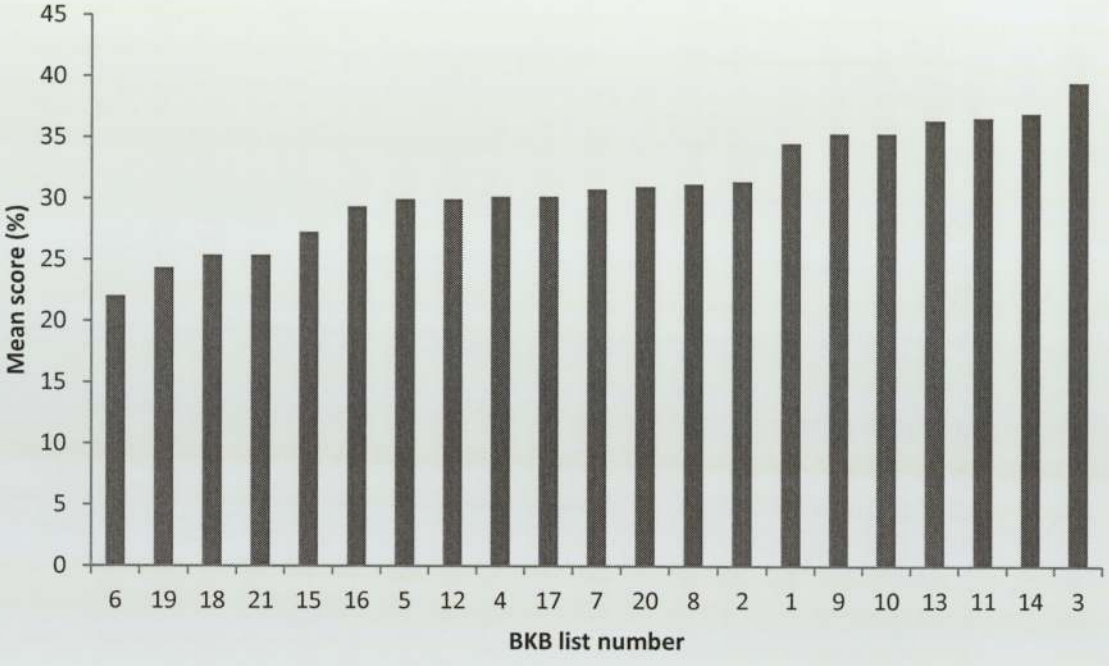

Figure 3.2. The mean intelligibility in order of difficulty for each of the original BKB lists for 30 participants with normal hearing. The BKB sentences were presented at a level of 65 dB(A) in background noise with a -8 dB SNR of pink noise. Sentences were scored as either correct or incorrect using tight scoring, i.e. each word must be identified exactly. The mean score for a BKB list was 31.2%, with a standard deviation of 4.6%.

Although no significant differences were found amongst the BKB sentence lists, as mentioned, there is a range of 17.5% between the least and most intelligible BKB lists. These results do

suggest that in an audio condition there are sentence lists which vary in intelligibility. The next section investigates the intelligibility of the individual BKB sentences.

3.2.2.2 Intelligibility of individual sentences

The individual participant scores with the BKB sentences are shown in Figure 3.3, which displays the percentage number of sentences correctly identified for each participant. The mean percentage of correct sentences identified was 31.8%, with a standard deviation of 16.4%.

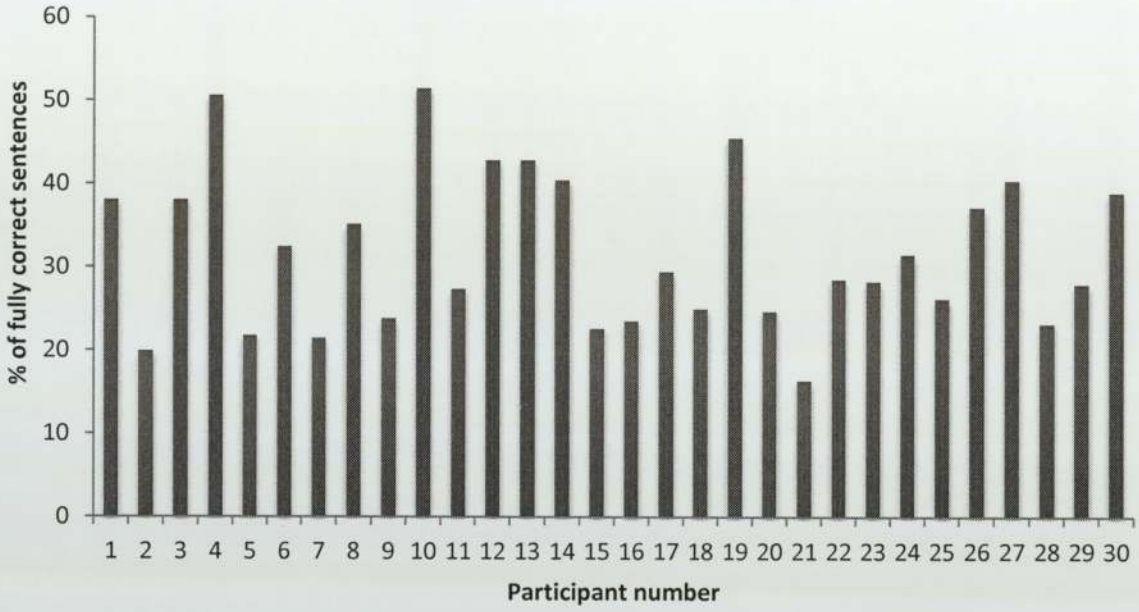

Figure 3.3. The percentage number of BKB sentences correctly identified by each participant. All 336 BKB sentences were presented to 30 normal hearing participants through headphones at a level of 65 dB(A) with a -8 dB SNR in pink noise. Sentences were scored as either correct or incorrect using tight scoring, i.e. each word must be identified exactly. The mean percentage of correct sentences identified was 31.8%, with a standard deviation of 16.4%.

The bar chart in Figure 3.4 shows the number of times a sentence was correctly identified following the single presentation to each of the 30 participants, e.g. 20 sentences were identified in 4 out of 30 presentations. As shown in Figure 3.4, 11 sentences were not identified by any of the 30 participants. 35 sentences were identified by 18 or more participants, to maintain the list structure and criteria of the original BKB sentences, 32 of these 35 sentences were selected to form two lists

of Easy BKB Sentences (Table 3.3). Careful consideration was taken to ensure the 32 sentences maintained the criteria as close as possible.

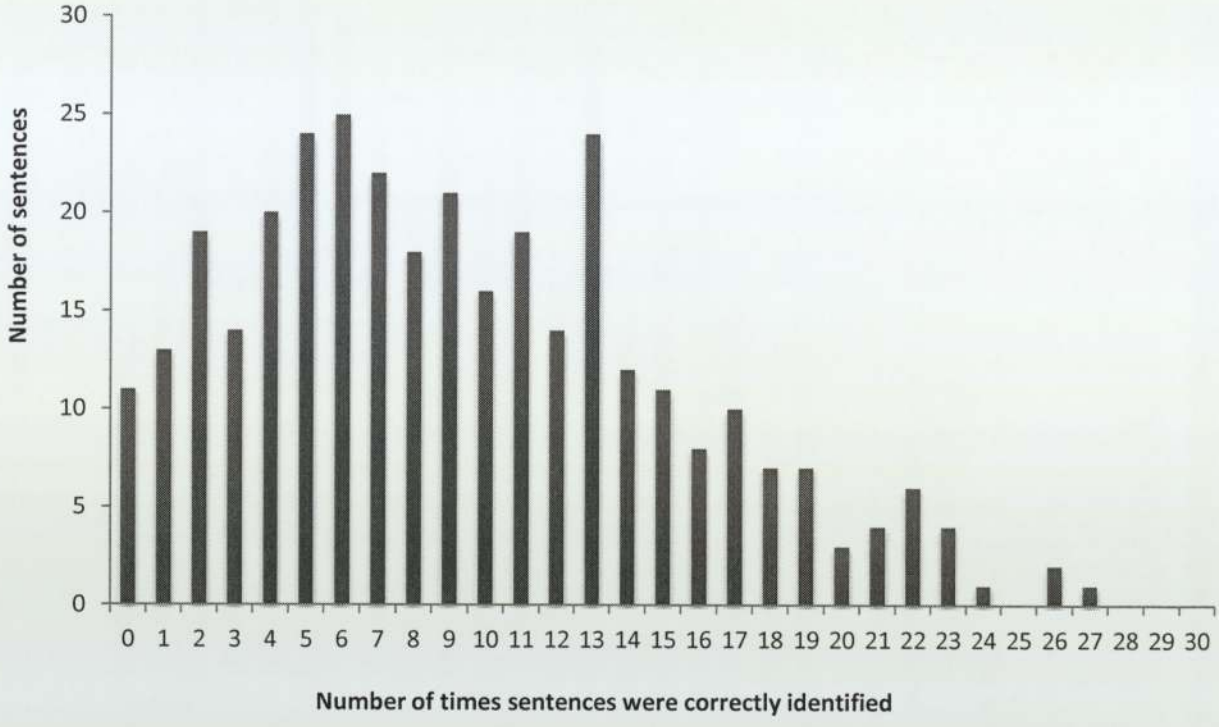

Figure 3.4. A count of the number of times a sentence was correctly identified by 30 participants who each listened to one presentation of each sentence, e.g. 20 sentences were identified by 4 out of 30 participant presentations. All 336 BKB sentences were presented through headphones at a level of 65 dB(A) with a -8 dB SNR in pink noise.

As shown in Table 3.4, the easy and original sentences have similar attributes and the relative frequencies of grammatical structure and type of first word are approximately maintained. For example, in any two lists from the original sentences there are 14 SVO sentences and in the easy sentences there are 13 SVOs. Similarly, for the type of first word, any two lists in the original sentences has 22 sentences beginning with a determiner and in the Easy BKB sentences there are 21 sentences beginning with a determiner. The characteristics for the number of words and syllables in each sentence are similar for the two tests. The original sentences have an average of five words, and are less than seven syllables and the Easy BKB sentence test has an average of five words and are less than seven syllables.

Sentence number	Sentence	Sentence number	Sentence
4	Children like strawberries.	145	A tea towel's by the sink.
7	The green tomatoes are small.	153	The postman brings a letter.
16	The ice cream was pink.	166	They finished the dinner.
30	The little baby sleeps.	170	They're coming for Christmas.
39	The children are walking home.	201	They waited for one hour.
44	The boy's running away.	205	The children are all eating.
55	They're crossing the street.	206	The boy has black hair.
62	The cook's making a cake.	211	They're drinking tea.
69	The kitchen sink's empty.	221	The postman comes early.
78	They wanted some potatoes.	239	The train stops at the station.
87	The sun melted the snow.	246	They called an ambulance.
110	The orange was quite sweet.	260	They knocked on the window.
111	He's holding his nose.	272	The dog chased the cat.
124	The bus stopped suddenly.	280	They painted the wall.
129	The book tells a story.	300	The boy slipped on the stairs.
141	The dinner plate's hot.	310	A cat jumped off the fence.

Table 3.3. The 32 BKB sentences of the Easy BKB Sentence Test.

Grammar	Original	Easy		1st word	Original	Easy
SVO	14	13		D	22	21
SVA	12	12		PP	8	10
SVC	4	5		N	2	1
SV	2	2				

Table 3.4. A comparison of the attributes for any two lists (32 sentences) in the original BKB list and the 32 sentences from the Easy BKB Sentence Test. The number of sentences for each grammatical structure or first word is displayed. (SVO – subject-verb-object, SVA – subject-verb-adverbial, SVC – subject –verb-complement, SV – subject-verb) and (D- determiner, PP – personal pronoun, N – noun).

3.2.3 The easier BKB sentences

32 of the most intelligible BKB sentences were identified in Section 3.2.2.2. The second aim of this experiment was to identify the factors that affect the intelligibility of the BKB sentences. This section explored these factors in further detail. As previously introduced, the BKB sentences vary in terms of the number of words per sentence (3 to 7), the number of syllables per sentence (4 to 8),

the number of keywords per sentence (3 or 4), the types of grammatical structures (SVO, SVA, SVC and SV) and the types of first words (D, PP and N). Figures 3.5-3.9, shows the percentage of correct sentence identification against the individual factors, e.g. number of words, number of syllables, number of keywords, grammatical structures and types of first words. A repeated measures ANOVA was used to identify whether the individual factors, i.e. number of words, the number of syllables, the types of grammatical structures or the types of first words affect the intelligibility of the BKB sentence, and a paired samples t-test was used for the number of keywords. The data for all 30 participants were analysed using a repeated measures ANOVA (assumptions of normality, homogeneity of variance and sphericity were met for the data sets).

From Figure 3.5, sentences with more words appear to be more difficult: sentences with three words had an average of 44% when the six sentences with three words were presented to 30 participants, and sentences with seven words had an average of 26%. The analysis revealed a significant difference; ($F [2, 59] = 8.0$, $p < 0.001$), suggesting that the number of words per sentence does affect the intelligibility of a sentence. A Pearson's r correlational analysis also confirmed that the number of words and intelligibility of BKB sentences were negatively and strongly related ($r = -0.96$, $p = 0.01$). This suggests that as the number of words per sentence increases the intelligibility does not.

As shown in Figure 3.6, the difficulty of the sentences was not related to the number of syllables per sentence; this was confirmed by the analysis of variance ($F [1, 40] = 1.0$, $p = 0.337$). Although the 8 syllable sentences appear to be less intelligible, due to the limited number of sentences containing 8 syllables there was no significant difference found.

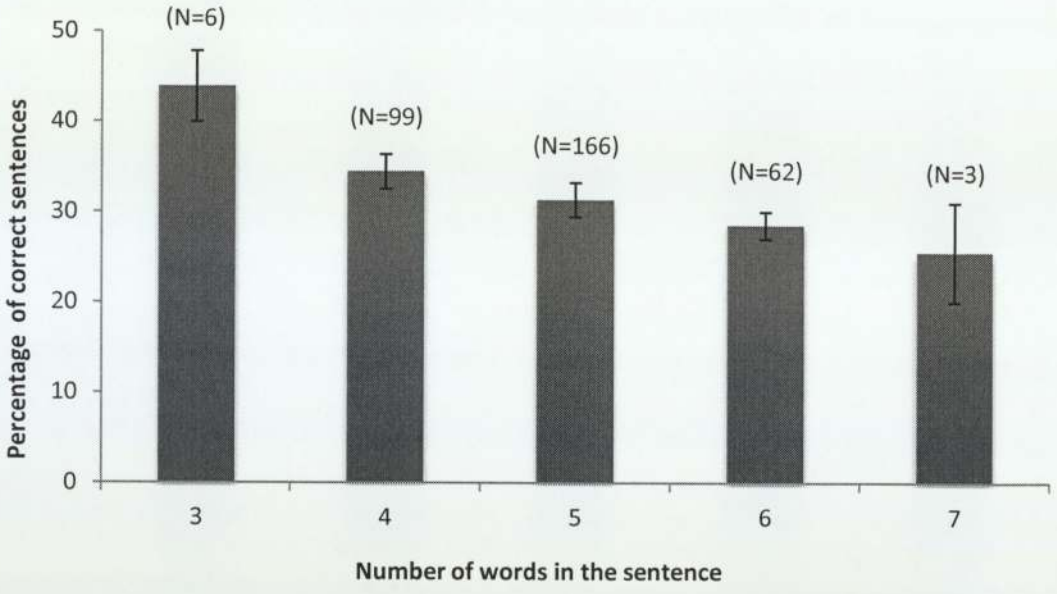

Figure 3.5. The mean percentage of correct sentences for the number of words in the BKB sentences. The number in brackets indicates the number of sentences in that category. The 336 BKB sentences were presented to 30 participants in background noise. The error bars show the standard error of the mean.

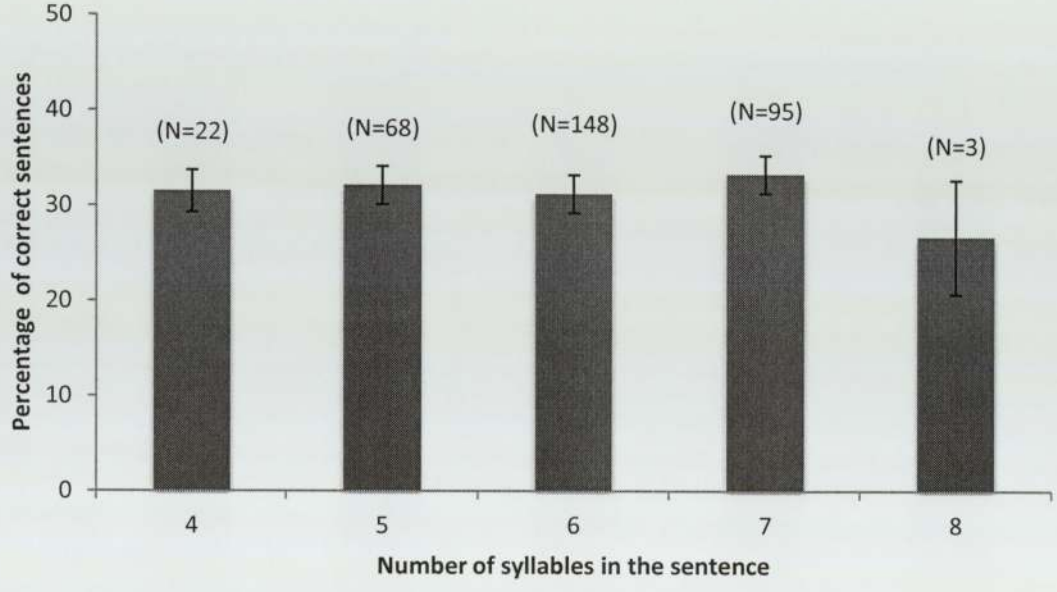

Figure 3.6. The mean percentage of correct sentences for the number of syllables in the BKB sentences. The number in brackets indicates the number of sentences in that category. The 336 BKB sentences were presented to 30 participants in background noise. The error bars show the standard error of the mean.

As shown in Figure 3.7, the types of first words for the sentence do not affect the intelligibility of a sentence; this was confirmed by the analysis of variance (F [1, 43] = 0.23, p= 0.724).

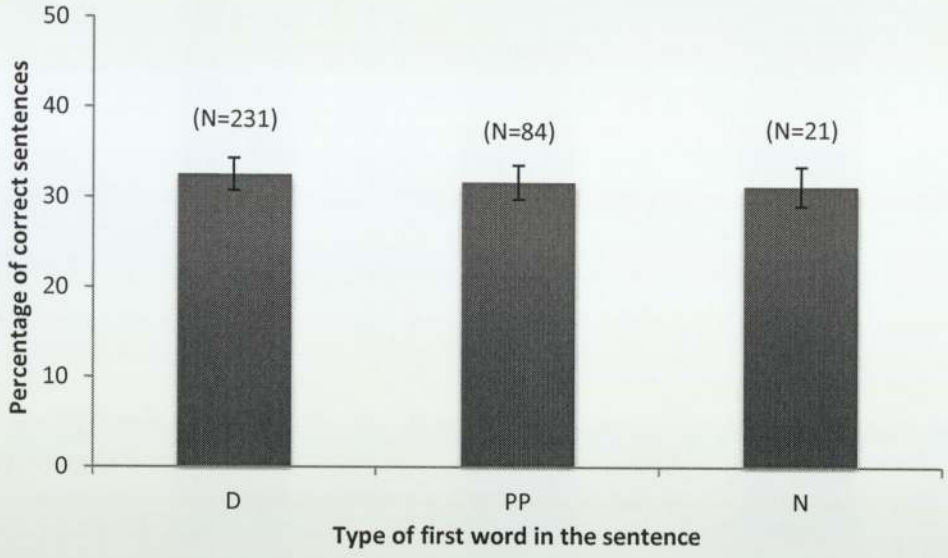

Figure 3.7. The mean percentage of correct sentences for the type of first word in the BKB sentences. The number in brackets indicates the number of sentences in that category. The 336 BKB sentences were presented to 30 participants in background noise. The error bars show the standard error of the mean. (D-determiner, PP – personal pronoun, N – noun).

From Figure 3.8, sentences containing SVC structures appeared easier to identify than the other grammatical structures, and this was confirmed by the analysis of variance (F [3, 87] = 3.4, p= 0.019).

Figure 3.9 suggests that the number of keywords in a sentence does not contribute to the difficulty of the sentence, the analysis confirmed that there was no significant difference; t (29) = 18.8, p = 0.08.

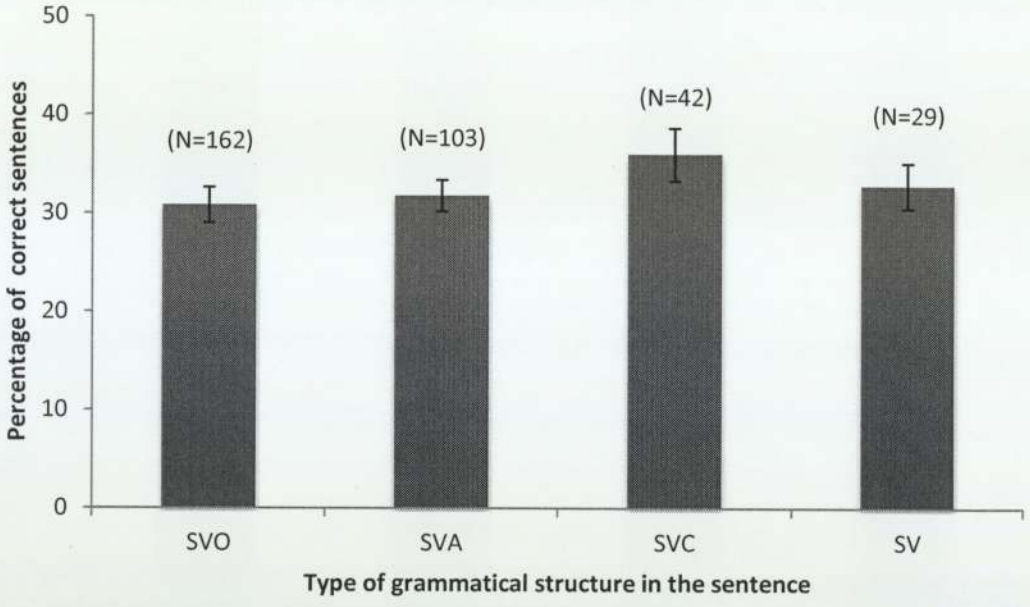

Figure 3.8. The mean percentage of correct sentence identifications against the different grammatical structures in the BKB sentences. The 336 BKB sentences were presented to 30 participants in background noise. The error bars show the standard error of the mean. (SVO – subject-verb-object, SVA – subject-verb-adverbial, SVC – subject –verb-complement, SV – subject-verb).

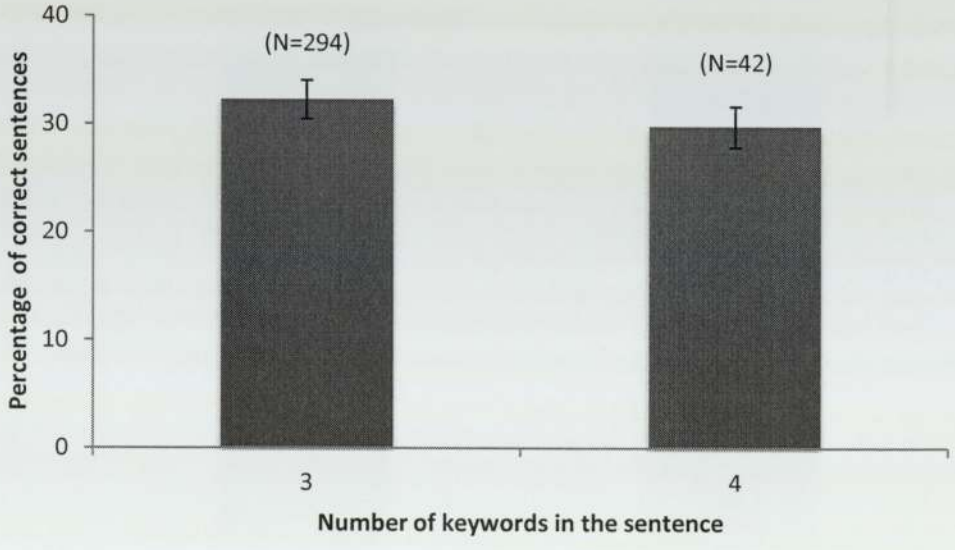

Figure 3.9. The mean percentage of correct sentence identifications against the number of keywords in the sentence. 336 BKB sentences were presented to 30 participants in background noise. The error bars show the standard error of the mean.

The speech properties for natural speech were discussed in Chapter 2, and how certain properties can increase the intelligibility of certain words due to features such as articulation and co-articulation. The focus of this analysis was to investigate whether particular components of consonants are more intelligible. This analysis investigates whether the proportion of voiced and unvoiced consonants affected the intelligibility of a BKB sentence. Figure 3.10 shows the comparison between the voiced P(V) and unvoiced phonemes P(UV) for the 32 most intelligible sentences and the original BKB sentences. Figure 3.10 suggests that the easy sentences tend to have an approximate balance between these two factors, as the scatter plots for the easy sentences are reasonably centred.

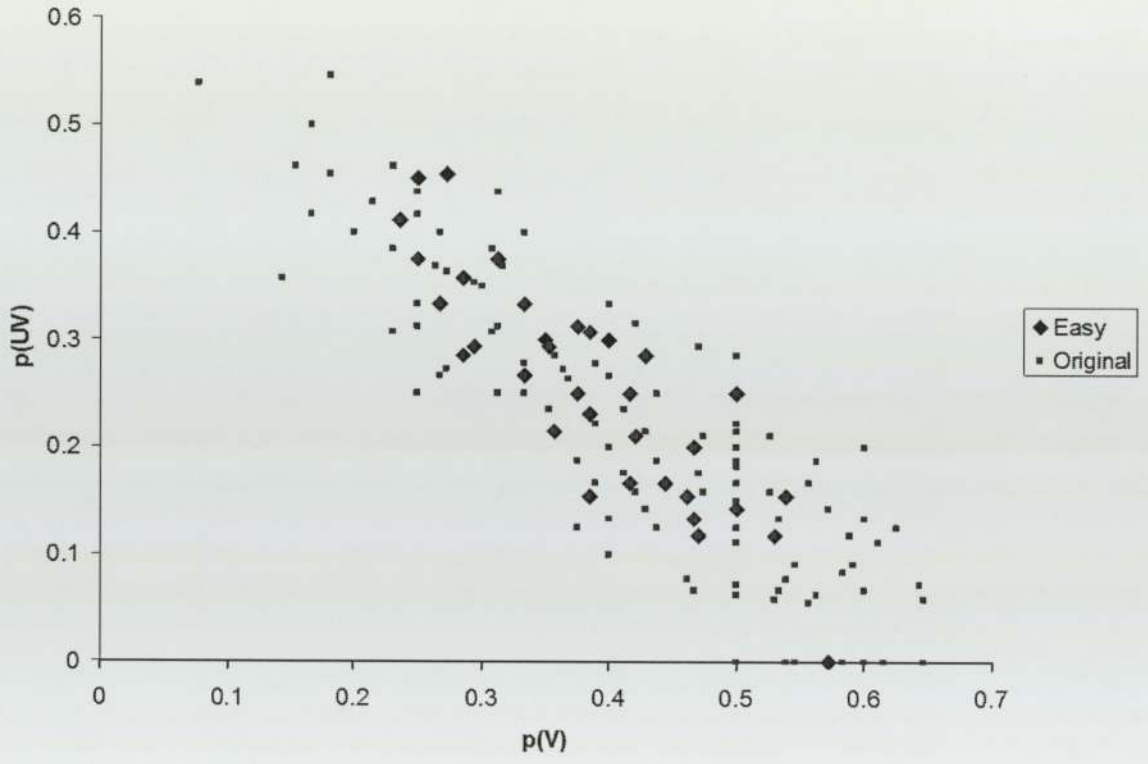

Figure 3.10. A comparison between the voiced and unvoiced phonemes for the 'Easy' and original BKB sentences. 336 BKB sentences were presented to 30 normally hearing participants in background noise. The effects of the proportion of voiced and unvoiced consonants are compared. Where P(V) is the number of voiced consonants as a proportion of total number of phonemes per sentence, and P(UV) is the number of unvoiced consonants as a proportion of total number of phonemes per sentence.

One aim of this experiment was to identify the factors that affect the intelligibility of the BKB sentences. The analyses described in this section identified that the number of words per sentence and the grammatical structures can affect the intelligibility, where three words and SVC structures are most intelligible. The remaining factors that were considered, i.e. the number of syllables, the number of keywords, and the type of first word or the proportion of voiced and unvoiced phonemes per sentence do not significantly affect the intelligibility of a BKB sentence.

3.2.4 Discussions

As introduced in Section 3.1, no specific attempt was made to ensure that the original lists were of equal difficulty, and since the original development of the BKB test, the lists have not since been refined or validated. Although the original BKB sentences were not developed in a visual format, they were rerecorded and previous research has suggested that the BKB sentences vary in intelligibility for a visual only condition (Foster et al, 1993 and Rosen and Corcoran, 1982). The first aim of the study was to investigate the range in intelligibility of the BKB sentences for an audio only condition. The repeated measures ANOVA in Section 3.2.2.1 did not reveal any significant difference between the 21 BKB lists, but a range of 17.5% was calculated between the most and least intelligible BKB list.

Another aim was to identify the easier BKB sentences and establish what factors contribute to the intelligible sentences. These easier sentences form the Easy BKB Sentence Test, a subset of the original BKB sentences.

3.2.4.1 Comparisons with Rosen & Corcoran, (1982) and Foster et al, (1993)

The mean score for the BKB lists was 30.5%, which is similar to that of Foster et al (1993) and Rosen and Corcoran, (1982) which was 29.8% and 30.2%, respectively. As shown in Figure 3.11 there are both similarities and differences found between this current study and that of Foster et al (1993) and Rosen and Corcoran, (1982). For example, list 18 appeared to be one of the most intelligible lists when lip reading the BKB sentences, however, list 18 was found to be one of the

least intelligible lists when presented in audio only conditions. Similarly, lists 3 and 13 were highly intelligible when presented in audio conditions; however, these two lists were amongst the least intelligible when lip read. As Foster et al (1993) and Rosen and Corcoran (1982) used visual stimuli; the results from this current study are not directly comparable to the mentioned authors. However, it can be established whether sentences that are more intelligible for lip reading are equally intelligible in listening conditions and vice versa.

The data from this study were compared with that of Rosen & Corcoran, (1982) and Foster et al, (1993), as shown in Table 3.5. This current study had a mean of 31.2% for the BKB lists with 30 participants, where in lip-reading conditions Foster et al, (1993) found an average of 29.8% with 21 participants and Rosen & Corcoran, (1982) found an average of 30.2% with 22 participants. The list numbers for each study are presented in order of intelligibility. As shown in Figure 3.5, the intelligibility of the BKB lists in order for this study are compared with the list orders for the data collected by Rosen and Corcoran, (1982) and Foster et al, (1993).

Current study List order	Mean score (%)	Foster et al (1993) List order	Mean score (%)	Rosen (1982) List order	Mean score (%)
6	22.1	2	19.1	18	23.2
19	24.4	1	21.7	1	24.4
18	25.4	21*	23.3	21	25.4
21	25.4	6*	24.1	6	25.4
15	27.3	4*	24.1	2	26.0
16	29.4	18*	25.1	4	27.0
5	30.0	3*	25.1	8*	27.6
12	30.0	5*	29.0	9*	29.0
4	30.2	7*	29.3	10*	29.4
17	30.2	8*	29.3	19*	29.6
7	30.8	10*	29.6	7*	30.0
20	31.0	9*	31.9	5*	30.6
8	31.3	12*	32.0	16*	30.8
2	31.5	16*	32.2	14*	31.6
1	34.6	20*	33.0	12*	31.8
9	35.4	17*	33.1	20*	33.2
10	35.4	15*	33.8	13*	33.4
13	36.5	19*	34.8	15*	34.0
11	36.7	13*	36.6	17	35.0
14	37.1	11*	37.0	3	37.4
3	39.6	14	39.4	11	37.8

Table 3.5. The mean values in order of difficulty for each BKB list for the 30 normally hearing participants in this study are presented in order of difficulty. The mean values for the findings from Rosen & Corcoran, (1982); n=22 and Foster et al, (1993); n=21, are also displayed in list order. List numbers marked with an asterisk were found to be of equal difficulty.

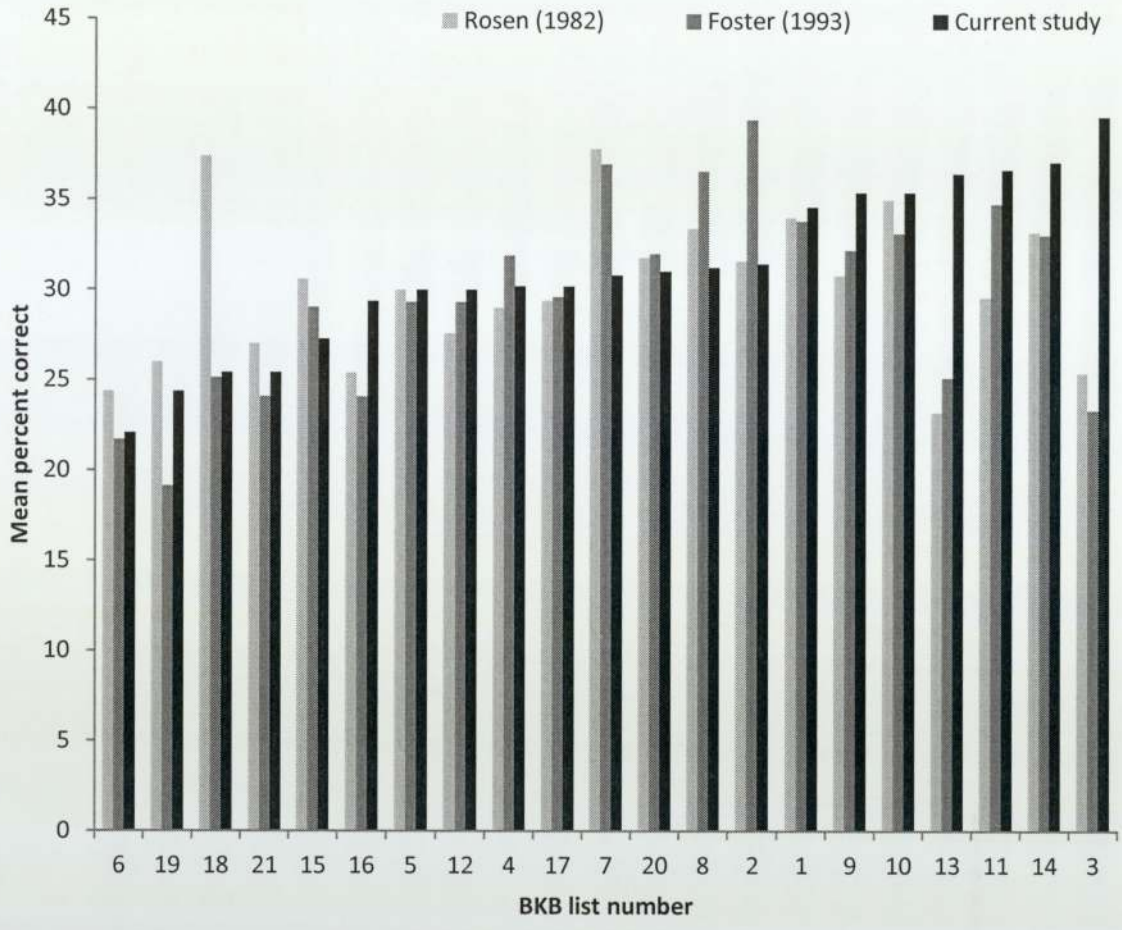

Figure 3.11. The mean values in list order for each BKB list when all sentences were presented to 30 normally hearing participants in a random order. The BKB lists are ranked in order of intelligibility for this current study, and the mean values from Rosen and Corcoran, (1982); n=22, and Foster et al, (1993); n=21, are also displayed. The black bars show data collected in this study, the light grey bars show the data collected by Rosen & Corcoran, (1982) and the dark grey bars show the data collected by Foster et al, (1993). For Rosen & Corcoran, (1982) and Foster et al, (1993) the sentences were presented without sound (lip-reading only), and keywords were scored using loose scoring. For this study complete sentences were scored using tight scoring.

To identify any relationships between the three sets of data, correlational analyses (Pearson's r) were performed. The scatter plots in Figure 3.12 show the relationships between the data in this study and those of Foster et al, (1993) and Rosen and Corcoran, (1982).

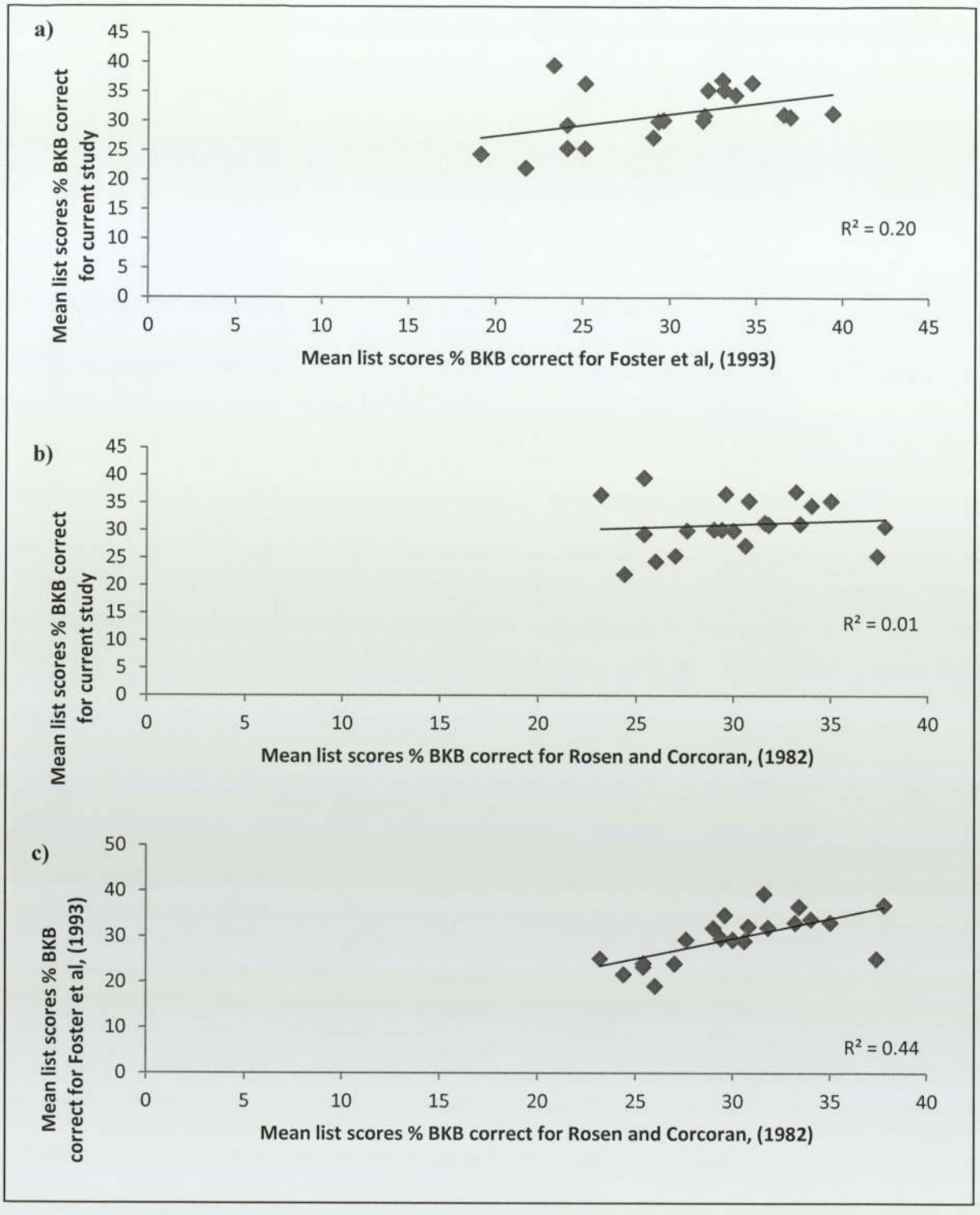

Figure 3.12. a) The relationship between the data collected by Foster et al, (1993) and of that collected in this study. b) The relationship between the data collected by Rosen and Corcoran, (1982) and of that collected in this study. c) The relationship between the data collected by Foster et al, (1993) and Rosen and Corcoran, (1982). The data collected in this study used audio only conditions, however, for Rosen & Corcoran, (1982) and Foster et al, (1993) the sentences were presented without sound (lip-reading only).

As shown in Figure 3.12a, a weak correlation ($r = +0.3$, $p = 0.25$) was found between the scores in this current study and those of Foster et al, (1993). However, as shown in Figure 3.12b, a significant moderate correlation ($r= +0.5$, $p= 0.02$ was found between the scores in this current study and those of Rosen and Corcoran, (1982). A positive correlation ($r= +0.7$, $p = 0.001$) as shown in Figure 3.12c was found to be significant between the data collected by Rosen and Corcoran, (1982) and Foster et al, (1993). The correlational analyses suggest that as the mean scores for the BKB lists increased in this study, the scores also increased for Rosen and Corcoran (1982). No significant relationship was found between the findings of this study and that of Foster et al (1993). As expected, due to similar experimental designs a positive strong correlation was found between that of Rosen and Corcoran (1982) and Foster et al (1993). It was earlier discussed that the two sets of data reported by Rosen and Corcoran (1982) and Foster et al (1993) were not significantly different when cross-compared. As a result, it would have been expected to observe a relationship with both sets of data, rather than just with Rosen and Corcoran (1982).

In visual conditions Foster et al (1993) identified the three most difficult and three easiest sentences. Of which, one of the three most difficult sentences was in the 32 Easy BKB sentences 'The sun melted the snow'. Another harder sentence 'The old gloves are dirty' was one of the 11 sentences that were not identified by any subject in this study. This overlap of particular sentences can be caused by certain speech properties, i.e. certain speech phonemes being more visible, therefore will appear to be more intelligible in lip-reading activities, and other phonemes being more audible will therefore be more intelligible in hearing activities. It would be interesting to compare the raw data of the individual sentences with those of Foster et al, (1993) and Rosen and Corcoran, (1982) as comparing list data will lose the accuracy of information.

3.2.4.2 General discussions

The experiment used normal hearing participants to identify the easiest sentences when presented in noise. Figure 3.3 shows the wide range in performance with the BKB sentences and Figure 3.4

suggests that normally hearing participants in noise are unable identify some sentences, for instance 11 sentences were not identified by any participant.

Due to a range of 17.5% difference in intelligibility between the easiest and hardest BKB list as shown in Figure 3.2, there is a need to revise the sentences within each list to ensure that they are equal in intelligibility. The BKB lists should ideally be equally difficult to ensure that clinical choices are based on the ability of the listener and not variations in list difficulty. This experiment used an alternate method for the presentation of the BKB sentence test, whereby, the 21 BKB lists are removed and 336 random sentences were presented to the subjects, this may be a more practical approach for clinical purposes as the more difficult and easier sentences will be spread over a larger distribution.

As discussed below there are several reasons as to why the BKB sentences may not be of equal difficulty and the following factors are further considered: the familiarity of certain words in sentences, the quality of recordings and also the failed BKB sentence criteria. The BKB sentence test was developed in 1979 and the constructs expressed by some words or phrases may no longer be familiar, particularly to younger adults. For example, in the BKB sentence: 'The bread van's coming' all the words may individually be recognisable, however, the context of the sentence may not be known. Of the 30 participants only 5 identified the above sentence, which is ranked as the 79th hardest sentence. If the suggestion of revising the lists to develop some consistency with the sentences is considered, then any sentences containing words that may not be familiar to younger adults should be removed.

The BKB sentences provided by the MRC Institute of Hearing Research, (Nottingham, UK) are used in clinical practice as part of the POCIA system and were also used in this experiment. These sentences consist of very high quality recordings, however, there are many sentences that have several words emphasised, e.g. 'The kettle boils quickly' and 'The kitchen sink's dirty'. Such emphasis is a feature of natural speech and can in general make a sentence more intelligible and it is therefore important that the use of emphasis is consistent across the recordings. In Chapter 5, the

effect of emphasis on the intelligibility of the BKB sentences is investigated in more detail. Therefore, the differences in intelligibility of the sentences may be due to the natural speech properties when the sentences were recorded.

As previously introduced in Chapter 2, (Section 2.2.3) some sentences do not meet the BKB criteria. Three sentences, for example, contain eight syllables. These sentences, 'The driver waits by the corner' (List 11; sentence number 165), 'The tiny baby was pretty' (List 15; sentence number 235) and 'The egg cups are on the table' (List 21; sentence number 330) were respectively ranked 160th, 235th, and 220th in order of difficulty. There is therefore some evidence that these sentences are generally more difficult than average, and therefore this could suggest that the failed criteria within the BKB sentence test could contribute to the differences in intelligibility.

The main aim of this study was to identify which of the BKB sentences are most intelligible, in order to create a subset of easy BKB sentences. The 32 most intelligible sentences were identified and formed part of the Easy BKB Sentences Test. Analyses were performed to identify the specific factors that contribute to the increased intelligibility. The factors that affected the intelligibility were the number of words per sentence and those with an SVC grammatical structure does affect the intelligibility of the BKB sentences. The number of syllables, types of first words and proportion of voiced/unvoiced phonemes do not affect the intelligibility of the sentences. Sentences with three keywords may have been more intelligible as this could correspond to the optimal sentence length, and anything above this could affect intelligibility. When the BKB sentence test was formed, the number of words per sentence was considered, as the number of words per sentence should not exceed the limit regarding an individual's memory. Sentences with a SVC structure could be more intelligible as it is the only grammatical structure that provides more information regarding the subject, as a complement is defined as a component that describes the subject in more detail. Other structures such as an SVO or SVA introduce new components are introduced into a sentence; hence a participant may be able to perform better with an SVC structure as more information is provided. These are important factors to consider, especially when creating

more BKB sentences. For example, if additional easy BKB sentences are to be created then they can be based on 3words per sentence with a SVC structure, and if more difficult sentences are to be created then these factors can be avoided.

3.3 Experiment 2: Using the Easy BKB Sentence Test with cochlear implant users

The 32 easier sentences identified in Section 3.2.2.2 were presented to cochlear implant listeners who currently perform poorly with the standard BKB sentence test. Section 3.1 introduced that hearing impaired listeners will have reduced abilities when identifying speech, as the speech cues are degraded due to hearing loss. The aim of the experiment was to investigate whether the sentences that were perceived to be more intelligible in background noise to those with normal hearing are also more intelligible when presented in quiet to listeners with a profound hearing loss. This section discusses the methods and compares the performance of scores for both the original and easy BKB sentences for cochlear implant listeners.

3.3.1 Methods

3.3.1.1 Participants

Ten adult cochlear implant users (aged from 40 to 83 years old) participated in this study. Participants were all patients from The University Hospital Birmingham NHS Trust, (Birmingham, UK), who had a unilateral Harmony (Advanced Bionics Ltd) or Freedom (Cochlear Corporation) cochlear implant for at least one year (Table 3.6). The participants were selected based on their BKB test performance at their previous annual review. The aim of this experiment was to identify whether the easier sentences are beneficial for those achieving low scores with the original test, i.e. those listeners who may be subject to floor effects. All participants used in this experiment had a BKB score of less than 30% keywords correct in their previous session. This score of 30% was implemented as a score higher than this can suggest that the listener is already performing well

with the speech test and not subject to floor effects. Participants were not selected on the basis of their age of onset of hearing loss, the number of implanted years or mode of stimulation. The participants were presented with the original and new sentences as part of their annual review.

Participant number	Age (yrs)	Onset of hearing loss	Number of implanted years	Make/Model
1	42	Since birth	1 (02/2009)	Harmony (A.Bionics)
2	83	Aged 58	1 (01/2009)	Harmony (A.Bionics)
3	56	Aged 46	3 (09/2006)	Freedom (Cochlear)
4	62	Aged 57	3 (10/2006)	Harmony (A.Bionics)
5	44	Aged 15	9 (/2000)	Freedom (Cochlear)
6	78	Aged 50	15(01/1994)	Freedom (Cochlear)
7	40	Since birth	8 (08/2001)	Freedom (Cochlear)
8	41	Aged 1	1 (03/2009)	Harmony (A.Bionics)
9	40	Aged 1.5	1 (11/2008)	Freedom (Cochlear)
10	75	Aged 2	4 (01/2005)	Freedom (Cochlear)

Table 3.6. Participant details for the ten cochlear implant users. All participants had one implant, and P5 had a hearing aid in their non implanted ear.

3.3.1.2 Procedure

As part of their annual review, participants were presented with 32 original BKB sentences and 32 BKB sentences from the new easy BKB test. The original sentences were chosen based on the BKB lists presented in their last review session, ensuring no duplicate lists were presented. However, as sentences in the Easy BKB Sentence Test were part of the original BKB test, there was some possibility of overlap. The order of easy and original sentence lists alternated for each listener.

The sessions were carried out in a quiet, but not sound treated room in the Hearing Assessment and Rehabilitation Centre at Selly Oak Hospital (Birmingham, UK). The MRC Institute of Hearing Research (Nottingham, UK) speech test program (vldwav.exe) was used for the presentation of the BKB sentences in this experiment and to score the participant responses. The sentences were presented in quiet through a loudspeaker at a sound level of 70 dB(A) which is the standard level in the POCIA protocol. The sound levels were calibrated before each session using a sound level meter. Each participant sat facing the loudspeaker at a distance of one meter. Participants were instructed to repeat back anything they had heard, even if they thought it was incoherent, and to take a break when required. The responses for each sentence were scored by means of loose scoring, which is the standard clinical method for scoring. In addition, each response was also transcribed for future analysis.

3.3.2 Results

Figure 3.13 shows the percentage number of keywords identified by each participant and, the Easy BKB sentence test. The Easy BKB sentences were more intelligible than sentences from the full BKB test for 9 out of 10 participants. P10 was the only listener who performed better with the original sentences and they scored 50% with the original sentences and 47% with the easy sentences. P8, however, achieved a score of 0% with the original and scored 8% with the easy sentences. Overall, for the ten participants, the mean score for the original BKB sentences was 16.1% (sd 12.3%), and for the easy BKB sentences, the mean score was 23.4% (sd 18.7%). A paired t-test was carried out to compare the means of both sentence groups, and the analysis revealed that the difference between the original and Easy BKB sentences was significant; $t(9) = -3.59$, $p = 0.006$.

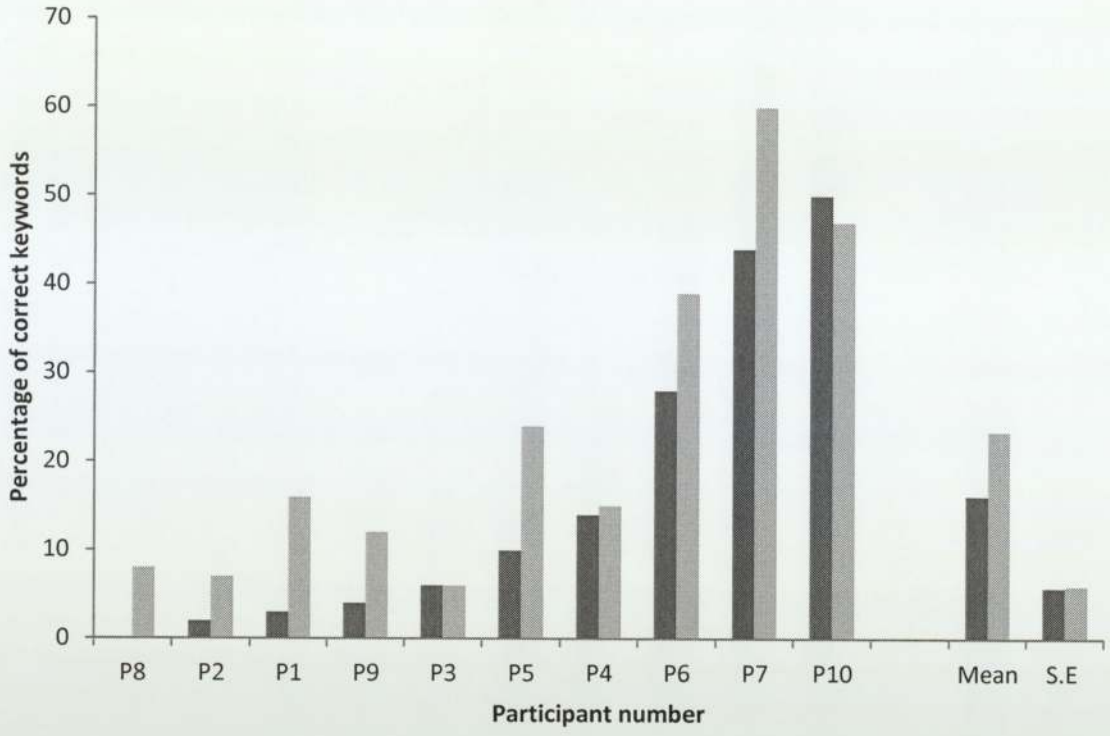

Figure 3.13. Individual participant scores for original BKB sentences (dark grey bars) in rank order. The corresponding Easy BKB Sentence Test scores are shown by the light grey bars. The BKB sentences were presented in quiet at a level of 70 dB(A) through a loudspeaker and responses were scored by means of loose scoring. The rightmost bars show the mean values for each test and the error bars (SE) show the standard error about the mean.

3.3.3 Discussions

The more intelligible sentences were identified in Section 3.2.3 with normally hearing participants, and a preliminary experiment which is described in Section 3.4.3 was carried out with cochlear implant users. The results from the statistical analysis in this experiment show that the easier sentences are significantly more intelligible with cochlear implant users. All but one participant (P10) improved in scores with the easy BKB sentences; this listener however was already performing at a reasonable level of 50%. Thus, suggesting that those listeners who achieve low scores with the original sentences are likely to demonstrate some benefit with the easier sentences, as shown in Figure 3.15.

3.4 Summary and conclusions

This study identified the most intelligible sentences, which confirms that the BKB lists are not approximately equally difficult. The 32 of the most intelligible sentences formed part of the Easy BKB Sentence Test, which had characteristics of any original two BKB lists, i.e. 32 sentences.

Two factors affected the intelligibility of the BKB sentences: sentences containing three words and those containing a subject-verb-complement (SVC) grammatical structure. These factors can be considered when generating easier BKB sentences.

The main aim of this experiment was to identify the easiest sentences and enabling them to be combined to form an Easy BKB Sentence Test, which could be used with listeners who achieve low scores with the original test. The sentences within the Easy BKB Sentence Test were found to be significantly more intelligible than the original BKB sentences when presented to ten cochlear implant users. Even though performance with the Easy BKB Sentence Test was improved, 6 of the 10 listeners were still scoring less than 10%. . These low scores suggest that even the easier BKB sentences are still not adequately intelligible to a certain group of individuals, thus making it difficult to carry out an accurate evaluation of speech recognition as intended. This suggests that there is a clinical need for an even easier test that is suitable for certain hearing impaired listeners; and this is the main focus in Chapter 5.

4 Using the Easy BKB Sentence Test with children

4.1 Introduction

As concluded in Chapter 3, cochlear implant listeners who get low scores with the original BKB sentence test can benefit from the Easy BKB Sentence Test. The aim of the experiment described in this chapter was to identify if sentences within the Easy BKB Sentence Test can be used on populations for example listeners with poor linguistic and language ability that may be caused by hearing impairments or other factors such as age. The BKB sentence test was originally developed for use with partially hearing children and was recommended for children over eight years of age (Bench and Bamford, 1979). However, in clinical practice it is not routinely used despite the recommendations of performing speech perception testing with both hearing aid and cochlear implant users. One limitation of sentence tests, as discussed in Chapter 2, (Section 2.2.1.1) is that sentence tests are extremely dependent on language and intelligibility, thus patients must be able to recognise the test material and be able to follow test instructions (Ballantyne and Martin, 2001). Furthermore, children with poor hearing and language abilities may not be able to score adequately with the standard BKB test, and may further benefit from the easy BKB sentences.

The assessment of speech for young children is challenging because of the variability with each child and unlike the candidacy for implantation for adults there are no minimum test protocols for children (Northern and Downs, 2002). Variability can include developmental factors, communication abilities and even a child's willingness to cooperate with tests, this there are no minimum procedures. The NICE guidelines state that for children who are to be considered for a cochlear implant, their functional hearing should be assessed through the development and maintenance of speech, language, communication and listening skills that are appropriate for the age, developmental stage and cognitive ability of the individual child (NICE, 2009). Speech perception testing is often used with older implanted children when appropriate and is

recommended for hearing impaired children regardless of their hearing provisions e.g. hearing aids or cochlear implants

The aim of the experiment in this chapter was to establish if the sentences within the Easy BKB Sentence Test are appropriate for use with younger children less than eight years of age. Normally hearing children are used in this experiment to identify if the vocabulary and sentence structures are comprehendible for younger age groups. If the sentences are found to be intelligible, then further experiments with the easier sentences can be carried out with hearing impaired children to form a part of a speech test battery for younger children with speech or language impairments. These sentences can be particularly useful in the assessment of speech recognition, and can also provide further measures of outcomes, alongside the currently used speech tests for children.

4.1.1 Speech tests for children

An example of available speech tests were discussed in Chapter 2 (Section 2.2.2) and this section gives an overview of the speech tests that are suitable for use with younger children. A number of speech tests have been created to be used clinically for children and Watson (1957) identified that such tests should include materials that are within the vocabulary range for the child and any lists should be phonetically balanced and equal in terms of difficulty. The child must be able to deliver the type of response required without causing any uncertainty to the tester (Fry, 1961; Watson, 1957). In addition, the tests used must be appropriate to the child's developmental age and performance ability.

It was discussed by Watson (1957) that one of the first speech recognition tests for children developed in the UK was the Kendall Toy Test (Kendall, 1953; 1954). This test was designed for young children aged between three to five years, and consisted of three lists each having ten monosyllabic words. Each word had a corresponding toy. The test was administered in free-field with live voice presentations, and the child is required to point to the required toy when requested (Markides, 1997). Similar to the Kendall Toy test, a commonly used speech test in current clinical practice is the McCormick Toy Test for children (McCormick, 2004) which consists of 14 words

and 7 pairs of associated toys. This test was originally developed in 1977 and was intended for children aged between two and five years. Each pair has a similar sounding word, for instance 'tree' and 'key'. The test is very useful in determining how well a child can discriminate between words, and is often used clinically as it is a short test to use. Originally, the test was used in free-field with live voice presentations; however, digital recordings of the words have now been made ensuring that the test can be automated. Another popular test is the Auditory Speech Sound Evaluation (ASSE) Test; this is a commonly used speech test which comprises of a range of auditory assessments and is particularly useful for children with poor speech or language intelligibility (Govaerts et al, 2006).

The Arthur Boothroyd words (Boothroyd, 1968) and the Manchester Junior words (Watson, 1957) are word tests that were designed to be used with children. Word tests are a useful measure as they can assess speech detection, and are particularly beneficial as they can be administered in a short period of time (Boothroyd, 1968). However, word tests do not provide the same contextual clues as sentence tests, and Miller et al (1951) identified that words are more intelligible when combined to form meaningful sentences. Sentences are more realistic of real life situations and children can utilise this contextual information that available in meaningful sentences for speech recognition assessments (Boothroyd et al, 1985).

As mentioned, the BKB sentence test was initially designed for children and does offer many advantages over word tests as it contains short meaningful sentences that provide contextual information. Natural language samples from over 260 hearing impaired children were analysed to develop the materials of this sentence test (Bench and Bamford, 1979). Although the test was intended for children, the test is not often used for paediatric use as it can be too complex for those with poor speech perception abilities due to age, hearing loss or language abilities. The aim of the experiment in this chapter aimed to identify if the previously identified easier BKB sentences will be beneficial for younger children with normal hearing. Normally hearing children are used in this study to identify the youngest age range for which the vocabulary is suitable; this can provide useful information and promotes future research with hearing impaired children. The children used

in this experiment were aged between four to eight years. The upper age range was used as the BKB sentences were designed for those over eight years of age, and the lower age range was selected as this was beyond the critical age range for language development, as discussed in Chapter 2 (Section 2.1.2).

4.1.2 The Renfrew Action Picture test

The Renfrew Action Picture test was used with all the participants in this experiment, as it can provide a measure of expressive language for children aged between three to eight years. The test assesses grammatical skills and the amount of information a child can convey and thus identifies a child's ability to use a range of sentences and vocabulary to express their ideas.

Catherine Renfrew created the first edition of The Action Picture Test in 1966 and it was revised in 1971 (Renfrew, 1997). The test was devised from pictures from the 'English language Scale' (Watts, 1944). The Action Picture Test is a standardised test that stimulates the child being tested to give examples of their spoken language, which can then be evaluated. The fourth and current edition of the test (Renfrew, 1997) contains the Renfrew Language Scales which the child's results can be compared to the normative values. The test is designed for children aged three to eight years and consists of ten different pictures being shown to the child. On the reverse of each picture card contains a question for the child, see Figure 4.1. The answer given by the child is then recorded and later scored for information and grammar. The results can then be compared to the normative value.

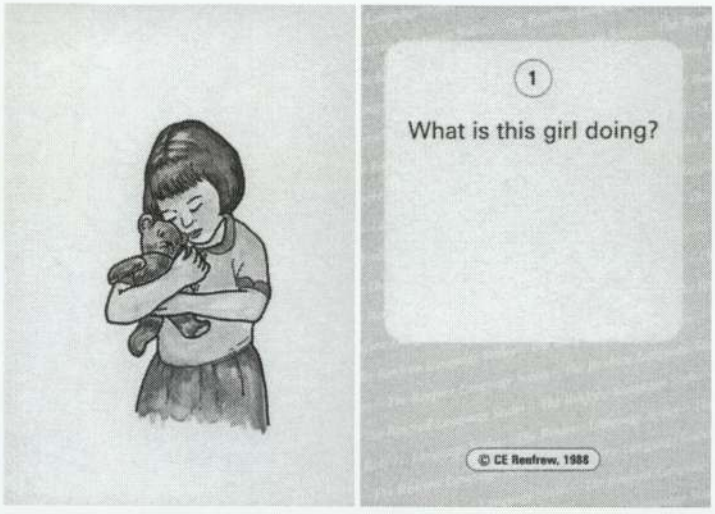

Figure 4.1. The first card from The Action Picture Test (Renfrew, 1997). The picture on the left is shown to the child and the question asked to the child is on the right.

4.2 Methods

4.2.1 Participants and procedures

This study received Aston University Ethics approval. An information sheet was sent to each parents/guardians of the 20 children between four to eight years of age who participated in this study. As participants were under the age of 16 years, parental/guardian consent was required. Consenting parents/guardians were either staff or students at Aston University (Birmingham, UK) or acquaintances of the tester. A consent form was signed by the parents/guardian and the researcher before any testing began. The experiments took place either in a soundproof booth at Aston University (Birmingham, UK) or in a quiet room at their residence. The total duration of this study was 60 minutes, including instructions, familiarisation and feedback.

For each child, an audiological history, a visual examination of the childs ear and a hearing screen at 20 dBHL was carried out in accordance with the British Society of Audiology (BSA) recommendations (BSA, 2004) in order to rule out any abnormal otological conditions. As a constant, the participants all had English as their first language and a normal level of hearing. The total duration of participation, including instructions, familiarisation and feedback was 60 minutes.

The MRC Institute of Hearing Research (Nottingham, UK) speech test program (vldwav.exe) was used for the presentation and scoring of the BKB sentences in this experiment. The calibration of the test materials was the same as discussed in Chapter 3. The utterances were presented dichotically through headphones at 65 dB SPL in quiet. Each child was presented with 32 original BKB sentences and 32 BKB sentences from the new easy BKB test. The order of easy and original sentence lists alternated for each listener. Each child was asked to say what they heard and all responses were noted, and a tight scoring method was used for each complete sentence, i.e. the child had to repeat the sentence exactly, therefore, the word tenses and stems of all the words was to be identical to the written word in order to obtain a correct score. After each test condition, the children took a ten minute break and they were encouraged to take additional breaks if required. Following the speech test, an assessment of expressive language abilities was performed using the Renfrew Action Picture Test, as this was the one of the available tests that was suitable for all ages.

4.3 Results

As discussed in the methods, for each age group four children participated in the study. On average, for all age groups except the eight year old children, the easier BKB sentences were more intelligible. The mean values for both the original and easier sentences, for each age group are presented in Figure 4.2. Observations of Figure 4.2 indicate that all children were achieving high scores of more than 85% with either of the original sentences (dark grey bars) and easier sentences (light grey bars). For the four children that were eight years of age, a maximum score of 100% was achieved with both sentence types. The intelligibility of BKB sentences increases as the age of the child increases, for both the original and easier sentences.

The mean values and standard deviations for both the original and easier sentences are shown in Table 4.1. Assumptions of normality, homogeneity of variance and sphericity were met, and a two-way repeated ANOVAs were carried out on the data. From Figure 4.2, the intelligibility of the easier and original sentences in all age groups appeared to be similar, and the within subjects analysis revealed that there was no significant difference found between the sentence condition i.e.

easy or original (F [1,15] = 4.2, p = 0.06). As shown in Figure 4.2, the children aged four years achieved lower scores than the other age groups, and significant a difference between age groups was confirmed by the was found between the different age groups (F [4,15] = 3.2, p = 0.04). However, no significant difference was detected for the interaction between the age groups and the different types of sentences (F [4,15] = 0.8, p = 0.52).

Age (years)	Percentage mean scores for original sentences	Standard deviations for original sentences	Percentage mean scores for easy sentences	Standard deviations for easy sentences
4	87.8	8.7	90.3	6.7
5	94.9	5.5	96.1	4.9
6	94.2	6.4	98.7	1.5
7	96.8	3.8	97.4	2.1
8	100.0	0.0	100	0.0
Average	94.7	6.5	96.5	4.9

Table 4.1. The percentage mean values and the standard deviations for all age groups are shown for both the original BKB sentences and the easier BKB sentences. The overall averages and standard deviations for the original and easier sentences are also shown.

Figure 4.2. The percentage mean values for the original BKB sentences (dark grey bars) and the easier BKB sentences (light grey bars) are displayed for the five age groups. N= 4 per age group. 32 original sentences and 32 easier sentences presented in quiet at 65 dB SPL. The standard error of the mean is displayed.

The results for the Renfrew Action Picture test are shown below in Table 4.2. The participant numbers in bold refer to the children who performed less than the normative values for their age range, and the asterisk identifies whether the grammar, information or both scores failed to meet the normative values. The individual scores for the original and easy BKB sentences are also shown in Table 4.2.

Participant number	Age	Grammar score	Information score	Original BKB score %	Easy BKB score %
1	4	15	23	84.6	87.2
2	4	18	25	100.0	100.0
3	4	16	25	79.5	84.6
4	4	22	28	87.2	89.7
5	5	21	35	87.2	89.7
6	5	16*	29	94.9	94.9
7	5	15*	28	97.4	100.0
8	5	19	23*	100.0	100.0
9	6	27	35	84.6	100.0
10	6	24	28*	97.4	100.0
11	6	26	34	97.4	97.4
12	6	27	35	97.4	97.4
13	7	34	29*	92.3	94.9
14	7	22*	32*	100.0	97.4
15	7	38	30*	94.9	100.0
16	7	29	32*	100.0	97.4
17	8	21*	33	100.0	100.0
18	8	31	28*	100.0	100.0
19	8	29	37	100.0	100.0
20	8	31	38	100.0	100.0

Table 4.2. The expressive language scores collected for the 20 participants. N= 4 per age group. The participant numbers in bold refer to the children who failed to achieve the normative Renfrew Action Picture test scores for their age group, for either the grammar, information or both scores. The individual speech scores are also displayed.

4.4 Discussion

On average, the children less than eight years of age performed better with the easier BKB sentences. The four children that were eight years of age achieved the maximum score in both

conditions. The difference between the age groups was found to be significant, however, no significant difference was found between the original and easier sentences, and in addition no interaction was found between the two conditions.

All children achieved a BKB score of more than 85% with either the original or easier sentences. This suggests that normally hearing children younger than eight can perform well with this test, and the vocabulary and syntax within the test materials is suitable for normally hearing children above the age of four. Therefore, when suitable the BKB sentences can be used for younger children to assess speech recognition abilities. If hearing provisions are made without any delay, then even hearing impaired children can develop the vocabulary range as well as normally hearing children (Northern and Downs, 2002), and performance can be measured with the BKB sentences.

The experiments were conducted with normally hearing children who have normal speech and language development, those with hearing impairments however, may perform differently with the original and easier sentences, and a significant difference may be observed, similar to the findings with the cochlear implant listeners. It was discussed in Chapter 2 (Section 2.1.5), that the speech and language development for children can be affected because of hearing impairments, due to decreased audibility and confusions in segmentation and prosody (Northen and Downs, 2002). Children with hearing loss may not also be able associate sounds and meanings and therefore lose the ability to identify contextual cues that are present in sentences, normally hearing children however, benefit from this skill (Northen and Downs, 2002). This could suggest why a significant difference was not seen between the sentence types, and further investigations would be beneficial.

The results of the Renfrew Action Picture Test suggest that 10 out of the 20 children tested were not performing to the standardised normative values. This low performance may be because of poor language acquisitions, and subjects would therefore have benefited from alternative measures of language proficiency that tested for other than expressive language development. Alternatively, the poor performances could be due to fatigue as the experimental session may have exceeded their period of concentration, and performance may have been at an optimal level if the session was split into two. Although 10 children failed to perform within the average range of the normative values,

the speech scores achieved are all exceptional. The results however, do suggest that adequate speech scores may still be achieved by participants with poor language performance. These sentences, especially the easier BKB sentences may be appropriate for younger children with lower language acquisition due to age or hearing loss. Although no specific test protocols are in place for children, a complete language and speech assessment that is appropriate for each individual's age range is essential. Overall, it is important to identify a child's language ability in order to establish the cause of speech test results, and further identify if a poor speech score is achieved due to hearing or language impairments.

4.5 Conclusion

The aim of the experiment in this chapter was to identify if the Easy BKB Sentence Test can be used on other populations other than profoundly deaf adults. The standard BKB sentences are recommended for use with individuals over the age of eight years. The aim of this experiment was to establish whether these easier sentences are within the Easy BKB Sentence Test are suitable for children younger than eight years of age. Experiments were performed with normally hearing children and the results suggested that the vocabulary and syntax of both the original and easier sentences are suitable for those over the age of five years. Further investigations are required to identify the suitability of these sentences with hearing impaired children, and thus validate the test materials. The original and the Easy BKB Sentence Test can be a valuable tool in paediatric speech audiology, for hearing and/or language impaired children.

5 The effect of repetition and emphasis on the intelligibility of the BKB sentences

5.1 Introduction

As previously highlighted, some profoundly deaf listeners with cochlear implants score less than 10% with BKB sentence test (Cooper, 2008); such low scores make it difficult to detect small improvements new technology or improved rehabilitation. In Chapter 3, the 32 most intelligible BKB sentences were identified and were presented to ten cochlear implant users who previously achieved low scores with the original BKB sentence test. Although the cochlear implant users showed a significant improvement in performance with the 32 easier sentences, six of the ten listeners still scored less than 10%. These findings suggested that the easier BKB sentences are still not intelligible enough for some hearing impaired individuals and there is a clinical need for an even easier sentence test. Therefore, for scores that are subject to 'floor' and 'ceiling' effects, a comprehensive evaluation of speech recognition is difficult to carry out.

Whilst maintaining the benefits of the BKB sentence test that were highlighted in Chapter 2, this chapter introduced some natural communication tactics that are used by hearing impaired individuals and the BKB sentences were modified to incorporate some of these strategies. It was aimed that the adapted sentences that were developed in this chapter generated another easier version of the BKB speech test that was suitable for a wider range of speech perception abilities.

5.1.1 Hearing strategies

Hearing impaired listeners encounter communication difficulties that often cause them to mishear or misunderstand speech. These difficulties are caused by external and internal factors; external factors are factors such as background noise or interruptions by other speakers, whilst internal factors are those caused by communicators themselves (e.g., insufficient information provided by the

speaker or unintelligible speech). When a communication breakdown occurs, listeners adopt a number of strategies to improve intelligibility (Tye-Murray et al, 1991; Dillon, 2001; Most, 2002). Dillon (2001) reviewed these hearing strategies and identified that they can be classed in three main groups, namely: observation, manipulating social interactions and manipulating the physical environment. These listening strategies can be essential for hearing impaired individuals to reduce the difficulties encountered; examples of these for each group are given below:

The strategies highlighted in the three groups provide useful

1. Observation:
    - Lip-reading
    - Speech reading (combination of lip-reading and interpretation of face and/body signals)
2. Manipulating social interactions:
    - Clear speaking rather than conversational speech
    - Increasing speech intensity
    - Gaining the listeners attention
    - Awareness of the topic when beginning conversations
    - Repair strategies: repeating, rephrasing, simplifying or clarification.
3. Manipulating the physical environment:
    - Lighting
    - Room size
    - Position

The strategies identified in group two are internal factors that the speaker can modify to reduce the communication difficulties for hearing impaired listeners. There are some strategies within group two that can be applied to the BKB sentences to make the test easier. This section is focussed on the two of the tactics in group two: clear speaking and repair strategies. Repair strategies are methods used to maintain communication when speech has not been fully understood. A common type of repair strategy is repetition, where the speaker repeats all or parts of the utterance (Tye-Murray

et al, 1991; 1995); this technique is discussed in greater detail in Section 5.1.2.1. Other effective types of repair strategies include rephrasing, simplifying and clarification of the spoken message (Most, 2002).

These repair strategies increase the intelligibility of speech, but there are limited speech tests that use them to improve listeners' performance. The aim of this study was to incorporate clear speech and repetition into the BKB sentences to produce an even easier BKB sentence test that is suitable for listeners who currently achieve low scores with the original test. The next section discusses how some speech tests already benefit from using hearing strategies, and goes on to discuss the two main strategies selected for this study in more detail.

5.1.1.1 Speech tests and hearing strategies

Speech tests can be modified to make the sentence test more appropriate for listeners when their scores are subject to 'floor' and 'ceiling' effects. For those scoring near 100%, noise can be added which would make the sentences less intelligible (e.g. Gatehouse and Robinson, 1997), for example the BKB-SIN and HINT sentence tests Some speech tests, e.g. the CUNY sentences are presented audio-visually and therefore enable the listener to use lip-reading, which is one of the observational hearing strategies described in Section 5.1.1. During communication difficulties, an individual is likely to rely on visual and contextual cues for speech communication (Hazan, 1997).

An audio-visual version of the BKB sentences was previously made for tests of lip-reading (Rosen and Corcoran, 1982), but this is no longer available for use in clinical practice. Other speech tests, for instance, the IHR and CUNY sentences have used audio-visual presentations to make listening easier and more representative of normal face-to-face listening conditions (MacLeod and Summerfield, 1990). These visual stimuli can substantially increase the performance of a speech test, and thus provide a useful tool for patients who perform poorly in audio-only listening tasks. Creating an audio-visual sentence test is complicated as the natural speech properties will cause certain words in the sentences to be easier to lip-read than others, as the amount of visual information connected with sounds differs greatly and therefore it is difficult to balance a test for

both auditory and visual properties (Keintz et al, 2007). Audio-visual presentations can provide a vast improvement in scores when used in speech tests, but they do not reveal a listeners true auditory performance. The experiments in this study do not use any visual stimuli in order to obtain a true measure of acoustic performance.

5.1.2 Repetition and emphasis

Repair strategies are one of the hearing strategies described in Section 5.1.1, which involve the speaker to manipulate their communication tactics by using some simple techniques such as repeating, rephrasing, simplifying or clarification of what has been spoken (Kaplan, 1995; Tye-Murray et al, 1995; Dillon, 2001 and Most, 2002). Repair strategies can be defined as either expressive or receptive strategies, where expressive repair strategies are carried out by the individual providing the message, and receptive strategies are carried out by the individual who is receiving the message (Gagné, J and Jennings, 2000). Repair strategies belong to the second group of the classification of hearing strategies defined by Dillon (2001), also a part of this group is clear speech which is also known as emphasis on speech. This study uses repetition and emphasis to modify the BKB sentences, as both strategies maintain the exact content of the test sentence. Other strategies such as rephrasing, simplifying or clarification would involve an introduction of new vocabulary and can therefore affect the intelligibility per target sentence.

5.1.2.1 Repetition

Following a communication breakdown, a hearing-impaired listener's understanding of the spoken message may be misunderstood or partially heard; therefore, an exact or partial repetition of the message can enable a more accurate understanding of the entire communication (Miller et al, 1951). The repetition of a message is the most commonly used type of repair strategy (Miller et al, 1951; Tye-Murray et al, 1991; 1995; Kaplan, 1995); however some investigations have found this to be the least effective strategy (Gagné and Wyllie, 1989), and this is discussed below.

Miller et al (1951) tested two normally hearing subjects in background noise to determine the effects of repetition on digits, sentences and nonsense syllables. This study used three conditions: automatic repetition, requested repetition and no repetition, at each signal-to-noise ratio tests, Miller et al found that the sentences were the most intelligible and the nonsense sentences were the least intelligible; the differences were attributed to the amount of redundancy in each type of test material. The study also showed that there was a small advantage of repetition for each type of test material. Repeated messages, whether automatic or requested, contain the same information, therefore, when a listener hears the message for the first time, the repetition can provide some confirmation of the original message, whether it was right or wrong. As only a small advantage was gained by repetition, listeners may benefit from changes to the message for example emphasis, simplification or clarification, where these tactics can be more helpful than simply repeating the original message (Gagné and Wyllie, 1989).

Tye-Murray (1990; 1991; 1995) compared the effectiveness of repair strategies. In one study, Tye-Murray (1990) used five groups of participants and a controls group to identify the effects of repair strategies with visual presentations, all participants had normal participants. The controls group were presented with the original sentences in live-voice twice and each of the five groups were assigned to one of the five strategies where they were able to ask the talker to do the following: (1) to repeat a sentence, (2) to simplify a sentence, (3) to rephrase a sentence, (4) to say an important keyword, or (5) to extend a sentence into two sentences. The study found a significantly greater improvement when the listener misheard the original sentence and requested the repair strategy assigned to their group, compared to when no strategy was implemented. Also, all strategies were found to improve intelligibility equally and no significant difference between the strategies was discovered. Although this study found an improvement with the use of repair strategies, the conditions were tested in visual conditions, and it is not clear which sentences were used or whether they were balanced for visual properties. As the visual information for sounds varies and this can cause certain sounds to be more intelligible than others when lip-read (Keintz, 2007), it would be required that the sentences are balanced.

Communication therapy is where individuals are encouraged to use repair strategies when they misunderstand a spoken message. Another study by Tye-Murray (1991) investigated whether communication therapy alters the choice of repair strategies when listeners had the opportunity to speech read, and identified which of the strategies the listeners preferred. The 15 listeners were able to request any of the repair strategies used in the first study (Tye-Murray, 1990), such as repetition of the sentence. Eight of the adults received therapy and had practice with the strategies and also sessions with a clinician, which included role play and other activities. The other seven participants in a control group had no therapy. Tye-Murray found that before and throughout the therapy participants were most likely to request a repeat of the sentence, and for those who received the therapy sessions other repair strategies were also requested. This suggests that in natural situations hearing impaired listeners are most likely to select repetition as the main strategy to help improve the communication process, and with appropriate therapy listeners can further benefit from the other strategies for example simplification.

In a further study, Tye-Murray (1995) investigated the use of repair strategies with 12 adult cochlear implant users. Two objectives of the study were to identify the repair strategies used by implant users with familiar and unfamiliar speakers, and to identify how communication partners respond to the request for a repair strategy. It was found that, with both familiar and unfamiliar speakers, implant users requested repetition and confirmation more than other strategies, such as requesting for further information. It found that the communication partner, i.e. the speaker, most commonly responded with repetition to a request for a repair strategy.

Gagné and Wyllie, (1989) compared the effectiveness of repetition, rephrasing and clarification when 30 normally hearing participants were assigned to each of the three conditions, i.e. ten participants per condition. The stimuli presented in each condition were under visual only conditions and consisted of 50 words, the benefit of the repair strategies for each condition, repetition, rephrasing and clarification were 1%, 16% and 23% respectively. These findings suggest that repetition alone has very limited benefit compared with the other repair strategies.

However, the findings of Gagné and Wyllie, (1989) contradict that of Miller et al (1951) and Tye-Murray (1990) who found improvements with the repetition strategy. The study by Miller et al (1951) used digits, words and sentences in audio conditions, where Gagné and Wyllie (1989) used words in visual conditions and Tye-Murray (1990) used visual stimuli but for the presentation of sentences. Miller et al (1951) found that words within meaningful sentences were more intelligible than words alone, due to the contextual clues present. This can identify why Miller et al (1951) and Tye-Murray (1990) found a difference with repetition, as a listener may identify a part of a sentence, and therefore, the exact or partial repetition of the misheard sentence can repair the communication breakdown more successfully. The findings of Miller et al (1951) are not directly comparable to that of Gagné and Wyllie (1989) and Tye-Murray (1990) due to the different conditions used.

5.1.2.2 Emphasised speech (Clear speech)

As introduced in Chapter 2, the stress, intonation, voicing and speaking rate of natural speech varies, these all affect the intelligibility of speech (Pichney et al, 1985; 1986; and Wright, 1997). These acoustic features are referred to as 'prosody' or 'prosodic aspects' and are essential for providing naturalness (Wright 1997; and Mary and Yegnanarayana, 2008). Listeners with normal hearing use these prosodic cues during communication, and they enhance speech perception in background noise (Hazan, 1997). Most of these prosodic cues however, are degraded by hearing loss because of the reduced hearing thresholds and therefore, and thus they perceive limited amounts of auditory information that is found in the speech signal (Hazan, 1997). As mentioned previously, hearing strategies increase the intelligibility of speech understanding, and these difficulties can be reduced if the speaker speaks clearly rather than conversationally (Pichney et al, 1985; 1986; Liu et al, 2004).

In poor listening conditions, speakers change their speech by deliberately stressing keywords and changing their pattern of intonation to increase speech intelligibility (Pichney et al, 1985; 1986; Ferguson and Kewley-Port, 2002). As shown in Figure 5.1, such clear speech is slower than

conversational speech, because of the insertion of gaps, the increased duration of phonemes and the complete annunciation of vowels (Pichney et al, 1985; Liu et al, 2004).

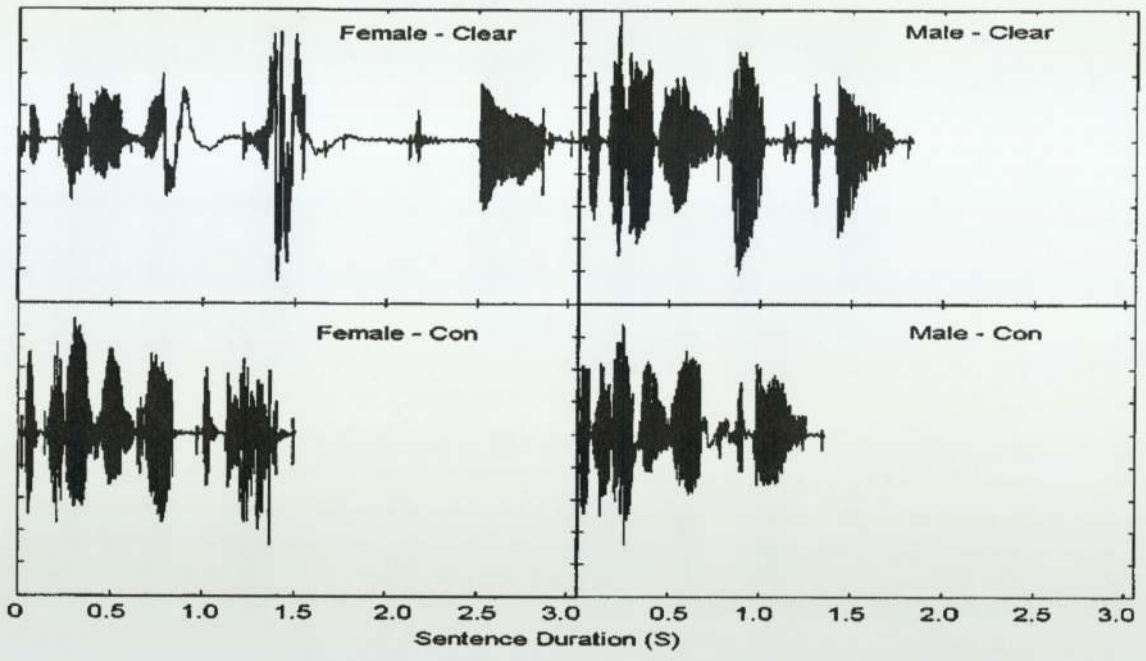

Figure 5.1. Waveforms for the utterance "The children dropped the bag." from Liu et al (2004) for clear speech (top plots) and conversational speech (bottom plots) by a female (left plots) and a male (right plots) speaker. The duration of waveforms for clear speech is considerably longer than those for conversational speech.

Researchers have found that emphasised speech improves speech intelligibility in a range of listening situations: audio, audio-visual and visual only, for hearing impaired listeners (Pichney et al, 1985; 1986), including those listeners with cochlear implants (Liu et al, 2004), as they can benefit from the emphasis in the speech properties. Pichney et al (1985) presented five hearing impaired listeners with nonsense sentences in quiet, spoken by three male speakers in both clear and conversational speech. The average intelligibility scores for clear speech were 17% higher than the average scores for conversational speech.

Similar findings were seen by Payton et al (1994) where twelve participants were used to identify the effect of clear speech in noise and reverberation. Of these twelve participants, ten had normal hearing and two had hearing impairments. Nonsense sentences using clear speech were found to be

more intelligible in all listening conditions, for the hearing impaired participants a 16% advantage was found in quiet, and for those with normal hearing 16% advantage was also found when a hearing loss was simulated. Greater advantages were found in the noise and reverberation conditions for both normal and hearing impaired listeners. It was concluded that a greater advantage of clear speech is found as the listening conditions with noise and/or reverberation become more challenging (Payton et al, 1994).

Liu et al (2004) used 27 normal hearing listeners to carry out three experiments and a further eight cochlear implant listeners for a fourth experiment. The stimuli consisted of 144 BKB sentences that were rerecorded with both a male and female speaker for both clear and conversational speech, and there was no significant difference found between speakers. For the normal hearing listeners, it was found that clear speech can improve the intelligibility and no significant difference was found between the male and female speakers. The cochlear implant users were categorised into two groups; good and poor users i.e. those who scored more than 75% with conversational speech were classed as good users and those who scored less than 60% were classed as poor users. Of the eight cochlear implant listeners, five were good users and three were poor users. It was found that the good users obtained less benefit from clear speech compared with the poor users. It was concluded from this study that for all conditions; normal hearing, simulated and implant users a clear speech benefit of 29%, 29% and 38% was found respectively. The findings of this study are relevant for the experiments in this current study as it shows that cochlear implant users benefit most from clear speech and a greater improvement is seen with poor users; the population of whom these experiments are targeted at.

5.2 Methods

5.2.1 Experimental design

The aim of this study was to investigate whether repetition and emphasis of keywords improves the intelligibility of the BKB sentences, and to further identify which of these modified sentence types

are most intelligible. Incorporating these techniques, a new set of sentences were developed to create an easier test for listeners who achieve poor scores with the original BKB test. The study used four test conditions: normal BKB sentences (N), repeated BKB sentences (R), where the sentence was automatically presented twice before the listener responded, emphasised BKB sentences (E), where emphasis is placed on each word, and a combination of emphasised and repeated BKB sentences (ER), where the emphasised sentence was automatically repeated twice.

The stimuli were presented to 10 normally hearing listeners at a level of 65dB in two different levels of background noise (either -8dB or -12dB SNR). Normal hearing listeners were used in this experiment to avoid the high variability that can occur with hearing impaired listeners. The background noise was used to reduce a listeners hearing threshold and mimic that of a hearing loss. Two noise levels of pink noise were used to resemble a moderate and profound hearing loss. A –8 dB SNR was used to simulate a moderate to severe hearing loss and found to give approximately 50% correct recognition of words from the original BKB sentences (Kaur, 2007). The second session used a SNR of –12 dB. This increased SNR simulated a severe to profound hearing loss and allowed an appropriate comparison to the scores of the poorly performing patients, with approximately 15% correct recognition of words.

As the results between the noise levels were not to be compared, the same participants were used for both noise levels and any practice effects could be ignored. Each participant always began with the -8 dB noise condition, and was therefore exposed to the same level of learning throughout the experiments. This was considered to be a controlled method, as opposed to randomising noise conditions, which would then lead participants who were presented with the -12 dB SNR level first to perhaps finding the -8 dB noise level an easier test condition, having done the harder task first.

In the experiment described in this chapter, and also for Chapter 7. Due to limitations of the MRC Institute of Hearing Research (Nottingham, UK) speech test program (vldwav.exe), a new speech test was developed, the Aston Speech Test program (created by Morse and Hartley, 2009). This test enabled the presentation of a range of new materials whereby the original speech test was unable to

present them. For instance, for the four new listening conditions, the original test (vldwav.exe) was unable to present the combination of the emphasised and repeated BKB sentences (ER) due to the length of each individual stimuli. The Aston Speech Test can also enable the presentation of automatic repetitions, which ensures that each sentence was repeated with a fixed gap. The Aston Speech Test program can also allow the presentation of closed set sentences, which is the discussed further in Chapter 7. Additionally, other materials not described in this thesis, such as cued speech with visual or auditory cues can be presented.

Selecting the speaker to re-record the BKB sentences was an important factor for this experiment. The speaker must have a clear voice and the ability to maintain a consistent level of competency throughout the recording. Information about the speaker is given below in Section 5.2.2, and was selected based on his speech qualities. Bench et al (1995) concluded that speakers should be selected through observation and possibly even trial and error, which suggests there are no specific guidelines when selecting a speaker.

5.2.2 Recordings

A 40 year old male speaker, with clear pronunciation, good intonation and voice quality was used to record the BKB sentences. The speaker was already familiar with the BKB sentences and the recording process. The recordings took place at Aston University (Birmingham, UK), in a soundproof booth over two sessions; the normal sentences were recorded in the first session and the emphasised sentences in the second session. The recordings were made with a sampling frequency of 44.1 kHz with 16-bit resolution. These recordings were made using an Edirol USB capture UA-25 (Edirol Europe Limited) analogue to digital converter. The microphone used for recording the speech was a C1000S dynamic microphone (AKG Acoustics GmbH), was placed 30 cm from the speaker in the soundproof booth.

The speaker had a trial session to ensure familiarisation with the sentences and to establish his expectations. The speaker was asked to speak in the following manner:

- For normal sentences, no emphasis was to be made on any particular word, e.g. keywords, beginnings or ends of sentences.

- For emphasised sentences, emphasis was only to be made on each word as though the speaker was speaking to someone with a hearing loss or in a noisy background.

- Each sentence was to be repeated twice and the speaker was asked to repeat any sentences that needed repeating further.

- The speaker was to maintain a straight face and avoid any facial gestures.

- The speaker was to pause for two seconds before and after each sentence, with his lips closed during this pause, in order to reduce any lip-smacks.

- Scheduled breaks were taken after each BKB list, and in addition to this, the speaker was informed to take further breaks if required. Regular breaks had been taken to avoid any fatigue for the speaker and to reduce the chances of a poor quality recording due to this. After each break the sound level was calibrated to ensure that it was consistent throughout the recording.

- After each break the speaker was able to familiarise himself with the next set of sentences.

The original recorded wav files were then edited using Cool Edit Pro, now known as Adobe Audition (Adobe Systems Incorporated) to create individual wav files for each sentence. As each sentence was repeated twice, the highest quality sentence was selected. Each sentence was checked for individual lip smacks and edited accordingly and removed.

5.2.3 Participants and procedures

This study received Aston University ethics approval. Ten participants between 18-35 years of age took part in this study at Aston University, (Birmingham, UK). For each participant; a brief participant history, a visual examination of the participant's ears and a hearing screen at 20 dBHL

was carried out in accordance with the British Society of Audiology (BSA) recommendations (BSA, 2004) to identify any abnormal otological conditions. All participants had English as their first language. The participants were required to attend two sessions and the total duration of this study over two sessions was 150 minutes, including instructions, familiarisation and feedback.

The 336 sentences for each of the four conditions: Normal, Repeated, Emphasised, and Emphasised-Repeated were randomly grouped into 4 lists of 84 sentences. For the four different listening conditions, 24 variations of list orders and test conditions are possible. A random list order and test order for each of the ten participants was selected. The utterances were presented diotically through headphones (HD 250 linear II Sennheiser) at 65 dB SPL with a SNR of -8 dB or -12 dB pink noise, in the first or second session, respectively, using the Aston Speech Test program (created by Morse and Hartley, 2009). The calibration of the sentences for level was as in Section 3.2.1.2. The participants were asked to say what they heard and a keyword loose scoring method was used, i.e. correct word tense and plural forms were not essential for a correct score.

5.3 Results

For both noise levels, all participants were presented with 84 sentences each in the four listening conditions and correct responses were scored by means of the loose scoring method. The mean results for all 10 participants for the -8 dB and -12 dB SNR noise condition are shown in Figure 5.2 and Figure 5.3, respectively. For both noise levels, repeating each sentence, emphasising the words in each sentence, or having a combination of repetition and emphasis, led to higher speech intelligibility compared with the normal sentences. On average, the combination of the repeated and emphasised sentences was the most intelligible.

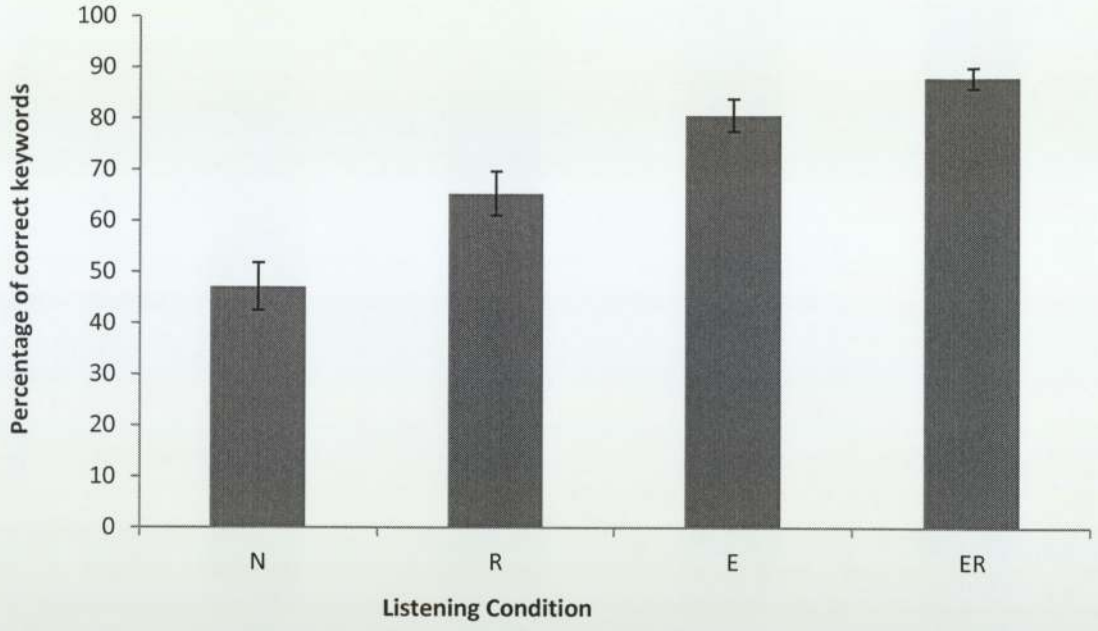

Figure 5.2. The percentage mean value for 84 BKB sentences in each of the four listening conditions: normal (N), repeated (R), emphasised (E) and emphasised repeated (ER). Sentences were presented at 65 dB(A) in -8 dB SNR of pink noise. N = 10. The standard error of the mean is displayed.

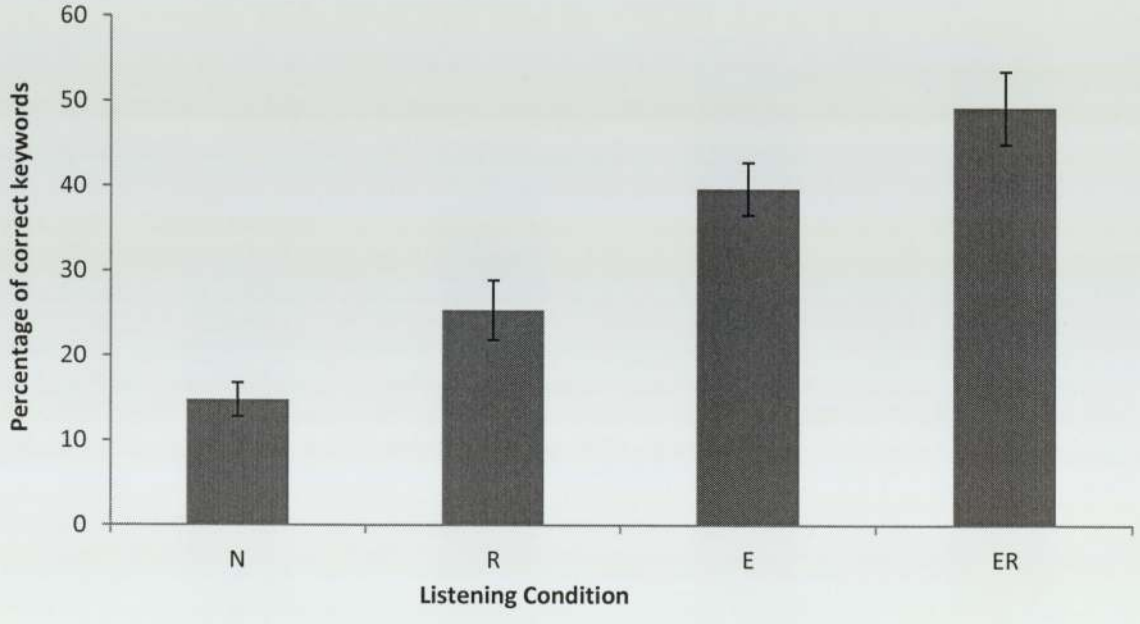

Figure 5.3. The percentage mean value for 84 BKB sentences in each of the four listening conditions: normal (N), repeated (R), emphasised (E) and emphasised repeated (ER). Sentences were presented at 65 dB(A) in -12 dB SNR of pink noise. N = 10. The standard error of the mean is displayed.

For the -8 dB SNR level, the mean and standard deviations were as follows: Normal = (47.0%, s.d = 14.4), Repeated = (65.4%, s.d = 13.5), Emphasis = (80.8%, s.d = 10.1) and Emphasised-Repeated = (88.3%, s.d = 6.5). For all conditions the mean scores were approximately normal, as assumptions of normality, homogeneity of variance and sphericity were met. Analysis of the box and whisker plots did not reveal any outliers within the data for the -8 dB SNR condition. A repeated-measures ANOVA showed that differences between conditions were significant ($F(2,21) = 74.7$, $p < 0.01$); an overall effect size of 0.89 showed that about 90% of the variation in error scores can be accounted for by the different listening conditions. The planned pairwise comparisons as shown in Table 5.1 confirm that there was a significant difference between all paired conditions except the emphasised and emphasised repeated conditions.

Condition	Comparison	% Mean difference (comparison-condition)	P value
Normal	Repeated	-18.2	.003*
	Emphasised	-33.6	<.001*
	Emphasised Repeated	-41.1	<.001*
Repeated	Normal	18.2	.003*
	Emphasised	-15.4	<.001*
	Emphasised Repeated	-22.9	.001*
Emphasised	Normal	33.6	<.001*
	Repeated	15.4	<.001*
	Emphasised Repeated	-7.5	.066
Emphasised-Repeated	Normal	41.1	<.001*
	Repeated	22.9	.001*
	Emphasised	7.5	.066

Table 5.1. Pairwise comparisons between the four listening conditions in the -8 dB SNR level, showing the % mean difference between the conditions and the significant differences (P value). A significant difference is shown in all compared conditions except the emphasised and emphasised-repeated comparison.

For the -12 dB SNR level, the mean and standard deviations are as follows: Normal = (14.8%, s.d = 6.5), Repeated = (25.4%, s.d = 11.1), Emphasised = (39.7%, s.d = 9.8) and Emphasised-Repeated = (49.3%, s.d = 13.6). Analysis of the box and whisker plots revealed an outlier within the data in the normal repeated BKB sentences using the –12 dB SNR, however, no outliers were found in the

remaining conditions. This outlier is therefore presumed to be because of individual differences, and may have been caused by fatigue effects, and thus this score was included in the further analysis. A repeated-measures ANOVA showed that the difference between conditions were significant ($F(2,14) = 60.4$, $p < 0.01$); an overall effect size of 0.87 showed that about 90% of the variation in error scores can be accounted for by the different listening conditions. The planned pairwise comparisons confirm that there is a significant difference between all paired conditions as shown in Table 5.2.

Condition	Comparison	% Mean difference (comparison-condition)	P value
Normal	Repeated	-10.600	.009*
	Emphasised	-24.900	<.001*
	Emphasised Repeated	-34.500	<.001*
Repeated	Normal	10.600	.009*
	Emphasised	-14.300	.018*
	Emphasised Repeated	-23.900	.001*
Emphasised	Normal	24.900	<.001*
	Repeated	14.300	.018*
	Emphasised Repeated	-9.600	.002*
Emphasised-Repeated	Normal	34.500	<.001*
	Repeated	23.900	.001*
	Emphasised	9.600	.002*

Table 5.2. Pairwise comparisons between the four listening conditions in the -12 dB SNR level, showing the % mean difference between the conditions and the significant differences (P value). A significant difference is shown in all compared conditions.

5.4 Discussion

This experiment aimed to identify whether modifications to the original BKB sentences improved speech intelligibility. New recordings of the BKB sentences were made and a total of four conditions were used in this study: (1) normal BKB sentences – N, (2) normal repeated BKB sentences - R, (3) emphasised BKB sentences – E, and (4) emphasised repeated BKB sentences – ER. The learning effect was considered when designing the experiment and therefore the order of

conditions were randomised in order to reduce learning effects between the four sentence conditions. However, as each participant performed the experiment in two different noise levels, there may have been some element of learning.

For both noise levels, repetition, emphasis and a combination of the two conditions, led to higher speech intelligibility compared with the normal sentences. On average, the combination of repeated and emphasised sentences was the most intelligible condition. The statistical analysis of the ANOVA showed that there is a significant difference between all four conditions for both noise levels. The analysis confirmed that repetition alone and emphasised alone sentences achieve greater performance than standard repetition, however, a combination of both strategies is most effective.

A significant difference was found between all pairwise comparisons except the emphasised and the combined emphasised and repeated conditions in the -8 dB SNR level. A significant difference may not have been found between these two conditions, as listeners were achieving scores more than 80% in the emphasised condition, and an 8% benefit was found for the combined emphasised repeated condition. This can suggest that good listeners may be subject to ceiling effects with the emphasised repeated condition, and thus may not benefit significantly from the added advantage of the combined condition as they perform well in the emphasised alone condition, and therefore have a reduced range of improvements. When the listening conditions were more challenging in the -12 dB noise level, a significant difference was found between the emphasised and the combined emphasised and repeated conditions. This supports the findings of Payton et al (1994) who suggest that greater advantages of clear speech can be found as the listening conditions with noise and/or reverberation become more challenging. Also, Liu et al (2004) suggested that poor cochlear implant listeners benefit most from clear speech, and that listeners who perform well in normal listening conditions will also perform well in clear speech, but fewer improvements are found between the conditions, suggesting that those who perform poorly in normal listening conditions will benefit most from clear speech. For the combined condition, the findings of this current study do support the findings by Liu et al (2004). A larger improvement was seen with a signal-to-noise ratio of -12 dB, where intelligibility had increased by over three times (from 15% in the normal

condition and 50% in the combined emphasised and repeated condition) and had almost doubled in the -8 dB noise level (from 47.2% correct in the normal condition and 88% correct in the combined emphasised and repeated condition).

As introduced earlier, previous research suggests that repetition is an effective repair strategy, but is not the most effective. Miller et al, (1951) found a small benefit of repetition for digits, words and sentences and similarly Gagné and Wyllie (1989) found a little benefit from repetition and suggested that an exact repetition of speech does not significantly improve the intelligibility of misheard speech. The findings in this study show that a significant difference in intelligibility was found for repetition alone, where listeners had improved by an average of 18% and 10% in the -8 dB and -12 dB SNR conditions respectively. The sentences presented to the two participants in the study by Miller et al, (1951) contained five major words, which were connected by auxiliaries such as 'of' and 'the'. As the BKB sentences had an average of five words (including keywords and non keywords) they may have been more intelligible, as it was identified in Chapter 3 that the more words a sentence contains, the less intelligible it can be. Gagné and Wyllie (1989) may have found a reduced benefit as the study involved visual identification of words. It has been previously discussed that due to the decreased contextual information provided by words they are less intelligible than sentences, therefore in this project the use of the BKB sentences increased the contextual information and thus improved intelligibility. Thus suggesting that repetition may only be beneficial when contextual cues are present; as listeners who only identify certain parts of a sentence can use the repeated message and contextual cues to confirm the missing parts of a sentence.

The benefit of emphasis appears to depend on the speech material. In the studies by Pichney (1985) and Payton et al (1994), which used nonsense sentences an improvement of 17% and 16% respectively. The study by Pichney (1985) used hearing impaired listeners; in contrast Payton et al (1994) used a sample of both normally hearing and hearing impaired listeners. In this current study, and in a similar study by Liu et al (2004), which both used BKB sentences emphasis resulted in a greater advantage of intelligibility. This current study used only normally hearing listeners in two

different noise levels and found that emphasis improved intelligibility by 34% and 25 % for signal to noise rations of -8 dB and -12 dB respectively. Whereby, Liu et al (2004) compared the benefit of clear speech with normal hearing listeners and cochlear implant users, and found a clear speech benefit of 29% and 38% respectively. Again, this greater difference can be due contextual information provided in sentences.

As similar findings were found by Liu et al (2004), it can be suggested that hearing impaired listeners with cochlear implants may also benefit from the emphasised BKB sentences similar to that of the -12 dB SNR conditions. However, this study would greatly benefit from further experiments with hearing impaired listeners with different degrees of hearing loss. This study aimed to reduce the hearing thresholds similar to that of a moderate and profound hearing loss, however, the findings cannot predict how hearing impaired listeners will perform with the emphasised sentences, as normal hearing listeners benefit from many auditory cues that can be degraded for hearing impaired listener. The effects of hearing loss on speech perception were discussed in Chapter 2, and listeners with a hearing loss have reduced audibility, spectral and temporal resolution. A further investigation with hearing impaired individuals could identify the whether the listeners benefit from repetition and emphasis in the same way as normally hearing adults.

When hearing strategies are used in speech tests, intelligibility of speech was improved than normal sentences, and an even greater improvement was found when the two techniques of repetition and emphasis were combined, especially for more complex listening conditions. For example, for the -12 dB SNR level, listeners were identifying 49% of keywords correct with the combined strategies compared to the individual conditions of 40% correct with emphasis alone and 25% correct with repetition alone. To increase intelligibility even further for hearing impaired individuals the use of rephrasing could be used (Gagné and Wyllie, 1989).

The speaker was carefully instructed to avoid any emphasis in the normal sentences and a consistent set of 336 BKB sentences were created for both the normal and emphasised sentences. The -8 dB SNR was used to simulate a moderate-severe hearing loss and give approximately 50%

correct recognition of words from BKB sentences, the recorded sentences used in this experiment resulted with an average of 47.2% keywords correct for the normal condition. In addition, the -12 dB SNR was used to simulate a severe-profound hearing loss and give approximately 15% correct recognition of words, the recorded sentences from this experiment resulted with 14.8% keywords correct for the normal condition. This suggests that the two noise levels selected for this experiment were appropriate.

The number of participants varies throughout the different studies discussed, and although it is not essential, to counterbalance this experiment, a sample size of 24 participants would be required. If this study is to be repeated a counterbalanced sample size could be used to investigate the rate of learning across the different listening conditions.

5.5 Conclusions

The aim of this study was to identify if repetition and emphasis can improve listeners' intelligibility of the BKB sentences. The sentences were re-recorded and were presented to normally hearing listeners in two noise levels (-8 dB SNR and -12 dB SNR). For both levels, repeating each sentence, emphasising the words in each sentence, or having a combination of repetition and emphasis, led to significantly higher speech intelligibility scores compared with the normal sentences. Greater improvements were noticed in more challenging listening conditions, and the combined condition gave the maximum improvement for both noise levels. The combination of the emphasised and repeated condition can greatly increase performance, and in the -12 dB SNR, listeners were achieving an average score of approximately 50%, suggesting that the adapted sentences can create a test that is more sensitive for listeners who achieve low scores with the original test. The findings of this study suggest an improvement in intelligibility with repetition and emphasis, however, this study can benefit from further experiments involving hearing impaired listeners to identify the effects of these techniques on hearing loss.

6 The generation of new BKB sentences

6.1 Introduction

The BKB sentences distributed by the MRC Institute of Hearing Research, (Nottingham, UK) are used in clinical practice as part of the POCIA system and were also used in the experiments carried out in Chapter 3 and 4. The original BKB sentences were recorded by both a male and female speaker, and both versions consist of 336 high-quality recordings. The male version is more routinely used in clinical practice.

When the BKB sentences were created, they were recorded by a female speaker who spoke Southern British English. It was discussed by the authors Bench and Bamford (1979) that dialect is not particularly important if the materials are recorded in a 'broadcasting' manner i.e. where each word is articulated clearly and precisely, as listeners are generally familiar with this style of speech. The sentences were later recorded by a male speaker, and these are the materials that are currently used in clinical practice. Although the male speaker had a clear voice and maintained a high level of standard throughout the recordings, some sentences within the BKB sentence test are over emphasised. 'The kettle boils quickly' and 'the kitchen sinks dirty' are just two examples where keywords are emphasised considerably. Such emphasis may be due to the natural speech properties of particular words, however, this emphasis increases the intelligibility of speech recognition, and this was confirmed by the experiments in Chapter 5.

Another consideration for the use of the BKB sentences is that when listeners repeat the test, the scores may improve because the listeners become familiar with the speech materials and it is therefore more intelligible. Such learning makes it difficult to determine whether improved results are due to increased speech comprehension, or to the learning itself. The test material, regardless of time between presentations, should ideally not be presented more than once to the same listener (Foster et al, 1993; Fry, 1961). This limitation of learning with the BKB sentences can be reduced if there is an increase in the number of test materials. As introduced in Chapter 2 (Section 2.),

learning of sentence materials can be reduced by combining the original BKB sentences with the Institute of Hearing Research (IHR) sentences (Parfect and Lutman, 2002). The BKB and IHR sentences have both been recorded with the same speaker, and the IHR sentences were adapted from BKB sentences (MacLeod and Summerfield, 1990), and were intended to have similar criteria to the BKB sentences. As discussed in Chapter 2, the IHR sentences do not maintain, as suggested, the original BKB sentence criteria, and therefore, the suggestions by Parfect and Lutman (2002) were not accepted in this thesis.

Therefore, to reduce the limitations of learning and to reduce the emphasis on the BKB sentences, more BKB sentences were generated. The original 336 sentences were also to be re-recorded to maintain consistency between the materials. In this chapter, the generation of the new sentences is described in Section 6.6, and the recording process of the materials is discussed in Section 6.3.

6.2 Creation of sentences

2050 sentences were initially created, each maintaining the specific BKB sentence criteria stated by Bench and Bamford (1979), for example no new sentence exceeded seven syllables, and the characteristics of each list was maintained. The sentences were created by rearranging the vocabulary of original sentences to form new ones. For example, the vocabulary in the two original BKB sentences, 'The cook's making a cake' and 'the child grabs the toy' can be reordered to create a new BKB sentence: 'The child grabs the cake'. Because no new vocabulary was added the vocabulary is still the vocabulary recorded from hearing impaired children (Bench and Bamford, 1979), and therefore as with the original sentences, they are deemed suitable for use with almost any age range.

The placement of each word was carefully considered. For example, Crystal et al (1976) discussed how placements of words can affect the difficulty of sentences, e.g. the sentence 'the man and the woman saw the cat and the dog'. If the words were to be arranged into the following sentence, 'the man saw that the woman was speaking to the dog'. This is further discussed by Denes and Pinson

(2002), who discuss how essential syntax is, e.g. 'the plants are green' is an acceptable sentence, while 'plants green are the' is not. The BKB sentences are characterised by their natural meaningful sentences, and thus it is vital that the new sentences are well structured and appear to be natural.

Contrary to the criteria by Bench and Bamford (1979) that each keyword must be included in the entire test at least twice, as described in Chapter 2, (Section 2.2.3) some keywords only appeared once in the BKB sentences. For example, 'ambulance' in 'they called an ambulance' (List 16, sentence 6), 'clouds' in 'rain falls from clouds' (List 18, sentence 6), and 'clown' in 'the clown has a funny face' (List 1, sentence 1). With the generation of the new sentences the original criteria are now met.

To record the sentences, several factors were considered including the gender and age of the speaker. Bench et al (1995) discussed that using a variety of speakers (of both genders and age ranges) would be the most preferable option for speech perception testing, as this would be more representative of everyday speech. As part of the experimental design in Chapter 5, the standard BKB sentences were recorded by a male speaker at Aston University (Birmingham, UK). These sentences were clear but the recording quality was not as good as the original sentences recorded at the Department of Psychology and Language Sciences, (University College London) by Professor Quentin Summerfield.

6.3 Description of the recordings

The speaker for the new recordings was the same male speaker used for the original BKB sentences; he was also the speaker for the IHR sentences. The speaker who was 60 years old, speaks Southern British English, was already very familiar with the recording process of the BKB and IHR sentences, and this enabled the recordings to be made in one day.

The sentences were made in audio only conditions. The laryngograph signal (Lx) was also recorded from the electrodes attached to the speaker's neck. Although not required in this thesis, the

fundamental frequency of the speaker can be derived by measuring the vocal fold closures across the speaker's neck (Rosen and Corcoran, 1982).

The recordings were made in the anechoic room at The University College London (London, UK) with the technical assistance of Mr Stephen Nevard. The speech signal was recorded using a Bruel & Kjaer 2231sound level meter fitted with a 4190 microphone cartridge. The microphone was positioned 30 cm from the speaker's mouth, at 15 degrees to the mid-saggital line. The output from the sound level meter was fed to the left line input of a Sony 60ES digital audio tape (DAT) recorder. The Lx output from a Laryngograph processor was fed to the right line input of the DAT recorder. The digital output from the DAT recorder was fed to the digital input of an M-Audio Delta 66 sound card in a Dell Optiplex PC. The ProRec software (version 1.2) written by Dr Mark Harkvale, (The University College London) was used for presenting the material (on a monitor in the anechoic chamber) and for saving the data from the DAT recorder onto the hard disk. The signals were digitized at 44.1 kHz.with 16 bit resolution. The recording level was set to be about -8 dB below the overload (using the DAT record level controls). An intercom between the anechoic chamber and the adjacent control room enabled communication with the speaker, this consisted of a switchable microphone and a preamplifier in the control room linked through to a loudspeaker in the chamber.

The 2050 new sentences and the 336 original sentences were recorded in a random order, in blocks of 100 sentences. Regular breaks were taken after each block of sentences, to avoid any fatigue for the speaker. The speaker was instructed to also take breaks when required. After each break, the sound level was calibrated to ensure that it was consistent throughout the recording. Before the recording started, the speaker had a trial session to familiarise himself with the sentences and the monitor displaying the sentences.

The speaker was asked to avoid emphasising any words, particularly, keywords, or the beginning or end of a sentence. He was also asked to maintain a consistent level of clarity, intonation and pronunciation in each spoken sentence. To reduce lip smacks and coarticulation between sentences,

the speaker was asked to pause for two second before each utterance and to keep their lips closed during this pause. As the speaker was familiar with the recording process, each sentence was only normally uttered once. The speaker, however, was immediately asked to repeat any unclear sentences; the speaker was also requested to repeat any utterances that he felt were poor. He was also instructed to maintain a straight face, avoid any facial gestures or movements during the recordings.

The recorded materials were later edited using Cool Edit Pro (Adobe Systems Incorporated) to create an individual sound (WAV) files for each sentence. For sentences that were repeated by the speaker, the highest quality sentence was selected, this applied for both the original and new sentences. Each sentence was checked for individual lip smacks and edited accordingly and removed. For those sentences that were unable to be edited the sentence was to be eliminated during the final selection process this is discussed further below.

6.4 Final sentence selection

On subsequent hearing 298 sentences were discarded because of reduced quality. From the remaining 1752 sentences, a further 88 sentences were discarded to balance the characteristics (grammatical structures, types of first words) of the new sentences with the original BKB sentences. Appendix C shows the total 1664 new sentences that were selected. 1664 new sentences is an equivalent of 104 BKB lists, each having 16 sentences. A total combination of 2000 sentences, (original and new) was therefore developed.

The 2000 sentences were calibrated and balanced for loudness using the same methods given in Chapter 3, Section 3.2.1.1. This method of calibration was also carried out for the original BKB and IHR sentences.

6.4.1 Comparison of the new and original sentences

The criteria for the original BKB sentences stated by Bench and Bamford (1979) are shown in Table 6.1. Despite the failed criteria of some sentences, all of the new sentences maintained the intended requirements. For the original sentences, the proportion of grammatical structures, types of first words and number of keywords per list was specified. There was no criterion for the number of words per sentence and the mean was five words per sentence. The criteria stated no sentence should exceed seven syllables, and the mean was six syllables per sentence.

Table 6.1 shows the comparisons between the original and new sentences. The characteristics are maintained exactly for the grammatical structures, types of first words and the number of keywords per sentence. As with the original sentences, the new sentences also have a mean of five words and six syllables.

Factor	Number of sentences in each list of 16 sentences that have characteristic		Number of sentences in the original test (336 sentences)that have characteristic	% number of sentences in the original sentences that have characteristic	Number of sentences in the new test (1664 sentences) that have characteristic	% number of sentences in the new test that have characteristic
Grammatical Structures	SVO	7	147	43.8	728	43.8
	SVA	6	126	37.5	624	37.5
	SVC	2	42	12.5	208	12.5
	SV	1	21	6.3	104	6.3
Type of first words	D	11	231	68.8	1144	68.8
	PP	4	84	25	416	25
	N	1	21	6.3	104	6.3
Number of keywords	3 K/W	14	294	87.5	1456	87.5
	4 K/W	2	42	12.5	208	12.5
Number of words	3		6	1.8	35	2.1
	4		99	29.5	462	27.8
	5		166	49.4	766	46.0
	6		62	18.5	372	22.4
	7		3	0.9	29	1.7
Number of syllables	3		0	0	1	0.1
	4		22	6.5	93	5.6
	5		68	20.2	381	22.9
	6		148	44.0	654	39.3
	7		95	28.3	535	32.2
	8		3	0.9	0	0

Table 6.1 – Comparison of the original and new BKB sentences for the grammatical structures, types of first words, number of keywords, number of words and number of syllables per sentences. (SVO – subject-verb-object, SVA – subject-verb-adverbial, SVC – subject –verb-complement, SV – subject-verb). (D- determiner, PP – personal pronoun, N – noun). (K/W – keyword).

7 The generation of a closed set BKB sentence test

7.1 Introduction

The overall aim of this thesis is to develop a range of sentence tests that are suitable for a wide range of speech perception abilities, especially for those listeners who are unable to perform well with the standard BKB sentence test. In Chapter 3 a subset of easier BKB sentences was identified and these were presented to profoundly deaf listeners who have cochlear implants. The easier sentences were more intelligible for these listeners; however, some listeners were achieving less than 10% of keywords correct. This suggested a need for an even easier test; and the aim of the experiment in Chapter 5 was to identify if repeated and emphasised BKB sentences were more intelligible than standard sentences. The adapted BKB sentences significantly improved speech recognition scores; however, in more challenging noise levels some listeners were still achieving scores less than 50%. This suggests that there still is a need to develop a test that is even more intelligible.

The variations of speech tests are introduced in Chapter 2, where one variation in speech testing is the type of responses; closed set or open set. A closed set BKB test is introduced in this chapter, for the use with people who achieve low scores with the range of open set BKB tests developed so far.

7.1.1 Closed set speech tests

There are two types of response methods available in speech tests: open set and closed set. An open set speech test requires an individual to listen to speech stimuli and say what they heard (Wright, 1997). Individuals are asked to repeat anything they heard as they may correctly identify a subset of the stimuli, e.g. a vowel sound from a word, or a word from a sentence, and depending on the type of scoring method selected marks may be awarded. Open set speech tests that assess either

word or sentence recognition are considered to be gold standard, as they can reveal the most information about an individual's speech and hearing ability (Chute and Nevins, 2008). As described in Chapter 2, the use of open set tests is only recommended for individuals who have some functional vocabulary as a true assessment can be carried out (Chute and Nevins, 2008). Where it is not possible to use open set testing, a closed set test is particularly useful with young children or listeners with poor speech communication. Closed set tests are multiple choice tasks and are also known as forced-choice tests, where the individual is required to listen to the speech stimuli in the same way as the open set test, but then selects a response from a pre-determined set of choices (Wright, 1997). Due to the multiple choice response method it is possible that scores are obtained by chance. However, it can be argued that the chance score can be based on sound awareness such as segmental discrimination, timing and intensity cues. If the responses are analysed then it can be useful to identify whether listeners are able to distinguish the differences between particular phonemes. Closed set tests focus on particular aspects of speech assessments, for example speech discrimination as well as speech recognition.

Depending on the number of options available, closed set tests can reduce the effects of learning and materials can be repeatedly used (Gelfand, 2001) this is extremely beneficial in clinical settings where test materials are limited.

As closed set tests usually consist of a word or picture selection, the accuracy of the results are not subjective to a listener's expressive vocabulary and articulation, thus making it useful for those with poor speech communication skills. Furthermore, tests can be automated and due to the simple instructions and procedures, an individual can perform the test without assistance. However, for computerised methods it is essential that the individual can perform the task, thus a disadvantage can arise if listeners are not able to read or see the responses, which can make the test less suitable for younger and elderly listeners.

An example of a closed set test is The Oldenburg Sentence test, which is discussed in detail below, and comparison with the open set BKB sentence test are made.

7.1.2 The Oldenburg Sentence Test

The Oldenburg Sentence Test was originally developed in Danish (Hagerman, 1984). The Danish materials were recorded in several different languages, and the English materials were recorded by a female speaker. Table 7.1 shows the words used to generate the English sentence test. The test is a matrix test, which means that the sentence is presented in a constant set of frames (Tye-Murray, 2008), i.e. each sentence contains the same structure. The materials follow the same format throughout the range of languages, and are deemed to be highly comparable across these different languages. Each sentence within the matrix is in the form of: 'Name verb numeral adjective object', e.g. 'Hannah wins twelve red tins'. For each of the five word positions there are 10 options, giving 100, 000 permutations components. Each permutation is syntactically correct and may be meaningful (e.g. Peter has five green toys). Although this test produces many "meaningful" sentences, the sentences are not equally concrete, e.g. 'Thomas kept eight thin desks' or 'Nina wins twelve red beds'. Such sentences may not be equally intelligible.

Name	Verb	Number	Adjective	Noun
Peter	got	three	large	desks.
Kathy	sees	nine	small	chairs.
Lucy	bought	five	old	shoes.
Alan	gives	eight	dark	toys.
Rachel	sold	four	thin	spoons.
Barry	likes	six	green	mugs.
Steven	has	two	cheap	ships.
Thomas	kept	ten	pink	rings.
Hannah	wins	twelve	red	tins.
Nina	wants	some	big	beds.

Table 7.1. The English matrix test for the Oldenburg sentence test. Each random structure will follow the 'Name verb numeral adjective object'

The software randomly selects a word from each category, due to the large number of permutations; the test can ensure the reduction of learning effects caused by familiar materials. In addition to the reduction of learning effects, other advantages of the Oldenburg Sentence test compared with open set tests include, the automated design of the sentence test enables listeners to perform the test without any assistance, thus saving a clinician's time. As the recordings have been made in several languages, a wider range of individuals can be tested, and in addition the clinician is no required to be familiar with that particular language. Closed set tests are generally more intelligible than open set tests because of the forced-choice option, therefore can use speech cues to predict the word, i.e. a listener may only identify a particular phoneme in a word and can use this to select the correct word. For some languages, The Oldenburg sentences can also be presented as an open set test, however the English version is not available for open set testing. This can be particularly useful, if listeners are presented with both tests.

There are however some disadvantages to the Oldenburg sentence test, and some of these factors may also be applicable to closed set tests in general. The English version is not yet available for clinical use, and from demonstrations of the Oldenburg test it appears that the materials were recorded as individual words. If the materials were recorded as individual words, the naturalness of speech is reduced and speech properties such as pitch, rhythm, and articulation factors are eliminated, and ultimately leaving the test to be a series of words that do not represent connected speech.

Although a large number of permutations are possible, the listener may find it difficult to select five words from a possible of 50 items, causing the test to be difficult to administer. This can therefore increase the cognitive load of an individual, as the individual will have to process a lot of information in a short amount of time. This type of test may therefore not be suitable for younger children or elderly users. Although random combinations are generated, due to the fixed sentence structures individuals will be aware of the structure and the items in the test and this can impact the overall results.

7.1.3 Benefits of a Closed Set BKB Sentence Test

The experiments described in this thesis have focused only on sentences due to the advantages they have compared with phoneme or word tests, for instance the increased redundancy. This main aim of this thesis was to develop a range of easier tests which are suitable for listeners who achieve low scores with the standard open set BKB sentence test. As introduced earlier, closed set tests can be beneficial when open set tests are not appropriate, for instance with listeners who are unable to use the open set test.

In this section, the development of a closed set BKB sentence test is discussed. The Oldenburg Matrix test was described earlier, however, the aim of developing a closed set BKB test was to maintain the advantages of the open set BKB test, and incorporate the benefits of a closed set design. This section discusses how the closed set BKB test will differ from the Oldenburg Matrix test, and the aim of the experiment discussed in Section 7.3 was to compare the intelligibility of the closed set test with the open set BKB test.

The closed BKB test was designed to have 16 templates that maintained the characteristics of the 16 sentences that formed one BKB list, for example, seven of the templates would follow the order of a subject-verb-order. Although the Oldenburg test had one matrix which could generate 100,000 permutations, one limitation is that the presentation of each permutation is identical thus, listeners would be aware of each structure. The closed set BKB sentence test differs to that of the Oldenburg matrix test as each template would generate a different style of presentation that vary in grammatical structures, the length of the sentence, the type of first word and the number of potential options. These variations can aim to reduce the learning of the matrix design.

The Oldenburg test has ten options for each word position, whereas, for the closed set BKB test, the number of word options in each word position varies and has a maximum of five options; this will ensure that the test will be manageable by individuals and avoid any cognitive load.

As the English version of the matrix test is not yet available, it is difficult to determine how the materials were recorded, and on demonstration it appears that the words were recorded as

individual words, and then combined together to form a 'string' of sentences. The words from the closed set BKB test will be extracted from complete BKB sentences, ensuring each complete sentence will maintain the natural properties of speech. The 2000 BKB+ new sentences were used to extract the words for the closed set test. The increased sentence materials that were described in Chapter 6 ensured that there was ample choices for each word within a template, and thus ensured that the permutations for each template maintained the natural speech properties.

As the BKB sentences contained vocabulary from natural language samples of hearing impaired children, they were deemed suitable for almost any age range. As no new vocabulary was added for the closed set test, the vocabulary within the closed set test should therefore be suitable for any age range.

In the next section, the development of the closed set BKB sentence test described. The aim of this the closed set test was to produce an even easier speech test that is useful for individuals who cannot achieve good scores with the easier open set tests developed so far in this thesis.

7.2 The Closed Set BKB design

As discussed, 16 individual templates were developed which maintained the specific characteristics of an original BKB list (Bench et al, 1979). Figure 7.1 shows template 4, which is for sentences with a subject-verb-object grammatical structure, with five words (three keywords) beginning with a determiner; all sentences generated from the template have six syllables. This template can generate 125 different templates. Figure 7.2 shows template 10, which is for sentences with a subject-verb-adverbial grammatical structure, with five words (three keywords) beginning with a personal pronoun; all sentences generated from the template have six syllables. This template can generate 75 different templates. 16 such templates have been designed and, each has been carefully created to maintain the properties of natural speech. Each column has a fixed number of syllables to ensure that the number of syllables per sentence is fixed.

Figure 7.1. Template 4 of the BKB closed set sentence test. The sentences have a subject-verb-object grammatical structure, begin with a determiner, contain five words and six syllables and have three keywords.

Figure 7.2. Template 10 of the BKB closed set sentence test. The sentences have a subject-verb-adverbial structure, begin with a personal pronoun, contain five words and six syllables and have three keywords.

7.2.1 Speech properties affecting test design

The stimuli for the closed set BKB test were created by digitally manipulating the original sentences to create new sentences using Cool Edit Pro (Adobe Systems Incorporated). Individual words were extracted from complete sentences of the 2000 BKB+ sentences. The extracted words

were saved as individual sound (WAV) files and the gaps between words were adjusted to obtain more natural sounding sentences.

Such editing, however, can affect the naturalness of synthesised speech. Speech consists of many properties and sounds are not produced independently of each another (Crystal, 1997; Borden et al, 2003). These speech properties are discussed in Chapter 2, and there are a number of characteristics within speech that provide naturalness, and these include: the stress, pitch, rate of speech, and clarity. When words are combined to make a sentence, the speed and rhythm of speech can cause some segments to adopt a weaker articulation, some segments may be lost or added and some may change altogether (Crystal, 1997). Thus, the combination of assimilation and co-articulation contribute to the naturalness in speech (Crystal, 1997 and Raphael et al, 2007), but such features make manipulation of the recorded sounds more difficult.

The words for the closed set test were extracted from complete sentences, and thus the sentence will be split up between words to construct new sentences, thus the factors occurring in connected speech can have an effect on the naturalness of the new sentence. New sentences may therefore sound unnatural and this can reduced the overall number of sentences created. This method, however, if carefully implemented can be extremely successful, and preliminary studies which used complete sentences suggest that such manipulation does not affect the intelligibility of the material. In addition, this method enables the voice of the original speaker to be maintained, thereby reducing variability.

To avoid extracting words which were affected by factors such as co-articulation, isolated words were used, i.e. words that had a silence immediately before and after. To maintain the speech properties further, for instance pitch, each word used in the template was carefully extracted to maintain the word order of the individual sentence. For example, if the closed set template sentence was to end with the word 'book', this word will only be extracted from a complete BKB sentence that ends with 'book' e.g. from the sentence 'father reads a book' and not from the sentence 'the

book was on the table'. This will maintain the pitch contours that are specific to word placements, as discussed in Chapter 2.

7.2.2 Creating the test materials

Figure 7.3 shows the process for extracting the word 'eating' from a complete BKB sentence 'the children are all eating' (original BKB sentence, list 13 sentence 13) using the Adobe software. Figure 7.3a shows the spectrogram for the entire sentence, the highlighted component in Figure 7.3b shows the isolated word 'eating'. There is a clear gap between the previous words and therefore, this is a good word to include in the closed set BKB test. The word 'eating' is extracted from the compete sentence, and is then displayed in Figure 7.3c. The single word is then saved as an individual sound (WAV) file.

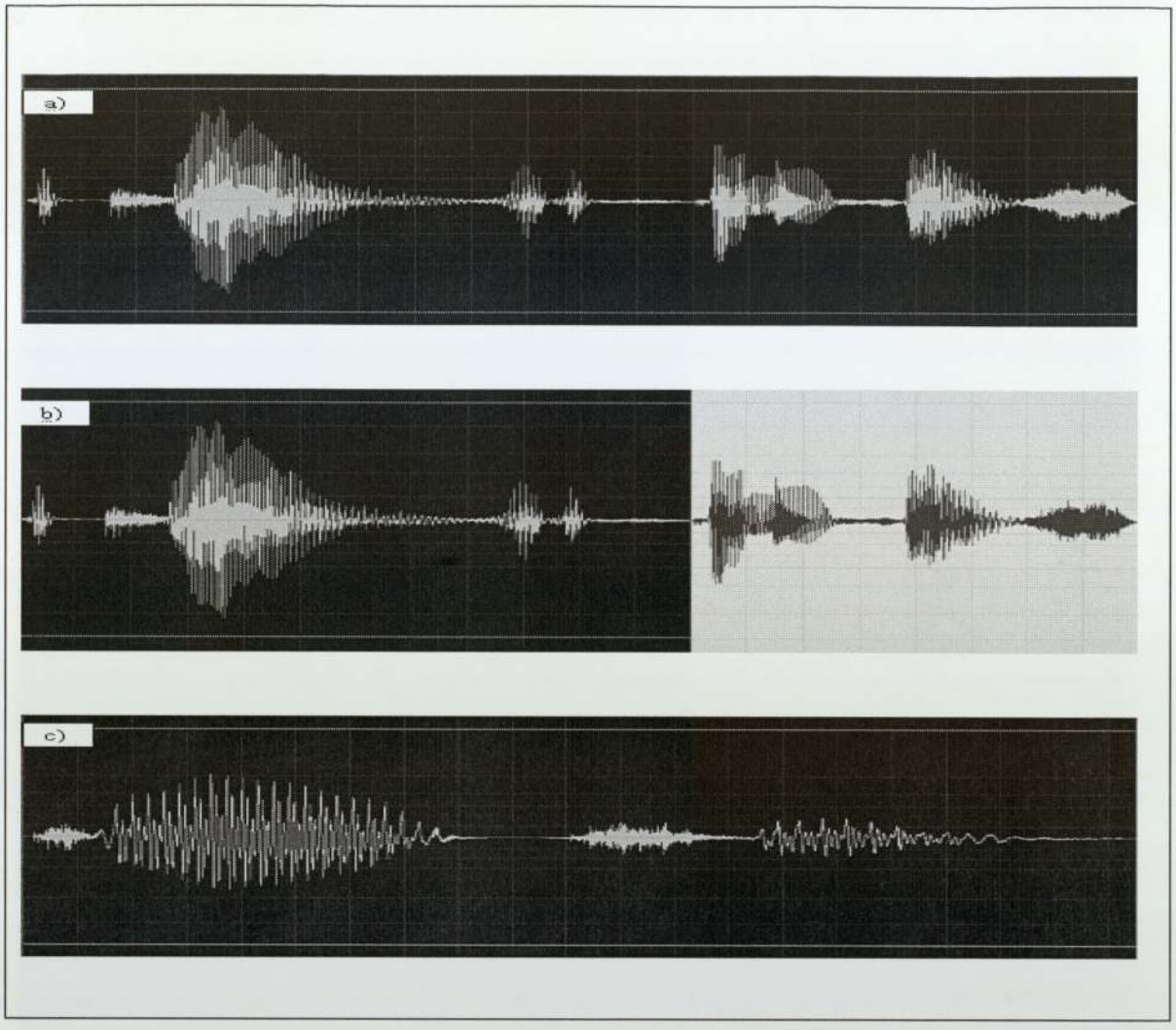

Figure 7.3. a) shows the waveform for original BKB sentence 'the children are all eating'. b) The isolated word 'eating' is highlighted for extraction from the complete sentence. c) The word eating is saved as its individual wav file.

7.3 Experiment: The evaluation of the Open and Closed BKB sentence test

7.3.1 Aims of study

The development of the new BKB sentences were described in Chapter 6, and the generation of the closed set BKB test was discussed in this chapter.

- The original BKB sentence test contains 336 sentences, Original BKB.

- These sentences were re-recorded as discussed in Chapter 6, Original BKB+.
- 1664 sentences were selected as new BKB sentences, New BKB.
- The total combination of the 2000 (i.e. the Original BKB+ and New BKB) are referred to as the BKB+ sentences.
- 16 templates were generated to form the closed set BKB sentence test, Closed Set.

There were three aims of the experiment described in this chapter.

The first aim was to compare the intelligibility of the open and closed set BKB test. This can identify if the closed set test is appropriate for individuals who achieve low scores with the open set tests developed in this thesis so far.

The second aim was to compare the intelligibility of the Original BKB and New BKB sentences. This can identify if the new sentences are more difficult than the original ones. Although no new vocabulary was added when generating new sentences, the rearrangement of words order may affect the intelligibility.

The third aim was to compare the intelligibility between the Original BKB and Original BKB+ sentences. This comparison will identify if the new recordings have affected the intelligibility of the sentences.

Normal hearing adults were used in this experiment to identify the above aims. As with the first experiment in Chapter 3, and the experiment in Chapter 5, normally hearing adults can decrease the variability that occurs with hearing impaired listeners. The stimuli were presented in noise to reduce hearing thresholds to simulate a moderate hearing loss.

7.3.2 Methods

7.3.2.1 Participants and procedures

This study received Aston University ethics approval. 24 participants, aged from 18 to 39 years of age took part in this study at Aston University (Birmingham, UK) and were either university staff

or students. As for the experiments in Chapter 3 and 5, for all participants, an audiological history, a visual examination of their ear and a hearing screen at 20 dBHL was carried out in accordance with the British Society of Audiology (BSA) recommendations (BSA, 2004) to identify any abnormal otological conditions. All participants had English as their first language. The participants were required to attend one session and the total duration of this study, including instructions, familiarisation and feedback was 60 minutes.

The calibration of the sentences for level was as in Section 3.2.1.2. The Aston Speech Test program (created by Morse and Hartley, 2009) was used for the presentation of the stimuli in this experiment and to score the participant responses. The utterances were presented diotically through Sennheiser (HD250 linear II or HD580) headphones, (Sennheiser GmbH) at 65 dB SPL with a SNR of -8 dB noise. For this experiment a touch screen monitor was used to ensure that participants could perform the closed set task with convenience.

128 random sentences were presented in the following four conditions: Original BKB, Original BKB+, New BKB and Closed Set. The presentation of conditions was counterbalanced for each participant.

For the Original BKB, Original BKB+ and New BKB a keyword loose scoring method was implemented and participants were instructed to say what they had heard, all responses were scored by the tester using the program. For the Closed Set condition, participants were instructed that they had to select one option for each word. The participants were given practice sentences to familiarise them with the equipment used for the Closed Set condition, i.e. the touch screen monitor and the speech test software. The tester was present in the soundproof booth where the experiments were carried out. The Aston Speech Test program was used to record the participant's responses, which were later analysed and are discussed below.

7.3.3 Results

For all participants, the Closed Set BKB sentence test led to higher intelligibility compared with the open set sentences (Original BKB, Original BKB+ and New BKB), as shown in Figure 7.4. The

Original BKB sentences appear to be the least intelligible, in comparison, similar intelligibility is observed for the Original BKB+ and New BKB sentences.

For the 24 participants the mean and standard deviations were as follows: Original BKB: 50.1%, sd = 13.2, Original BKB+: 58.5%, sd = 13.2, New BKB: 59.0%, sd = 11.7 and Closed Set: 84.3%, sd = 7.9. For all conditions the mean scores were approximately normal, and assumptions of normality, homogeneity of variance and sphericity were met. A repeated-measures ANOVA showed that differences between conditions were significant ($F [3,63] = 67.0$, $p < 0.001$); an overall effect size of 0.75 showed that about 75% of the variation in error scores can be accounted for by the different listening conditions. The planned pairwise comparisons in Table 7.2 show that there was a significant difference between all paired conditions except the Original BKB+ and New BKB+ sentences.

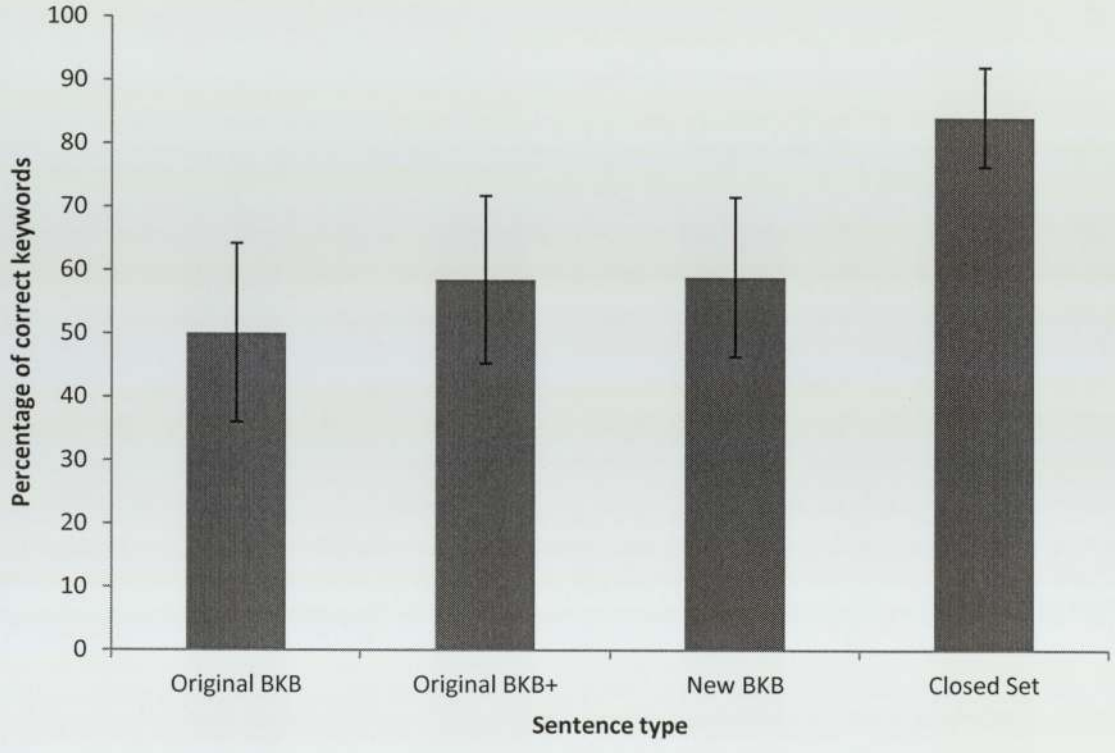

Figure 7.4. Mean intelligibility for four speech tests: Original BKB, Original BKB+, New BKB + and Closed Set. Sentences were presented at 65 dB(A) in -8 dB SNR of pink noise. N = 24. The standard error of the mean is displayed.

Condition	Comparison	% Mean difference (comparison-condition)	P value
Original BKB	Original BKB+	-8.4	.018*
	New BKB	-8.9	.027*
	Closed set	-34.2	< .0001*
Original BKB+	Original BKB	8.4	.018*
	New BKB	-.5	1.000
	Closed set	-25.8	< .0001*
New BKB	Original BKB	8.9	.027*
	Original BKB+	.5	1.000
	Closed set	-25.3	< .0001*
Closed set	Original BKB	34.2	< .0001*
	Original BKB+	25.8	< .0001*
	New BKB	25.3	< .0001*

Table 7.2. Pairwise comparisons between the four listening conditions, showing the % mean difference between the conditions and the significant differences (P value). A significant difference is shown in all compared conditions except the Original BKB+ and New BKB sentences.

7.3.4 Discussions

There were three aims of the experiment in this study. The first aim was to identify whether the closed set test was more intelligible than the open set tests. The second aim of the experiment was to identify if the new BKB sentences that were generated in Chapter 6 were significantly different from the original BKB+ sentences. A final aim was to investigate if there was a difference in intelligibility in the Original BKB sentences and the Original BKB+ sentences.

The analysis carried out on the data collected in this experiment showed that there was a significant difference between the four conditions, and the planned pairwise conditions identified all pairs to be significantly different except the Original BKB+ and New BKB sentences.

First, the Closed Set sentences were significantly easier than the three open set conditions, suggesting that this test can be more beneficial than the open set test. The benefits of a closed set test are discussed earlier in this chapter, where it is discussed that closed set tests are generally more intelligible than open set tests as the listener can benefit from the multiple choice option, and additionally make use of the timing and intensity cues available. The Closed Set BKB sentence test

generated as part of this thesis can therefore be particularly useful for those listeners who are unable to achieve good scores with the open set test.

Secondly, no significant difference was found between the Original BKB+ and New BKB sentences. This suggests that the new sentences are of equal intelligibility to the Original BKB+, thus implying that the rearrangement of words in the original sentences to create new ones did not affect the intelligibility of the scores. As no significant difference was found between the Original BKB+ and New BKB+ sentences, the two groups of sentences can be combined to create the BKB+ sentences containing 2000 BKB sentences.

Finally, a significant difference was found between the Original BKB and the Original BKB+ sentences. It would be expected that the difference is due to the quality of recordings. The same speaker for the new sentences was used as the Original BKB sentences, however, instructions were given to insure the speaker did not emphasise any words in the sentences as some emphasis was found in the original sentences. This instruction could have caused all sentences to be more balanced in intelligibility. The Original BKB sentences had an average score of 50.1% when presented in a -8 dB SNR. This level of noise was selected ensuring listeners achieve an average score of 50%. If experiments are to be carried out with the Original BKB+ sentences, as the average score was 58.5%, then the level of noise will need to be adjusted to reach the same average score of 50%.

A conversion score between the Original BKB and the Original BKB+ sentences will be required for hearing impaired individuals; this will allow clinicians to compare performance scores for listeners who will be using the new sentences as part of a rehabilitation process.

7.3.5 Conclusions

In this chapter a closed set BKB sentence test was developed to increase the intelligibility for listeners compared to the open set BKB sentence test. The closed set BKB test maintained the characteristics of the open set sentences and incorporated the benefits of a closed set design. When

presented to normally hearing adults, the closed set test was significant more intelligible than the open set BKB test.

Due to the quality of recordings, the Original BKB+ sentences were more intelligible than the original sentences. However, the findings of this study identified that the new BKB sentences were equally intelligible as the re-recorded BKB sentences (Original BKB+); therefore the 1664 new sentences can be combined with the 336 re-recorded BKB sentences, to form the 2000 BKB+ sentences.

8 Thesis review, future work and conclusions

8.1 Review of the thesis

Speech perception testing is routinely used with cochlear implant users, and can assess many speech perception abilities. Tests of speech recognition are particularly valuable as they aim to identify a person's ability to function socially. Furthermore, compared to word and syllable tests, speech tests that use meaningful sentences are more representative of sounds heard in daily life.

This thesis aimed to overcome some limitations of the BKB sentence test, which is a routinely used test in speech perception testing. These limitations were floor and ceiling effects and learning effects, which can be encountered when using the test with hearing impaired listeners.

For listeners that are achieving scores that are subject to floor and ceiling effects, it can be difficult to carry out an effective assessment of speech recognition. The aim of the first experiment in Chapter 3 was to identify the easiest BKB sentences with normally hearing adults, and create a subset of easier sentences. The 32 most intelligible sentences formed part of the Easy BKB sentence test. These 32 sentences were selected to match the sentence criteria of two original BKB lists. The easier sentences were analysed to identify any factors that were contributing to the intelligibility of BKB sentences, and two factors were revealed: sentences containing a 'subject-verb-complement' grammatical structure, and sentences containing three words. These factors can be used to generate more BKB sentences; however, as there were only six sentences that contain three words in the entire BKB test, the results for this may not be as applicable.

The aim of the second experiment in Chapter 3 was to identify if the 32 easier BKB sentences were more intelligible to ten cochlear implant listeners who currently achieve low scores with the original BKB sentences. 32 original sentences were presented to the listeners and compared with the 32 easier BKB sentences. All but one listener had found the easier sentences more intelligible; however, six of the ten listeners were achieving less than 10% keywords correct with these easier sentences. This suggested a need for an even easier BKB sentence test.

Even though the BKB sentences were derived from hearing impaired children, the BKB sentence test is not routinely used with children. The aim of the experiment in Chapter 4 was to identify if the easier sentences were more intelligible and therefore appropriate for use with younger children. 20 normally hearing children between the ages of four and eight took part in this experiment, and their expressive language abilities were measured using the Renfrew Action Picture test (Renfrew, 1997). Of the 20 children, ten had less than average scores for either the grammar or information part of the language assessment but still achieved excellent speech scores. This experiment concluded that there was no difference found between the original and easier sentences for all age groups, however there was an effect of age; as the children who were four years old achieved significantly lower scores than the other age groups. These findings suggest that the BKB sentences can be appropriate for children with normal hearing over the age of five, and therefore the vocabulary within the sentences are suitable for this age range. It can be suggested that hearing impaired children of this age group can therefore benefit from the BKB sentences if their language and vocabulary skills are satisfactory for their age group. A wider range of language assessments other than those used in this experiment are recommended, as they can reveal more specific information regarding a child's language abilities.

In Chapter 5, new sentence materials were generated to incorporate two hearing strategies that listeners with hearing impairments often use to improve listening situations. The sentences were recorded in two conditions: normal and emphasised, and four test conditions were used: normal, repeated, emphasised and emphasised-repeated. These sentences were presented to normally hearing adults in the presence of background noise, and two degrees of hearing loss were simulated: moderated and severe. For both noise levels, listeners had improved intelligibility in all conditions compared to the normal sentences, and the emphasised-repeated were the most intelligible. These adapted sentences had significantly improved speech recognition scores, and therefore could be beneficial to hearing impaired listeners who achieve low scores with the standard sentences. As repetition alone was found to increase intelligibility of sentences, this can be implemented as standard into speech perception testing and this strategy will enable speech tests to

be more representative of natural communication. As with experiments in this study, the repetition can be automatic, or the repeated messages can be presented on request.

In Chapter 7, the generation of the 1664 new BKB sentences was discussed. The 336 original BKB sentences were also re-recorded. In Chapter 7, the development of a closed set BKB sentence test was discussed. The closed set test is valuable for many reasons, for example, it can be beneficial for those who cannot perform well with the open set test. There were three aims of the experiment discussed in Chapter 8, and these were to compare the materials generated in Chapter 6 and 7. In the presence of background noise, normal hearing listeners were presented with four sentence conditions: the original sentences (BKB), the original sentences that were re-recorded (original BKB+), the new BKB sentences (New BKB) and the closed set sentences (closed set). The results of this experiment concluded that the closed set test was significantly more intelligible than the open set sentences. The original BKB+ and New BKB sentences were not significantly different, thus suggesting that the new sentences were equally difficult as the original sentences, and the rearrangement of vocabulary in the new sentences did not affect the intelligibility. However, the new (New BKB and original BKB+) sentences were more intelligible than the original BKB sentences. A significant difference was seen between the new (New BKB and original BKB+) sentences and original BKB sentences, as the same speaker was used for the new recordings, this difference can be due to the improved quality of recordings and advances in audio equipment.

For all of the experiments described in this thesis, the original open set BKB sentences were not presented in the original BKB list formats and sentences were presented randomly. This can reduce learning effects and familiarity of test materials, and can also distribute any difficult sentences/lists randomly.

As the New BKB sentences are not significantly different to the Original BKB+ sentences, the two sets can be combined to create the BKB+ sentence test which contains 2000 sentences. The BKB+ sentence test is suitable for clinical use with listeners who perform well with the standard sentences. In addition, this thesis described the range of sentence materials developed that can be

useful for listeners who achieve low scores with the standard sentences. The developed materials include: the closed Set BKB sentence test, the emphasised sentences and the Easy BKB sentences.

8.2 Future work

This thesis provides a direction for the generated test materials; however, they must be validated with the population they are intended for, as listeners with a hearing loss may not perform in the same way as normally hearing listeners with the presence of background noise due to the degraded auditory skills caused by hearing impairments. A relationship between the test materials would be particularly useful, thus, if listeners were presented with any of the test materials, the scores would be relative to the standard BKB+ sentences.

As the NICE guidelines suggest a particular BKB score when considering adults for a cochlear implant, a revised score will be required if these new sentences are to be used in clinical practice. In addition to this, a conversion score between the BKB+ (2000) sentences and the original BKB test would be useful, to compare performance scores for listeners who will be using the new sentences as part of a rehabilitation process.

Investigations into learning effects would also be useful with the BKB+ sentences and the closed set test, to identify whether the generation of a large number of sentences is useful in clinical and even laboratory settings.

The use of hearing strategies with the BKB sentences, i.e. the emphasised and repeated sentences was more intelligible than the normal sentences. It can thus be suggested that other repair strategies such as paraphrasing and simplifying could be incorporated to further reduce any floor effects with open set tests. Another strategy that can be useful to overcome floor effects is the use of visual stimuli, as this additional factor can further improve floor effects within the BKB sentences.

The use of hearing strategies and the closed set test significantly improved the performance when compared with the intelligibility of standard open set sentences. The closed set BKB test can

incorporate the automatic repetition, where listeners are automatically presented with the utterance twice. This can further improve the intelligibility of the closed set BKB sentence test. However, further investigations would be required to identify if the emphasised sentences can be used to extract words for the closed set test. This may increase the intelligibility of a repeated closed set BKB test, however, the speech properties such as pitch, may not enable the words to appear as natural sounding sentences. If successful, a closed set test that presents emphasised sentences may produce an even easier test.

As described in Chapter 2, speech perception tests, particularly sentence tests, are not routinely used with hearing aid users as they are more time consuming and the additional time spent on this may not be possible within clinics due to waiting lists and staff shortages (Gatehouse & Robinson, 1997; Boothroyd, 1968). The closed set sentence test described in Chapter 7 is simple and effective to administer. One advantage of this test is that it can be performed without assistance. The closed set BKB sentence test can be used as a pre-assessment for individuals before their session with a clinician, and the valuable findings can be incorporated immediately into the rehabilitation process.

The closed set BKB sentence test can also be made available online as a rehabilitation tool, where individuals have access to the program and can monitor their own speech recognition performance. The speech test results can be useful for discussion with the clinician, and the rehabilitation process can be adapted accordingly.

As discussed, the closed set BKB test can be beneficial to increase the intelligibility compared with open set tests. However, as discussed the test has added advantages for clinical use. To implement the test as a pre-assessment or online rehabilitation tool, further investigations would certainly be required. In addition, the range of speech tests developed in this thesis can be investigated further, to identify even easier tests, and thus providing several directions for future research.

This thesis has focused on developing materials for listeners who achieve low scores with the original test. Although it was briefly introduced in Chapter 2 (Section, 2.2.1.3) for listeners who

perform near 100%, a simple way to make the test more difficult is by adding background noise to reduce hearing thresholds. The BKB sentences contain grammatical structures that are of level two and three. One way to make the test more difficult for good listeners is to increase the complexity of the materials. Stage four sentences contain four components, and examples include "the boys are throwing stones at the dog" and would be classified as a SVOA structure. A range of level four sentences were recording alongside the BKB+ recordings, and these will be extremely beneficial in future experiments. As shown in Appendix D, 110 Level 4 sentences were recorded, and although not used in any experiments described in this thesis, they can provide a focal point for future experiments.

8.3 Conclusions

The main aim of this thesis was to overcome some limitations of the BKB sentence test. The first limitation was the floor effects which can be encountered when using the test with hearing impaired listeners. The first aim was to develop suitable test materials for individuals who cannot achieve good scores with the standard test. A range of tests have been developed, and are significantly more intelligible than the standard sentences. These consist of the Easy BKB sentence test, the emphasised and repeated BKB sentence test, and the closed set BKB sentence test.

The second aim was to greatly increase the number of sentences within the BKB sentence test to reduce the learning effects that can be encountered with the standard BKB sentences. The new sentences were equally as intelligible as the re-recorded original sentences. The BKB+ sentences contain 1664 new sentences and 336 re-recorded original BKB sentences.

The range of tests developed in this thesis overcomes the limitations highlighted with the BKB sentence test. These tests can be implemented into clinical use and can provide more appropriate speech recognition measures for hearing impaired individuals.

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Appendix A: The BKB Sentences

The table below shows a breakdown for the original BKB sentences.

- Words = number of words per sentence
- Syllables = number of syllables per sentence
- K/W = number of keywords per sentence (please note, each keyword is in bold)
- 1st Word = type of first word; determiner (D) , personal pronoun (PP) or noun (N)
- Structure = grammatical structure of the sentence
    - Subject – Verb – Object (SVO)
    - Subject – Verb – Adverb (SVA)
    - Subject – Verb – Complement (SVC)
    - Subject – Verb (SV)

An asterix next to a structure identifies a possible ambiguity for that structure.

	Sentence	Words	Syllables	K/W	1st Word	Structure
1						
1.	The **clown** had a **funny face.**	6	7	3	D	SVO
2.	The **car engine's running.**	4	6	3	D	SV
3.	**She cut** with her **knife.**	5	5	3	PP	SVA
4.	**Children like strawberries.**	3	6	3	N	SVO
5.	The **house** had **nine rooms.**	5	5	3	D	SVO
6.	**They're buying** some **bread.**	4	5	3	PP	SVO
7.	The **green tomatoes** are **small.**	5	7	3	D	SVC
8.	**He played** with his **train.**	5	5	3	PP	SVO
9.	The **postman shut** the **gate.**	5	6	3	D	SVO
10.	**They're looking at** the **clock.**	5	6	4	PP	SVO*
11.	The **bag bumps** on the **ground.**	6	6	3	D	SVA*
12.	The **boy did** a **handstand.**	5	6	3	D	SVO
13.	A **cat sits on** the **bed.**	6	6	4	D	SVA*
14.	The **lorry carried fruit.**	4	6	3	D	SVO
15.	The **rain came down.**	4	4	3	D	SV

16.	The **ice cream** was **pink.**	5	5	3	D	SVC
2						
1.	The **ladder's near** the **door.**	5	6	3	D	SVA*
2.	**They** had a **lovely day.**	5	6	3	PP	SVO
3.	The **ball went into** the **goal.**	6	7	4	D	SVA
4.	The **old gloves** are **dirty.**	5	6	3	D	SVC
5.	**He cut** his **finger.**	4	5	3	PP	SVO
6.	The **thin dog** was **hungry.**	5	6	3	D	SVC
7.	The **boy knew** the **game.**	5	5	3	D	SVO
8.	**Snow falls** at **Christmas.**	4	5	3	N	SVA
9.	**She's taking** her **coat.**	4	4	3	PP	SVO
10.	The **police chased** the **car.**	5	6	3	D	SVO
11.	A **mouse ran down** the **hole.**	6	6	4	D	SVA
12.	The **lady's making** a **toy.**	5	7	3	D	SVO
13.	Some **sticks** were **under** the **tree.**	6	7	3	D	SVA*
14.	The **little baby sleeps.**	4	6	3	D	SV
15.	**They're watching** the **train.**	4	5	3	PP	SVO
16.	The **school finished early.**	4	6	3	D	SVA
3						
1.	The **glass bowl broke.**	4	4	3	D	SV
2.	The **dog played** with a **stick.**	6	6	3	D	SVO
3.	The **kettle's quite hot.**	4	5	3	D	SVC
4.	The **farmer keeps** a **bull.**	5	6	3	D	SVO
5.	**They say** some **silly things.**	5	6	4	PP	SVO
6.	The **lady wore** a **coat.**	5	6	3	D	SVO
7.	The **children** are **walking home.**	5	7	3	D	SVA
8.	**He needed** his **holiday.**	4	7	3	PP	SVO
9.	The **milk came** in a **bottle.**	5	7	3	D	SVA*
10.	The **man cleaned** his **shoes.**	5	5	3	D	SVO
11.	**They ate** the **lemon jelly.**	5	7	4	PP	SVO
12.	The **boy's running away.**	4	6	3	D	SV
13.	**Father looked** at the **book.**	5	6	3	N	SVO*
14.	**She drinks** from her **cup.**	5	5	3	PP	SVA*
15.	The **room's getting cold.**	4	5	3	D	SVC
16.	A **girl kicked** the **table.**	5	6	3	D	SVO
4						
1.	The **wife helped** her **husband.**	5	6	3	D	SVO
2.	The **machine** was **quite noisy.**	5	7	3	D	SVC
3.	The **old man worries.**	4	5	3	D	SV
4.	A **boy ran** down the **path.**	6	6	3	D	SVA*
5.	The **house** had a **nice garden.**	6	7	3	D	SVO
6.	**She spoke to** her **son.**	5	5	4	PP	SVO

7.	**They're crossing** the **street.**	4	5	3	PP	SVO*
8.	**Lemons grow** on **trees.**	4	5	3	N	SVA*
9.	**He found** his **brother.**	4	5	3	PP	SVO
10.	Some **animals sleep on straw.**	5	6	4	D	SVA*
11.	The **jam jar** was **full.**	5	5	3	D	SVC
12.	**They're kneeling down.**	3	4	3	PP	SV
13.	The **girl lost** her **doll.**	5	5	3	D	SVO
14.	The **cook's making** a **cake.**	5	6	3	D	SVO
15.	The **child grabs** the **toy.**	5	5	3	D	SVO
16.	The **mud stuck** on his **shoe.**	6	6	3	D	SVA*
5						
1.	The **bath towel** was **wet.**	5	5	3	D	SVC
2.	The **matches lie** on the **shelf.**	6	7	3	D	SVA*
3.	**They're running past** the **house.**	5	6	4	PP	SVA*
4.	The **train** had a **bad crash.**	6	6	3	D	SVO
5.	The **kitchen sink's empty.**	4	6	3	D	SVC
6.	A **boy fell** from the **window.**	6	7	3	D	SVA*
7.	**She used** her **spoon.**	4	4	3	PP	SVO
8.	The **park's near** the **road.**	5	5	3	D	SVA*
9.	The **cook cut** some **onions.**	5	6	3	D	SVO
10.	The **dog made** an **angry noise.**	6	7	4	D	SVO
11.	**He's washing** his **face.**	4	5	3	PP	SVO
12.	**Somebody took** the **money.**	4	7	3	N	SVO
13.	The **light went out.**	4	4	3	D	SV
14.	**They wanted** some **potatoes.**	4	7	3	PP	SVO
15.	The **naughty girl's shouting.**	4	6	3	D	SV
16.	The **cold milk's** in a **jug.**	6	6	3	D	SVO*
6						
1.	The **paint dripped** on the **ground.**	6	6	3	D	SVA*
2.	The **mother stirs** the **tea.**	5	6	3	D	SVO
3.	**They laughed** at his **story.**	5	6	3	PP	SVO
4.	**Men wear long trousers.**	4	5	4	N	SVO
5.	The **small boy** was **asleep.**	5	6	3	D	SVC
6.	The **lady goes to** the **shop.**	6	7	4	D	SVA
7.	The **sun melted** the **snow.**	5	6	3	D	SVO
8.	The **father's coming home.**	4	6	3	D	SVA
9.	**She** had her **pocket money.**	5	7	3	PP	SVO
10.	The **lorry drove** up the **road.**	6	7	3	D	SVA*
11.	**He's bringing** his **raincoat.**	4	6	3	PP	SVO
12.	A **sharp knife's dangerous.**	4	6	3	D	SVC
13.	**They took** some **food.**	4	4	3	PP	SVO
14.	The **clever girls** are **reading.**	5	7	3	D	SV

15.	The **broom stood** in the **corner.**	6	7	3	D	SVA
16.	The **woman tidied** her **house.**	5	7	3	D	SVO
7						
1.	The **children dropped** the **bag.**	5	6	3	D	SVO
2.	The **dog came back.**	4	4	3	D	SV
3.	The **floor looked clean.**	4	4	3	D	SVC
4.	**She found** her **purse.**	4	4	3	PP	SVO
5.	The **fruit lies** on the **ground.**	6	6	3	D	SVA*
6.	**Mother fetches** a **saucepan.**	4	7	3	N	SVO
7.	**They washed** in **cold water.**	5	6	4	PP	SVA
8.	The **young people** are **dancing.**	5	7	3	D	SV
9.	The **bus went early.**	4	5	3	D	SVA
10.	**They** had **two empty bottles.**	5	7	4	PP	SVO
11.	A **ball's bouncing along.**	4	6	3	D	SVA
12.	The **father forgot** the **bread.**	5	7	3	D	SVO
13.	The **girl** has a **picture book.**	6	7	3	D	SVO
14.	The **orange** was **quite sweet.**	5	6	3	D	SVC
15.	**He's holding** his **nose.**	4	5	3	PP	SVO
16.	The **new road's** on the **map.**	6	6	3	D	SVA*
8						
1.	The **boy forgot** his **book.**	5	6	3	D	SVO
2.	A **friend came** for **lunch.**	5	5	3	D	SVA*
3.	The **match boxes** are **empty.**	5	6	3	D	SVC
4.	**He climbed** his **ladder.**	4	5	3	PP	SVO
5.	The **family bought** a **house.**	5	7	3	D	SVO
6.	The **jug stood** on the **shelf.**	6	6	3	D	SVA*
7.	The **ball broke** the **window.**	5	6	3	D	SVO
8.	**They're shopping** for **cheese.**	4	5	3	PP	SVA*
9.	The **pond water's dirty.**	4	6	3	D	SVC
10.	**They heard** a **funny noise.**	5	6	4	PP	SVO
11.	**Police** are **clearing** the **road.**	4	7	3	N	SVO*
12.	The **bus stopped suddenly.**	4	6	3	D	SVA
13.	**She writes** to her **brother.**	5	6	3	PP	SVO
14.	The **footballer lost** a **boot.**	5	7	3	D	SVO
15.	The **three girls** are **listening.**	5	7	3	D	SV
16.	The **coat lies on** a **chair.**	6	6	4	D	SVA*
9						
1.	The **book tells** a **story.**	5	6	3	D	SVO
2.	The **young boy left home.**	5	5	4	D	SVA*
3.	**They're climbing** the **tree.**	4	5	3	PP	SVO*
4.	**She stood** near her **window.**	5	6	3	PP	SVA*
5.	The **table** has **three legs.**	5	6	3	D	SVO

6.	A **letter fell** on the **mat.**	6	7	3	D	SVA*
7.	The **five men** are **working.**	5	6	3	D	SV
8.	**He listens to** his **father.**	5	7	4	PP	SVO
9.	The **shoes** were **very dirty.**	5	7	3	D	SVC
10.	**They went** on **holiday.**	4	6	3	PP	SVA
11.	**Baby broke** his **mug.**	4	5	3	N	SVO
12.	The **lady packed** her **bag.**	5	6	3	D	SVO
13.	The **dinner plate's hot.**	4	5	3	D	SVC
14.	The **train's moving fast.**	4	5	3	D	SVA
15.	The **child drank** some **milk.**	5	5	3	D	SVO
16.	The **car hit** a **wall.**	5	5	3	D	SVO
10						
1.	A **tea towel's** by the **sink.**	6	6	3	D	SVA*
2.	The **cleaner used** a **broom.**	5	6	3	D	SVO
3.	**She looked in** her **mirror.**	5	6	4	PP	SVA*
4.	The **good boy's helping.**	4	5	3	D	SV
5.	**They followed** the **path.**	4	5	3	PP	SVO
6.	The **kitchen clock** was **wrong.**	5	6	3	D	SVC
7.	The **dog jumped on** the **chair.**	6	6	4	D	SVA*
8.	**Someone's crossing** the **road.**	4	6	3	N	SVO
9.	The **postman brings** a **letter.**	5	7	3	D	SVO
10.	**They're cycling along.**	3	6	3	PP	SVA
11.	**He broke** his **leg.**	4	4	3	PP	SVO
12.	The **milk** was by the **front door.**	7	7	3	D	SVA*
13.	The **shirts hang** in the **cupboard.**	6	7	3	D	SVA*
14.	The **ground** was **too hard.**	5	5	3	D	SVC
15.	The **buckets hold water.**	4	6	3	D	SVO
16.	The **chicken laid** some **eggs.**	5	6	3	D	SVO
11						
1.	The **sweet shop** was **empty.**	5	6	3	D	SVC
2.	The **dogs go** for a **walk.**	6	6	3	D	SVA
3.	**She's washing** her **dress.**	4	5	3	PP	SVO
4.	The **lady stayed** for **tea.**	5	6	3	D	SVA
5.	The **driver waits** by the **corner.**	6	8	3	D	SVA
6.	**They finished** the **dinner.**	4	6	3	PP	SVO
7.	The **policeman knows** the **way.**	5	7	3	D	SVO
8.	The **little girl** was **happy.**	5	7	3	D	SVC
9.	**He wore** his **yellow shirt.**	5	6	4	PP	SVO
10.	**They're coming** for **Christmas.**	4	6	3	PP	SVA*
11.	The **cow gave** some **milk.**	5	5	3	D	SVO
12.	The **boy got into bed.**	5	6	4	D	SVA
13.	The **two farmers** are **talking.**	5	7	3	D	SV

14.	**Mother picked** some **flowers.**	4	6	3	N	SVO
15.	A **fish lay** on the **plate.**	6	6	3	D	SVA*
16.	The **father writes** a **letter.**	5	7	3	D	SVO
12						
1.	The **food cost** a **lot.**	5	5	3	D	SVO
2.	The **girl's washing** her **hair.**	5	6	3	D	SVO
3.	The **front garden** was **pretty.**	5	7	3	D	SVC
4.	**He lost** his **hat.**	4	4	3	PP	SVO
5.	The **taps** are **above** the **sink.**	6	7	3	D	SVA*
6.	**Father paid at** the **gate.**	5	6	4	N	SVA
7.	**She's waiting** for her **bus.**	5	6	3	PP	SVO
8.	The **bread van's coming.**	4	5	3	D	SV
9.	**They** had some **cold meat.**	5	5	3	PP	SVO
10.	The **football game's over.**	4	6	3	D	SVA
11.	**They carry** some **shopping bags.**	5	7	4	PP	SVO
12.	The **children help** the **milkman.**	5	7	3	D	SVO
13.	The **picture came** from a **book.**	6	7	3	D	SVA*
14.	The **rice pudding** was **ready.**	5	7	3	D	SVC
15.	The **boy** had a **toy dragon.**	6	7	3	D	SVO
16.	A **tree fell** on the **house.**	6	6	3	D	SVA*
13						
1.	The **fruit came** in a **box.**	6	6	3	D	SVA*
2.	The **husband brings** some **flowers.**	5	7	3	D	SVO
3.	**They're playing** in the **park.**	5	6	3	PP	SVA
4.	**She argued** with her **sister.**	5	7	3	PP	SVA
5.	A **man told** the **police.**	5	6	3	D	SVO
6.	**Potatoes grow** in the **ground.**	5	7	3	N	SVA
7.	**He's cleaning** his **car.**	4	5	3	PP	SVO
8.	The **mouse found** the **cheese.**	5	5	3	D	SVO
9.	**They waited** for **one hour.**	5	6	4	PP	SVA
10.	The **big dog** was **dangerous.**	5	7	3	D	SVC
11.	The **strawberry jam** was **sweet.**	5	7	3	D	SVC
12.	The **plant hangs above** the **door.**	6	7	4	D	SVA
13.	The **children** are **all eating.**	5	7	3	D	SV
14.	The **boy** has **black hair.**	5	5	3	D	SVO
15.	The **mother heard** her **baby.**	5	7	3	D	SVO
16.	The **lorry climbed** the **hill.**	5	6	3	D	SVO
14						
1.	The **angry man shouted.**	4	6	3	D	SV
2.	The **dog sleeps** in a **basket.**	6	7	3	D	SVA*
3.	**They're drinking tea.**	3	4	3	PP	SVO
4.	**Mother opens** the **drawer.**	4	6	3	N	SVO

5.	An **old woman** was at **home.**	6	7	3	D	SVA
6.	**He dropped** his **money.**	4	5	3	PP	SVO
7.	**They broke all** the **eggs.**	5	5	4	PP	SVO
8.	The **kitchen window** was **clean.**	5	7	3	D	SVC
9.	The **girl plays** with the **baby.**	6	7	3	D	SVO
10.	The **big fish got away.**	5	6	4	D	SV
11.	**She's helping** her **friend.**	4	5	3	PP	SVO
12.	The **children washed** the **plates.**	5	6	3	D	SVO
13.	The **postman comes early.**	4	6	3	D	SVA
14.	The **sign showed** the **way.**	5	5	3	D	SVO
15.	The **grass** is **getting long.**	5	6	3	D	SVC
16.	The **match fell** on the **floor.**	6	6	3	D	SVA*
15						
1.	A **man's turning** the **tap.**	5	6	3	D	SVO
2.	The **fire** was **very hot.**	5	7	3	D	SVC
3.	**He's sucking** his **thumb.**	4	5	3	PP	SVO
4.	The **shop closed** for **lunch.**	5	5	3	D	SVA
5.	The **driver starts** the **engine.**	5	7	3	D	SVO
6.	The **boy hurried** to **school.**	5	6	3	D	SVA
7.	Some **nice people** are **coming.**	5	7	3	D	SV
8.	**She bumped** her **head.**	4	4	3	PP	SVO
9.	**They met some friends.**	4	4	4	PP	SVO
10.	**Flowers grow** in the **garden.**	5	7	3	N	SVA
11.	The **tiny baby** was **pretty.**	5	8	3	D	SVC
12.	The **daughter laid** the **table.**	5	7	3	D	SVO
13.	**They walked across** the **grass.**	5	6	4	PP	SVA
14.	The **mother tied** the **string.**	5	6	3	D	SVO
15.	The **train stops** at the **station.**	6	7	3	D	SVA
16.	The **puppy plays** with a **ball.**	6	7	3	D	SVO
16						
1.	The **children wave** at the **train.**	6	7	3	D	SVA*
2.	**Mother cut** the **Christmas cake.**	5	7	4	N	SVO
3.	**He closed** his **eyes.**	4	4	3	PP	SVO
4.	The **raincoat's very wet.**	4	6	3	D	SVC
5.	A **lady buys** some **butter.**	5	7	3	D	SVO
6.	**They called** an **ambulance.**	4	6	3	PP	SVO
7.	**She's paying** for her **bread.**	5	6	3	PP	SVO
8.	The **policeman found** a **dog.**	5	7	3	D	SVO
9.	Some **men shave** in the **morning.**	6	7	3	D	SVA
10.	The **driver lost** his **way.**	5	6	3	D	SVO
11.	**They stared** at the **picture.**	5	6	3	PP	SVA*
12.	The **cat drank** from a **saucer.**	6	7	3	D	SVA*

13.	The **oven door** was **open.**	5	7	3	D	SVC
14.	The **car's going too fast.**	5	6	4	D	SVA
15.	The **silly boy's hiding.**	4	6	3	D	SV
16.	The **painter used** a **brush.**	5	6	3	D	SVO
17						
1.	The **apple pie's cooking.**	4	6	3	D	SV
2.	**He drinks** from his **mug.**	5	5	3	PP	SVA*
3.	The **sky** was **very blue.**	5	6	3	D	SVC
4.	**They knocked** on the **window.**	5	6	3	PP	SVA*
5.	The **big boy kicked** the **ball.**	6	6	4	D	SVO
6.	**People** are **going home.**	4	6	3	N	SVA
7.	The **baby wants** his **bottle.**	5	7	3	D	SVO
8.	The **lady sat** on her **chair.**	6	7	3	D	SVA*
9.	**They** had some **jam pudding.**	5	6	3	PP	SVO
10.	The **scissors** are **quite sharp.**	5	6	3	D	SVC
11.	**She's calling** her **daughter.**	4	6	3	PP	SVO
12.	Some **brown leaves fell** off the **tree.**	7	7	4	D	SVA*
13.	The **milkman carried** the **cream.**	5	7	3	D	SVO
14.	A **girl ran along.**	4	5	3	D	SVA
15.	The **mother reads** a **paper.**	5	7	3	D	SVO
16.	The **dog chased** the **cat.**	5	5	3	D	SVO
18						
1.	The **cake shop's opening.**	4	6	3	D	SV
2.	**They like orange marmalade.**	4	7	4	PP	SVO
3.	The **mother shut** the **window.**	5	7	3	D	SVO
4.	**He's skating with** his **friend.**	5	6	4	PP	SVA
5.	The **cheese pie** was **good.**	5	5	3	D	SVC
6.	**Rain falls** from **clouds.**	4	4	3	N	SVA*
7.	**She talked** to her **doll.**	5	5	3	PP	SVO
8.	**They painted** the **wall.**	4	5	3	PP	SVO*
9.	The **towel dropped** on the **floor.**	6	6	3	D	SVA*
10.	The **dog's eating** some **meat.**	5	6	3	D	SVO
11.	A **boy broke** the **fence.**	5	5	3	D	SVO
12.	The **yellow pears** were **lovely.**	5	7	3	D	SVC
13.	The **police help** the **driver.**	5	7	3	D	SVO
14.	The **snow lay** on the **roof.**	6	6	3	D	SVA*
15.	The **lady washed** the **shirt.**	5	6	3	D	SVO
16.	The **cup hangs** on a **hook.**	6	6	3	D	SVA*
19						
1.	The **family like fish.**	4	6	3	D	SVO
2.	**Sugar's very sweet.**	3	5	3	N	SVC
3.	The **baby lay** on a **rug.**	6	7	3	D	SVA*

4.	The **washing machine broke.**	4	6	3	D	SV
5.	**They're clearing** the **table.**	4	6	3	PP	SVO*
6.	The **cleaner swept** the **floor.**	5	6	3	D	SVO*
7.	A **grocer sells butter.**	4	6	3	D	SVO
8.	The **bath water** was **warm.**	5	6	3	D	SVC
9.	**He's reaching** for his **spoon.**	5	6	3	PP	SVO
10.	**She hurt** her **hand.**	4	4	3	PP	SVO
11.	The **milkman drives** a **small van.**	6	7	4	D	SVO
12.	The **boy slipped on** the **stairs.**	6	6	4	D	SVA*
13.	**They're staying** for **supper.**	4	6	3	PP	SVA
14.	The **girl held** a **mirror.**	5	6	3	D	SVO
15.	The **cup stood** on a **saucer.**	6	7	3	D	SVA*
16.	The **cows went** to **market.**	5	6	3	D	SVA
20						
1.	The **boy got** into **trouble.**	5	7	3	D	SVA
2.	**They're going out.**	3	4	3	PP	SV
3.	The **football hit** the **goalpost.**	5	7	3	D	SVO
4.	**He paid** his **bill.**	4	4	3	PP	SVO
5.	The **teacloth's quite wet.**	4	5	3	D	SVC
6.	A **cat jumped off** the **fence.**	6	6	4	D	SVA*
7.	The **baby** has **blue eyes.**	5	6	3	D	SVO
8.	**They sat** on a **wooden bench.**	6	7	4	PP	SVA
9.	**Mother made** some **curtains.**	4	6	3	N	SVO
10.	The **oven's too hot.**	4	5	3	D	SVC
11.	The **girl caught** a **cold.**	5	5	3	D	SVO
12.	The **raincoat's hanging up.**	4	6	3	D	SV
13.	**She brushed** her **hair.**	4	4	3	PP	SVO
14.	The **two children** are **laughing.**	5	7	3	D	SV
15.	The **man tied** his **scarf.**	5	5	3	D	SVO
16.	The **flower stands** in a **pot.**	6	7	3	D	SVA
21						
1.	The **pepper pot** was **empty.**	5	7	3	D	SVC
2.	The **dog drank** from a **bowl.**	6	6	3	D	SVA
3.	A **girl came** into the **room.**	6	7	3	D	SVA
4.	**They're pushing** an **old car.**	5	6	4	PP	SVO
5.	The **cat caught** a **mouse.**	5	5	3	D	SVO
6.	The **road goes up** a **hill.**	6	6	4	D	SVA
7.	**She made** her **bed.**	4	4	3	PP	SVO
8.	**Bananas** are **yellow fruit.**	4	7	3	N	SVC
9.	The **cow lies** on the **grass.**	6	6	3	D	SVA
10.	The **egg cups** are on the **table.**	7	8	3	D	SVA
11.	**He frightened** his **sister.**	4	6	3	PP	SVO

12.	The **cricket team's playing.**	4	6	3	D	SV
13.	The **father picked** some **pears.**	5	6	3	D	SVO
14.	The **kettle boiled quickly.**	4	7	3	D	SVA
15.	The **man's painting** a **sign.**	5	6	3	D	SVO
16.	**They lost** some **money.**	4	5	3	PP	SVO

Appendix B: The IHR Sentences

The table below shows a breakdown for the IHR sentences.

- Words = number of words per sentence
- Syllables = number of syllables per sentence
- K/W = number of keywords per sentence (please note, each keyword is in bold)
- 1st Word = type of first word; determiner (D) , personal pronoun (PP) or noun (N)
- Structure = grammatical structure of the sentence
    - Subject – Verb – Object (SVO)
    - Subject – Verb – Adverb (SVA)
    - Subject – Verb – Complement (SVC)
    - Subject – Verb (SV)

	Sentence	Words	Syllables	K/W	1st Word	Structure
1						
1.	They moved the furniture	4	6	3	PP	SVO
2.	He's wiping the table	4	6	3	PP	SVO
3.	He hit his head	4	4	3	PP	SVO
4.	The yellow leaves are falling	5	7	3	D	SV
5.	The cat played with some wool	6	6	3	D	SVO
6.	The bag was very heavy	5	7	3	D	SVC
7.	The towel dripped on the carpet	6	7	3	D	SVA
8.	The bull chased the lady	5	6	3	D	SVO
9.	The man dug his garden	5	6	3	D	SVO
10.	The room has a lovely view	6	7	3	D	SVO
11.	The girl helped in the kitchen	6	7	3	D	SVA
12.	The old shoes were muddy	5	6	3	D	SVC
13.	Father's hiding the presents	4	7	3	N	SVO
14.	The milk boiled over	4	6	3	D	SVA
15.	The neighbour knocked at the door	6	7	3	D	SVA
2						

1.	He tore his shirt	4	4	3	PP	SVO
2.	They finished the jigsaw	4	6	3	PP	SVO
3.	She brought her camera	4	6	3	PP	SVO
4.	The lady watered her plants	5	7	3	D	SVO
5.	The salt cellar's full	4	5	3	D	SVC
6.	The boy hit his thumb	5	5	3	D	SVO
7.	The mother shook her head	5	6	3	D	SVO
8.	The snow lay on the hills	6	6	3	D	SVA
9.	The father used a towel	5	6	3	D	SVO
10.	The tree was in the back garden	7	8	3	D	SVA
11.	The yacht sailed past	4	5	3	D	SVA
12.	The lady pushed the pram	5	6	3	D	SVO
13.	They're leaving today	3	5	3	pp	SVA
14.	The picture hung on the wall	6	7	3	D	SVA
15.	The children sit under the tree	6	8	3	D	SVA
3						
1.	The lunch was very early	5	7	3	D	SVA
2.	The dirty boy is washing	5	7	3	D	SVO
3.	He hid his money	4	5	3	PP	SVO
4.	The curtains were too short	5	6	3	D	SVC
5.	The knife cut her cake	5	5	3	D	SVO
6.	They emptied their pockets	4	6	3	PP	SVO
7.	The new shoes were tight	5	5	3	D	SVC
8.	The coat hangs in a cupboard	6	7	3	D	SVA
9.	The sun shone through the clouds	6	6	3	D	SVO
10.	She took her purse	4	4	3	PP	SVO
11.	The team lost the match	5	5	3	D	SVO
12.	The shirt caught on a nail	6	6	3	D	SVA
13.	They picked some raspberries	4	6	3	PP	SVO
14.	The man climbed the mountain	5	7	3	D	SVO
15.	The lady hurt her arm	5	6	3	D	SVO
4						
1.	The old clothes were dirty	5	6	3	D	SVC
2.	He carried a stick	4	5	3	PP	SVO
3.	She read her book	4	4	3	PP	SVO
4.	The new house was empty	5	6	3	D	SVC
5.	The thief bought a ladder	5	6	3	D	SVO
6.	The horse stands by the gate	6	6	4	D	SVA
7.	They're heading for the park	5	6	3	PP	SVA
8.	The gardener trimmed the hedge	5	7	3	D	SVO
9.	They're standing up	3	4	3	PP	SVA
10.	Someone's hiding in the bushes	5	8	4	N	SVA

11.	The waiter lit the candles	5	7	3	D	SVO
12.	The baker iced the cake	5	6	3	D	SVO
13.	The woman slipped on the ice	6	7	3	D	SVO
14.	The small puppy was scared	5	6	3	D	SVA
15.	The lady changed her mind	5	6	3	D	SVO
5						
1.	The daughter closed the box	5	6	3	D	SVO
2.	He broke into the safe	5	6	3	PP	SVO
3.	The doctor carries a bag	5	7	3	D	SVO
4.	The new game was silly	5	6	3	D	SVC
5.	The little boy was tired	5	7	3	D	SVC
6.	They saw the sign	4	4	3	PP	SVO
7.	She's wrapping the parcel	4	6	3	PP	SVO
8.	The children laughed at the clown	6	7	3	D	SVO
9.	The apple pie was hot	5	6	3	D	SVC
10.	The ship sailed up the river	6	8	3	D	SVA
11.	They house had a lovely garden	6	8	3	PP	SVO
12.	The noisy dog is barking	5	7	3	D	SV
13.	They bought some tickets	4	5	3	PP	SVO
14.	The man goes to the bank	6	6	3	D	SVA
15.	The nurse helped the child	5	5	3	D	SVO
6						
1.	The girl knew the story	5	6	3	D	SVO
2.	He reached for the cup	5	5	3	PP	SVO
3.	The lady was quite cross	5	6	3	D	SVC
4.	The rope was too short	5	5	3	D	SVC
5.	She's listening to the radio	5	9	3	PP	SVO
6.	The husband cleaned the car	5	6	3	D	SVO
7.	The postman leaned on the fence	6	7	3	D	SVO
8.	The china vase was broken	5	7	3	D	SVC
9.	The other team won	4	5	3	D	SV
10.	They locked the safe	4	4	3	PP	SVO
11.	The leaves dropped from the trees	6	6	3	D	SVO
12.	The men watched the race	5	5	3	D	SVO
13.	The bird's building a nest	5	6	3	D	SVO
14.	The woman called her dog	5	6	3	D	SVO
15.	They're waving at the train	5	6	3	PP	SVA
7						
1.	The cat scratched the chair	5	5	3	D	SVO
2.	She tapped at the window	5	6	3	PP	SVA
3.	The man painted the gate	5	6	3	D	SVO
4.	He slid on the floor	5	5	3	PP	SVA

5.	They're lifting the box	4	5	3	PP	SVO
6.	The woman listened to her friend	6	8	3	D	SVO
7.	The driver hooted his horn	5	7	3	D	SVO
8.	The cake tasted nice	4	5	3	D	SVA
9.	The sailor stood on the deck	6	5	3	D	SVA
10.	The young girls were pretty	5	6	3	D	SVC
11.	They painted the ceiling	4	6	3	PP	SVO
12.	The back door was shut	5	5	3	D	SVC
13.	The tree lost its leaves	5	5	3	D	SVO
14.	The boy eats with his fork	6	6	3	D	SVO
15.	The young mother's shopping	4	6	3	D	SV
8						
1.	The girl sharpened her pencil	5	7	3	D	SVO
2.	She closed her eyes	4	4	3	PP	SVO
3.	The puppy licked his master	5	7	3	D	SVO
4.	The plant grows on the wall	6	6	3	D	SVA
5.	The family's having a picnic	5	9	3	D	SVO
6.	The train arrived on time	5	6	3	D	SVA
7.	They won the game	4	4	3	PP	SVO
8.	They lady waited for her husband	6	9	3	PP	SVO
9.	The post office was near	5	6	3	D	SVC
10.	They rowed the boat	4	4	3	PP	SVO
11.	The old fox was sly	5	5	3	D	SVC
12.	The baby lost his rattle	5	7	3	PP	SVO
13.	He dug with his spade	5	5	3	PP	SVO
14.	The boiled egg was soft	5	6	3	D	SVC
15.	The two ladies were listening	5	8	3	D	SV
9						
1.	The car engine's running	4	6	3	D	SV
2.	They parked by the station	5	6	3	PP	SVA
3.	The lemons were quite bitter	5	7	3	D	SVC
4.	They're cutting the grass	4	5	3	PP	SVO
5.	The woman called a doctor	5	7	3	D	SVO
6.	The man shaved with a razor	6	7	3	D	SVO
7.	He tied his shoelaces	4	6	3	PP	SVO
8.	The bus is leaving early	5	7	3	D	SVA
9.	She's sewing on a button	5	7	3	PP	SVO
10.	The horse kicked the rider	5	6	3	D	SVO
11.	The yellow bananas are ripe	5	8	3	D	SVC
12.	The lady has a fur coat	6	7	3	D	SVO
13.	The cat jumped onto the table	6	8	3	D	SVA
14.	The book sits on the shelf	6	6	3	D	SVO

15.	The boy told a joke	5	5	3	D	SVO
10						
1.	She sings in the bath	5	5	3	PP	SVA
2.	The meat was too tough	5	5	3	D	SVC
3.	The child ate some jam	5	5	3	D	SVO
4.	They're stealing the apples	4	6	3	PP	SVO
5.	The children dried the dishes	5	7	3	D	SVO
6.	The paper boy was cheeky	5	7	3	D	SVC
7.	The little car was slow	5	6	3	D	SV
8.	The bath taps are dripping	5	6	3	D	SVC
9.	They came at Easter	4	5	3	PP	SVA
10.	He's wearing a tie	4	5	3	PP	SVO
11.	The new towel was clean	5	5	3	D	SVC
12.	The water poured from a jug	6	7	3	D	SVO
13.	The red apples were in a bowl	7	8	3	D	SVA
14.	The bus stopped at the shops	6	6	3	D	SVA
15.	The man drew with a pencil	6	7	3	D	SVO

Appendix C: The New BKB sentences

The table below shows a breakdown for the New BKB sentences.

- Words = number of words per sentence
- Syllables = number of syllables per sentence
- K/W = number of keywords per sentence (please note, an asterisk before a word represents a keyword)
- 1st Word = type of first word; determiner (D) , personal pronoun (PP) or noun (N)
- Structure = grammatical structure of the sentence
    - Subject – Verb – Object (SVO)
    - Subject – Verb – Adverb (SVA)
    - Subject – Verb – Complement (SVC)
    - Subject – Verb (SV)

	Sentence	Structure	Syllables	Words	1st Word	K/W
BKB+1	A *box was *under the *tree	SVA	7	6	D	3
BKB+2	A *boy *fell from the *roof	SVA	6	6	D	3
BKB+3	A *boy *fell from the *train	SVA	6	6	D	3
BKB+4	A *boy *fell *from the *wall	SVA	6	6	D	4
BKB+5	A *boy *fell in the *pond	SVA	6	6	D	3
BKB+6	A *boy *fell off the *chair	SVA	6	6	D	3
BKB+7	A *boy *ran *down the *garden	SVA	7	6	D	4
BKB+8	A *boy *ran *down the *street	SVA	6	6	D	4
BKB+10	A *bus *went *along	SVA	5	4	D	3
BKB+11	A *car *came *back	SV	4	4	D	3
BKB+12	A *cat *jumped off the *curtains	SVO	7	6	D	3
BKB+13	A *cat *sits near the *door	SVA	7	6	D	3
BKB+15	A *dog *grabs the *shoe	SVO	5	5	D	3
BKB+17	A *dog *ran down the *hill	SVA	6	6	D	3
BKB+19	A *girl *cut some *onions	SVO	7	5	D	3
BKB+20	A *girl *kicked the *ball	SVO	5	5	D	3
BKB+21	A *girl *kicked the *boy	SVA	5	5	D	3
BKB+22	A *girl *talks to the *baby	SVA	7	6	D	3
BKB+23	A *lady *buys some *bread	SVO	6	5	D	3
BKB+24	A *lady *buys some *fruit	SVO	6	5	D	3

BKB+25	A *lady *sat on the *bench	SVA	7	6	D	3
BKB+26	A *lady *slipped on the *stairs	SVA	7	6	D	3
BKB+27	A *letter *fell on the *floor	SVA	7	6	D	3
BKB+28	A *man *buys some *sugar	SVO	6	5	D	3
BKB+29	A *man *climbed the *hill	SVA	5	5	D	3
BKB+30	A *man *found the *cheese	SVO	5	5	D	3
BKB+32	A *man *told the *story	SVO	6	5	D	3
BKB+34	A *mouse *ran near the *door	SVA	7	6	D	3
BKB+35	A *naughty *boy *shouted	SV	6	4	D	3
BKB+36	A *shirt *was in the *cupboard	SVA	7	6	D	3
BKB+37	A *tree *fell on the *bus	SVA	6	6	D	3
BKB+39	An *old *man was at *home	SVA	6	6	D	3
BKB+42	An *old *woman *stayed for *tea	SVO	7	6	D	4
BKB+43	An *old *woman *ties the *string	SVO	7	6	D	4
BKB+44	*Apples *grow on *trees	SVA	4	5	N	3
BKB+45	*Broken *glass is *dangerous	SVC	7	4	N	3
BKB+48	*Children *like *stories	SVO	5	3	N	3
BKB+50	*Father *ate the *banana	SVO	7	4	N	3
BKB+51	*Father *ate the *green *pear	SVO	6	5	N	4
BKB+52	*Father *ate the *yellow *pear	SVO	7	5	N	4
BKB+53	*Father *bought a *fish	SVO	5	4	N	3
BKB+56	*Father *cleaned the *bench	SVO	5	4	N	3
BKB+57	*Father *cleaned the *house	SVO	5	4	N	3
BKB+59	*Father *cleaned the *window	SVO	6	4	N	3
BKB+60	*Father *dropped his *bag	SVO	5	4	N	3
BKB+61	*Father *drove the *lorry	SVO	6	4	N	3
BKB+62	*Father *fell off the *ladder	SVO	7	5	N	3
BKB+63	*Father *likes *oranges	SVO	6	3	N	3
BKB+64	*Father likes *rice *pudding	SVO	6	4	N	3
BKB+66	*Father *looked at the *baby	SVA	7	5	N	3
BKB+67	*Father *looked at the *bull	SVA	6	5	N	3
BKB+69	*Father *made a *funny *noise	SVO	7	5	N	4
BKB+70	*Father *made a *tree *house	SVO	6	5	N	4
BKB+71	*Father *opens the *door	SVO	6	4	N	3
BKB+74	*Father *painted the *big *door	SVO	7	5	N	4
BKB+75	*Father *painted the *fence	SVO	6	4	N	3
BKB+76	*Father *reads a *book	SVO	5	4	N	3
BKB+77	*Father *shouts at his *son	SVA	6	5	N	3
BKB+79	*Father *shut the *gate	SVO	5	4	N	3
BKB+81	*Father *slipped on the *stairs	SVA	6	5	N	3
BKB+82	*Father *waits by the *corner	SVA	7	5	N	3
BKB+83	*Father *waits by the *door	SVA	6	5	N	3
BKB+85	*Father *washed the *car	SVO	5	4	N	3
BKB+87	*Father *went on *holiday	SVA	7	4	N	3
BKB+88	*Father *went *shopping	SVA	5	3	N	3
BKB+91	*Father *wore a yellow *shirt	SVO	7	5	N	3
BKB+92	*Father *wore his *brown *hat	SVO	6	5	N	4
BKB+93	*Father *worries a *lot	SVA	6	4	N	3
BKB+95	*Father's *clearing the *roof	SVA	6	4	N	3
BKB+97	*Father's *playing *cricket	SVO	6	3	N	3
BKB+98	*Father's *playing *football	SVO	6	3	N	3

BKB+99	*Father's *waiting by the *gate	SVA	7	5	N	3
BKB+101	*Father's *watching *cricket	SVO	6	3	N	3
BKB+102	*Father's *watching *football	SVO	6	3	N	3
BKB+103	*Father's *writing a *letter	SVO	7	4	N	3
BKB+104	*Five *men went on *holiday	SVA	7	5	N	3
BKB+105	*Flowers *grow in the *grass	SVA	6	5	N	3
BKB+106	*Friends *play in the *park	SVA	5	5	N	3
BKB+107	*Green *apples *fell off the *tree	SVA	7	6	N	4
BKB+108	*Green *pears *fell off the *tree	SVA	6	6	N	4
BKB+110	*He *ate the *cheese	SVO	5	4	PP	3
BKB+111	*He *bought her *flowers	SVO	5	4	PP	3
BKB+112	*He *bought *new *shoes	SVO	4	4	PP	4
BKB+113	*He *broke his *nose	SVO	4	4	PP	3
BKB+114	*He *broke the *eggs	SVO	4	4	PP	3
BKB+115	*He *broke the *kettle	SVO	5	4	PP	3
BKB+116	*He *broke the *washing *machine	SVO	7	5	PP	4
BKB+117	*He *bumped his *head	SVO	4	4	PP	3
BKB+118	*He *carried a *blue *bag	SVO	6	5	PP	4
BKB+119	*He *carried his *ladder	SVO	6	4	PP	3
BKB+120	*He *carried the *football	SVO	6	4	PP	3
BKB+121	*He *carries the *matches	SVO	6	4	PP	3
BKB+123	*He *closed his *front *door	SVO	5	5	PP	4
BKB+124	*He *closed the *kitchen *door	SVO	6	5	PP	4
BKB+125	*He *cut his *fruit	SVO	4	4	PP	3
BKB+126	*He *cycled to *work	SVA	5	4	PP	3
BKB+127	*He *cycled very *fast	SVA	6	4	PP	3
BKB+128	*He *drank *hot *milk	SVO	4	4	PP	4
BKB+129	*He *drinks *from his *bottle	SVO	6	5	PP	4
BKB+132	*He *dropped all the *eggs	SVO	5	5	PP	3
BKB+133	*He *dropped his *basket	SVO	5	4	PP	3
BKB+134	*He *dropped his *mug	SVO	4	4	PP	3
BKB+135	*He *dropped the *bananas	SVO	6	4	PP	3
BKB+136	*He eats *lemon *sweets	SVO	5	4	PP	3
BKB+138	*He *fell off his *ladder	SVA	6	5	PP	3
BKB+139	*He *forgot his *football *bag	SVO	7	5	PP	4
BKB+140	*He *forgot his *football *boots	SVO	7	5	PP	4
BKB+141	*He *found his *machine	SVO	5	4	PP	3
BKB+142	*He *found the *lemon *jelly	SVO	7	5	PP	4
BKB+143	*He *hurt his *nose	SVO	4	4	PP	3
BKB+144	*He likes *cold *water	SVO	5	4	PP	3
BKB+145	*He likes *eating *fish	SVO	5	4	PP	3
BKB+147	*He *listens to a *story	SVO	7	5	PP	3
BKB+148	*He *listens to the *child	SVA	7	5	PP	3
BKB+149	*He *lost his *dog	SVA	4	4	PP	3
BKB+150	*He *lost his *father	SVA	5	4	PP	3
BKB+151	*He *lost his *football	SVO	5	4	PP	3
BKB+152	*He *lost his *old *gloves	SVO	5	5	PP	4
BKB+153	*He *lost his *school *bag	SVO	5	5	PP	4
BKB+154	*He *lost his *story *book	SVO	6	5	PP	4
BKB+155	*He *lost his *toy *dragon	SVO	6	5	PP	4
BKB+1141	The *footballer *lost the *ball	SVO	7	5	D	3

BKB+1526	The *naughty *girl *took *money	SVO	7	5	D	4
BKB+159	*He *played at *Christmas	SVA	5	4	PP	3
BKB+160	*He *played at *school	SVA	4	4	PP	3
BKB+161	*He *played in the *garden	SVA	6	5	PP	3
BKB+162	*He *played near the *door	SVA	6	5	PP	3
BKB+163	*He *played with his *brother	SVA	6	5	PP	3
BKB+164	*He *played with his *toy *car	SVO	6	6	PP	4
BKB+165	*He *ran to his *father	SVA	6	5	PP	3
BKB+166	*He *shouted at his *brother	SVA	7	5	PP	3
BKB+167	*He *sits in the *fire *engine	SVA	7	6	D	4
BKB+168	*He *talked to the *policeman	SVA	7	5	PP	3
BKB+169	*He *tells a *funny *story	SVO	7	5	PP	4
BKB+170	*He *waited for *two *hours	SVA	7	5	PP	4
BKB+171	*He *walked in the *snow	SVA	5	5	PP	3
BKB+172	*He *walked on the *path	SVA	5	5	PP	3
BKB+173	*He *washed his *school *shirt	SVO	5	5	PP	4
BKB+174	*He *wore a *black *scarf	SVO	5	5	PP	4
BKB+175	*He *wore a *blue *shirt	SVO	5	5	PP	4
BKB+176	*He *wore *blue *gloves	SVO	4	4	PP	4
BKB+177	*He wore *green *gloves	SVO	4	4	PP	3
BKB+178	*He *wore his *blue *hat	SVO	5	5	PP	4
BKB+179	*He *wore his *football *boots	SVO	6	5	PP	4
BKB+180	*He *wore his *gloves	SVO	4	4	PP	3
BKB+181	*He *wore his *green *shirt	SVO	5	5	PP	4
BKB+182	*He *wore his *hat	SVO	4	4	PP	3
BKB+183	*He *wore his *new *shirt	SVO	5	5	PP	4
BKB+184	*Her *bag was *empty	SVC	5	4	PP	3
BKB+185	*Her *bag's near the *door	SVA	6	5	PP	3
BKB+187	*Her *book is in her *school *bag	SVA	7	6	PP	4
BKB+188	*Her *books *fell from her *bag	SVA	6	6	PP	4
BKB+189	*Her *coat *hangs in the *cupboard	SVA	7	6	PP	4
BKB+190	*Her *coat is *hanging *up	SV	6	5	PP	4
BKB+191	*Her *cupboard was *full	SVC	5	4	PP	3
BKB+192	*Her *dinner got *cold	SVC	5	4	PP	3
BKB+193	*Her *friends *came for *dinner	SVA	6	5	PP	4
BKB+194	*Her *hair got *wet	SVA	4	4	PP	3
BKB+196	*Her *long *hair is *brown	SVC	5	5	PP	4
BKB+197	*Her *new *coat was *lovely	SVC	6	5	PP	4
BKB+199	*Her *son was *asleep	SVA	5	4	PP	3
BKB+201	*Her *trousers are very *long	SVC	7	5	PP	3
BKB+204	*He's *buying *dinner	SVO	5	3	PP	3
BKB+206	*He's *cleaning the *park	SVA	5	4	PP	3
BKB+207	*He's *cleaning the *shop	SVA	5	4	PP	3
BKB+208	*He's *cleaning the *van	SVA	5	4	PP	3
BKB+209	*He's *hiding by the *table	SVA	7	5	PP	3
BKB+211	*He's *holding her *hand	SVO	5	4	PP	3
BKB+213	*He's *holding his *book	SVO	5	4	PP	3
BKB+214	*He's *holding the *ladder	SVO	6	4	PP	3
BKB+215	*He's *holding the *paper	SVO	6	4	PP	3
BKB+216	*He's *painting the *wooden *bench	SVA	7	5	PP	4
BKB+217	*He's *reaching for her *hand	SVO	7	5	PP	3

BKB+218	*He's *running with his *friend	SVA	6	5	PP	3
BKB+219	*He's *talking to his *mother	SVA	7	5	PP	3
BKB+220	*He's *waiting by the *bus *stop	SVA	7	6	PP	4
BKB+221	*He's *washing his *raincoat	SVO	6	4	PP	3
BKB+222	*He's *washing his *trousers	SVO	6	4	PP	3
BKB+223	*He's *washing the *dog	SVA	5	4	PP	3
BKB+224	*He's *washing the *window	SVO	6	4	PP	3
BKB+226	*His *dinner was too *cold	SVC	6	5	PP	3
BKB+227	*His *face was *dirty	SVC	5	4	PP	3
BKB+228	*His *football *shirt was *dirty	SVC	7	5	PP	4
BKB+229	*His *gloves are *blue	SVC	4	4	PP	3
BKB+230	*His *hair got *wet	SVC	4	4	PP	3
BKB+231	*His *hat *cost a *lot	SVC	5	5	PP	4
BKB+232	*His *lunch *box is *empty	SVC	6	5	PP	4
BKB+234	*Little *children like *puppies	SVO	7	4	N	3
BKB+235	*Mother ate the *green *apple	SVO	7	5	N	3
BKB+236	*Mother *ate the *oranges	SVO	7	4	N	3
BKB+237	*Mother *bought a *puppy	SVO	6	4	N	3
BKB+238	*Mother *bought some *onions	SVO	7	4	N	3
BKB+239	*Mother *cleaned the *flowerpot	SVO	7	4	N	3
BKB+240	*Mother *closed the *curtains	SVO	6	4	N	3
BKB+241	*Mother comes *home *early	SVA	6	4	N	3
BKB+242	*Mother *cut some *onions	SVO	7	4	D	3
BKB+243	*Mother *cut the *cheese *pie	SVO	6	5	N	4
BKB+244	*Mother *dropped her *bag	SVO	5	4	N	3
BKB+245	*Mother *dropped her *gloves	SVO	5	4	N	3
BKB+246	*Mother *fell in the *kitchen	SVA	7	5	N	3
BKB+247	*Mother *fell *off the *ladder	SVO	7	5	N	4
BKB+248	*Mother *fetches her *purse	SVO	6	4	N	3
BKB+249	*Mother has *blue *eyes	SVO	5	4	N	3
BKB+250	*Mother *helped her *son	SVA	5	4	N	3
BKB+252	*Mother *laughed at the *story	SVO	7	5	N	3
BKB+254	*Mother *likes *jam *pudding	SVO	6	4	N	4
BKB+255	*Mother *looked at the *baby	SVO	7	5	N	3
BKB+256	*Mother *lost her *black *hat	SVO	6	5	N	4
BKB+258	*Mother *opens the *basket	SVO	7	4	N	3
BKB+259	*Mother *opens the *bottle	SVO	7	4	N	3
BKB+260	*Mother *reads a *story	SVO	6	4	N	3
BKB+261	*Mother *shouts at the *children	SVA	7	5	N	3
BKB+262	*Mother *shut her *bag	SVO	5	4	N	3
BKB+263	*Mother *shut the *kitchen *door	SVO	7	5	N	4
BKB+264	*Mother *shuts the *door	SVO	5	4	N	3
BKB+265	*Mother *sits in the *garden	SVA	7	5	N	3
BKB+266	*Mother *sits on the *bed	SVA	6	5	N	3
BKB+268	*Mother *slipped on the *stairs	SVA	6	5	N	3
BKB+269	*Mother *waits by the *bus *stop	SVA	7	6	N	4
BKB+270	*Mother *waits by the *corner	SVA	7	5	N	3
BKB+271	*Mother *waits by the *school *gate	SVA	7	6	N	4
BKB+272	*Mother *was at *home	SVA	5	4	N	3
BKB+273	*Mother was *very *happy	SVC	7	4	N	3
BKB+274	*Mother *washed a *saucepan	SVO	6	4	N	3

BKB+275	*Mother wears a *blue *scarf	SVO	6	5	N	3
BKB+276	*Mother wore a *black *scarf	SVO	6	5	N	3
BKB+277	*Mother wore a *pink *dress	SVO	6	5	N	3
BKB+278	*Mother wore her *pink *hat	SVO	6	5	N	3
BKB+279	*Mother wore her *yellow *gloves	SVO	7	5	N	3
BKB+280	*Mother *worries a *lot	SVA	6	4	N	3
BKB+282	*Mother's *cutting the *apple	SVO	7	4	N	3
BKB+283	*Mother's *eating *dinner	SVO	6	3	N	3
BKB+284	*Mother's *talking to the *cook	SVA	7	5	N	3
BKB+285	*People *wait for the *bus	SVO	6	5	N	3
BKB+286	*People *wait for the *train	SVO	6	5	N	3
BKB+287	*Puppy *plays in the *garden	SVA	7	5	N	3
BKB+288	*School *finished *early	SVA	5	3	N	3
BKB+289	*Sharp *scissors are *dangerous	SVC	7	4	N	3
BKB+290	*She *argued for *one *hour	SVA	6	5	PP	4
BKB+291	*She *argued in the *park	SVA	6	5	PP	3
BKB+292	*She *argued with her *friend	SVA	6	5	PP	3
BKB+293	*She *argued with the *police	SVA	7	5	PP	3
BKB+294	*She *ate the *orange	SVO	5	4	PP	3
BKB+295	*She *ate the *sweets	SVO	5	4	PP	3
BKB+296	*She *bought some *flowers	SVO	5	4	PP	3
BKB+297	*She *broke her *mirror	SVO	5	4	PP	3
BKB+298	*She *broke the *basket	SVO	5	4	PP	3
BKB+299	*She *broke the *game	SVO	4	4	PP	3
BKB+300	*She *broke the *glass *jug	SVO	5	5	PP	4
BKB+301	*She *carried an *orange *box	SVO	7	5	PP	4
BKB+302	*She *carried her *basket	SVO	6	4	PP	3
BKB+303	*She *carried her *book	SVO	5	4	PP	3
BKB+304	*She *carried her *fruit *basket	SVO	7	5	PP	4
BKB+305	*She *carried the *green *apples	SVO	7	5	PP	4
BKB+307	*She *carries her *big *bag	SVO	6	5	PP	4
BKB+308	*She *carries her *bottle	SVO	6	4	PP	3
BKB+309	*She *carries her *flowers	SVO	6	4	PP	3
BKB+310	*She *carries her *school *bag	SVO	6	5	PP	4
BKB+311	*She *carries *pink *flowers	SVO	6	4	PP	4
BKB+314	*She *cleaned the *garden *table	SVA	7	5	PP	4
BKB+315	*She *cleans the *car	SVO	4	4	PP	3
BKB+316	*She *closed the *door	SVO	4	4	PP	3
BKB+317	*She *closed the *drawer	SVO	4	4	PP	3
BKB+318	*She *cut some *lemons	SVO	5	4	PP	3
BKB+319	*She *cut the *bread	SVO	4	4	PP	3
BKB+320	*She *cut the *orange	SVO	5	4	PP	3
BKB+321	*She drank *cold *water	SVO	5	4	PP	3
BKB+322	*She drinks *hot *milk	SVO	4	4	PP	3
BKB+323	*She *drinks *milk	SVO	3	3	PP	3
BKB+324	*She *drinks the *cold *milk	SVO	5	5	PP	4
BKB+325	*She *dropped her *money *box	SVO	6	5	PP	4
BKB+326	*She *dropped her *spoon	SVO	4	4	PP	3
BKB+327	*She *dropped the *apple *pie	SVO	6	5	PP	4
BKB+328	*She *dropped the *ball	SVO	4	4	PP	3
BKB+329	*She *dropped the *big *box	SVO	5	5	PP	4

BKB+330	*She *dropped the *jam *jar	SVO	5	5	PP	4
BKB+331	*She *dropped the *tea towel	SVO	5	5	PP	3
BKB+332	*She *eats the *pink *jelly	SVO	6	5	PP	4
BKB+335	*She *fell in the *mud	SVA	5	5	PP	3
BKB+336	*She *fell on the *grass	SVO	5	5	PP	3
BKB+337	*She *finished her *cake	SVO	5	4	PP	3
BKB+339	*She *finished her *ice *cream	SVO	6	5	PP	4
BKB+340	*She *finished the *book	SVO	5	4	PP	3
BKB+341	*She *finished the *painting	SVO	6	4	PP	3
BKB+342	*She *finished the *story	SVO	6	4	PP	3
BKB+343	*She *followed the *bus	SVO	5	4	PP	3
BKB+344	*She *followed the *car	SVO	5	4	PP	3
BKB+345	*She *followed the *milkman	SVA	6	4	PP	3
BKB+346	*She *forgot her *purse	SVO	5	4	PP	3
BKB+347	*She *forgot her *school *bag	SVO	6	5	PP	4
BKB+348	*She *found her *book	SVO	4	4	PP	3
BKB+349	*She *found her *pink *bag	SVO	5	5	PP	4
BKB+350	*She *found some *food	SVO	4	4	PP	3
BKB+351	*She *found the *new *road	SVO	5	5	PP	4
BKB+352	*She *goes *running in the *park	SVA	7	6	PP	4
BKB+355	*She has a *doll *house	SVO	5	5	PP	3
BKB+358	*She *held a *yellow *flower	SVO	7	5	PP	4
BKB+360	*She *hurried to *school	SVA	5	4	PP	3
BKB+361	*She *hurt her *thumb	SVO	4	4	PP	3
BKB+362	*She *jumped on the *bed	SVA	5	5	PP	3
BKB+363	*She *kicked the *wooden *fence	SVO	6	5	PP	4
BKB+364	*She *knocked the *door	SVA	4	4	PP	3
BKB+365	*She *likes *bananas	SVO	5	3	PP	3
BKB+366	*She *likes *cycling	SVO	4	3	PP	3
BKB+367	*She likes *eating *eggs	SVO	5	4	PP	3
BKB+368	*She likes *eating *ice *cream	SVO	6	5	PP	4
BKB+370	*She likes *ice *cream	SVO	4	4	PP	3
BKB+371	*She *likes *pudding	SVO	4	3	PP	3
BKB+372	*She *likes *strawberries	SVO	5	3	PP	3
BKB+373	*She *likes the *bread	SVO	4	4	PP	3
BKB+375	*She *likes *tomatoes	SVO	5	3	PP	3
BKB+376	*She *listens to her *friends	SVA	6	5	PP	3
BKB+377	*She *listens to the *story	SVO	7	5	PP	3
BKB+378	*She *looked over the *fence	SVA	6	5	PP	3
BKB+379	*She *lost her *bag	SVO	4	4	PP	3
BKB+380	*She *lost her *book	SVO	4	4	PP	3
BKB+381	*She *lost her *brother	SVA	5	4	PP	3
BKB+382	*She *lost her *coat	SVO	4	4	PP	3
BKB+383	*She *lost her *dancing *shoes	SVO	5	5	PP	4
BKB+384	*She *lost her *hat	SVO	4	4	PP	3
BKB+385	*She *lost her *letter	SVO	5	4	PP	3
BKB+386	*She *lost her *mirror	SVO	5	4	PP	3
BKB+387	*She *lost her *money	SVO	5	4	PP	3
BKB+388	*She *lost her *pocket *money	SVO	7	5	PP	4
BKB+389	*She *lost her *scarf	SVO	4	4	PP	3
BKB+390	*She *lost her *shoe	SVO	4	4	PP	3

BKB+391	*She made *lemon *cake	SVO	5	4	PP	3
BKB+392	*She *opened the *car *door	SVO	6	5	PP	4
BKB+393	*She *paid for the *sweets	SVO	5	5	PP	3
BKB+394	*She *paid her *bill	SVO	4	4	PP	3
BKB+395	*She *painted a *picture	SVO	6	4	PP	3
BKB+396	*She *painted in the *house	SVA	6	5	PP	3
BKB+397	*She *picked *yellow *flowers	SVO	6	4	PP	4
BKB+398	*She *played in the *snow	SVA	5	5	PP	3
BKB+399	*She *played on the *train	SVA	5	5	PP	3
BKB+400	*She *played with her *doll *house	SVO	6	6	PP	4
BKB+401	*She *played with her *sister	SVA	6	5	PP	3
BKB+402	*She *plays *football	SVO	4	3	PP	3
BKB+403	*She *plays on the *street	SVA	5	5	PP	3
BKB+404	*She *plays with her *toy *kitchen	SVO	7	6	PP	4
BKB+405	*She *plays with her *two *sisters	SVA	7	6	PP	4
BKB+406	*She *plays with the *puppy	SVA	6	5	PP	3
BKB+408	*She *reads her *book	SVO	4	4	PP	3
BKB+409	*She runs *across the *snow	SVA	6	5	PP	3
BKB+410	*She *sat on her *chair	SVA	5	5	PP	3
BKB+411	*She *shouted in the *shop	SVA	6	5	PP	3
BKB+412	*She *shut the *car *door	SVO	5	5	PP	4
BKB+413	*She *shut the *gate	SVO	4	4	PP	3
BKB+414	*She *sits on a *chair	SVA	5	5	PP	3
BKB+415	*She *sits on her *bed	SVA	5	5	PP	3
BKB+416	*She *sleeps on the *bed	SVA	5	5	PP	3
BKB+417	*She *slipped on the *bus	SVA	5	5	PP	3
BKB+418	*She *slipped on the *snow	SVA	5	5	PP	3
BKB+419	*She *spoke to her *husband	SVA	6	5	PP	3
BKB+420	*She *spoke to her *sister	SVA	6	5	PP	3
BKB+421	*She *stands near her *car	SVA	5	5	PP	3
BKB+422	*She *stared at the *blue *sky	SVO	6	6	PP	4
BKB+424	*She *stood in the *corner	SVA	6	5	PP	3
BKB+426	*She *stood near the *baby	SVA	6	5	PP	3
BKB+427	*She *stood near the *car	SVA	5	5	PP	3
BKB+428	*She *stood near the *chair	SVA	5	5	PP	3
BKB+429	*She *stood near the *clown	SVA	5	5	PP	3
BKB+430	*She *stood near the *door	SVA	5	5	PP	3
BKB+433	*She *stood near the *sink	SVA	5	5	PP	3
BKB+434	*She *stood near the *table	SVA	6	5	PP	3
BKB+435	*She *stood near the *train	SVA	5	5	PP	3
BKB+436	*She *stood near the *tree	SVA	5	5	PP	3
BKB+437	*She *stood on the *mat	SVA	5	5	PP	3
BKB+438	*She *stopped *laughing	SVO	4	3	PP	3
BKB+439	*She *stopped *shouting	SVO	4	3	PP	3
BKB+440	*She *stopped *talking	SVO	4	3	PP	3
BKB+441	*She *suddenly *laughed	SVO	5	3	PP	3
BKB+442	*She *talked to her *friend	SVA	5	4	PP	3
BKB+443	*She *talked to the *lady	SVA	6	5	PP	3
BKB+444	*She *tells a *story	SVO	5	4	PP	3
BKB+445	*She *tidied her *house	SVO	5	4	PP	3
BKB+446	*She *tidied the *toys	SVO	5	4	PP	3

BKB+448	*She *used her *money	SVO	5	4	PP	3
BKB+449	*She *used her *scissors	SVO	5	4	PP	3
BKB+450	*She *waited for her *sister	SVA	7	5	PP	3
BKB+451	*She *waits by the *gate	SVA	5	5	PP	3
BKB+452	*She *waits by the *street	SVA	5	5	PP	3
BKB+453	*She *walked in the *snow	SVA	5	5	PP	3
BKB+454	*She *walked *past the *ladder	SVA	6	5	PP	4
BKB+455	*She *wanted some *apple *pie	SVO	7	5	PP	4
BKB+456	*She was *cycling by the *road	SVA	7	6	PP	3
BKB+457	*She was *reading a *book	SVO	6	5	PP	3
BKB+458	*She was *reading the *map	SVO	6	5	PP	3
BKB+459	*She *washed her *car	SVO	4	4	PP	3
BKB+460	*She *washed her *dinner *plate	SVO	6	5	PP	4
BKB+461	*She *washed her *hair	SVO	4	4	PP	3
BKB+462	*She *washed his *face	SVO	4	4	PP	3
BKB+463	*She *watched the *fire *engine	SVO	6	5	PP	4
BKB+464	*She *went to the *sweet *shop	SVA	6	6	PP	4
BKB+465	*She wore a *green *dress	SVO	5	5	PP	3
BKB+466	*She wore a *green *scarf	SVO	5	5	PP	3
BKB+467	*She wore a *yellow *hat	SVO	6	5	PP	3
BKB+468	*She wore her *dancing *shoes	SVO	6	5	PP	3
BKB+469	*She *wore her *hat	SVO	4	4	PP	3
BKB+471	*She wore her *yellow *dress	SVO	6	5	PP	3
BKB+472	*She wore *pink *gloves	SVO	4	4	PP	3
BKB+473	*She *writes a *funny *story	SVO	7	5	PP	4
BKB+474	*She *writes to the *footballer	SVA	7	5	PP	3
BKB+475	*She's *buying her *lunch	SVO	5	4	PP	3
BKB+476	*She's *calling her *brother	SVA	6	4	PP	3
BKB+477	*She's *calling her *father	SVA	6	4	PP	3
BKB+478	*She's *calling the *dog	SVA	5	4	PP	3
BKB+479	*She's *cleaning her *car	SVO	5	4	PP	3
BKB+480	*She's *drinking *milk	SVO	4	3	PP	3
BKB+481	*She's *drinking *tea	SVO	4	3	PP	3
BKB+482	*She's *drinking *water	SVO	5	3	PP	3
BKB+483	*She's *helping her *sister	SVA	6	4	PP	3
BKB+484	*She's *helping the *baby	SVA	6	4	PP	3
BKB+485	*She's *hiding by the *tree	SVA	6	5	PP	3
BKB+486	*She's *moving *home	SVO	4	3	PP	3
BKB+487	*She's *moving *school	SVO	4	3	PP	3
BKB+488	*She's *painting a *picture	SVO	6	4	PP	3
BKB+489	*She's *paying for her *butter	SVO	7	5	PP	3
BKB+490	*She's*paying for her *dinner	SVO	7	5	PP	3
BKB+491	*She's *paying for some *meat	SVO	6	5	PP	3
BKB+492	*She's *paying for the *paper	SVO	7	5	PP	3
BKB+493	*She's *paying her *bill	SVO	5	4	PP	3
BKB+494	*She's *playing with her *doll	SVO	6	5	PP	3
BKB+495	*She's *pushing her *sister	SVA	6	4	PP	3
BKB+496	*She's *reading a *story	SVO	6	4	PP	3
BKB+497	*She's *running in the *park	SVA	6	5	PP	3
BKB+498	*She's *shouting at her *sister	SVA	7	5	PP	3
BKB+499	*She's *taking her *purse	SVO	5	4	PP	3

BKB+500	*She's *taking some *bread	SVO	5	4	PP	3
BKB+501	*She's talking to her *mother	SVA	7	5	PP	3
BKB+502	*She's *talking too *fast	SVC	5	4	PP	3
BKB+503	*She's *waiting at the *gate	SVA	6	5	PP	3
BKB+504	*She's *waiting for her *children	SVA	7	5	PP	3
BKB+505	*She's *waiting for her *friend	SVA	6	5	PP	3
BKB+506	*She's *waiting for the *milkman	SVA	7	5	PP	3
BKB+507	*She's *waiting for the *train	SVO	6	5	PP	3
BKB+508	*She's *washing her *hair	SVO	5	4	PP	3
BKB+509	*She's *washing the *plates	SVO	5	4	PP	3
BKB+510	*She's *watching the *game	SVO	5	4	PP	3
BKB+511	*She's *writing a *story	SVO	6	4	PP	3
BKB+513	*Some *nice *people are *helping	SV	7	5	D	4
BKB+514	*Some *people saw the *car *crash	SVO	7	6	D	4
BKB+515	The *ambulance *came *quickly	SVA	7	4	D	3
BKB+516	The *ambulance *was *noisy	SVA	7	4	D	3
BKB+517	The *ambulance *went *past	SV	6	4	D	3
BKB+518	The *angry *boy *kicked the *fence	SVO	7	6	D	4
BKB+519	The *angry *boy went *out	SVA	6	5	D	3
BKB+520	The *angry *cleaner *shouted	SV	7	4	D	3
BKB+521	The *angry *cook *shouted	SV	6	4	D	3
BKB+522	The *angry *man *argued	SV	6	4	D	3
BKB+523	The *angry *man came *home	SV	6	5	D	3
BKB+524	The *angry *man left *home	SVA	6	5	D	3
BKB+525	The *angry *man *sleeps	SV	5	4	D	3
BKB+526	The *angry *man was at *home	SVA	7	6	D	3
BKB+527	The *angry *man *washed the *plates	SVO	7	6	D	4
BKB+528	The *animals *sleep on *streets	SVA	7	5	D	3
BKB+529	The *apple *pie's too *hot	SVC	6	5	D	3
BKB+530	The *apple *pie's very *sweet	SVC	7	5	D	3
BKB+531	The *apple *tree was *lovely	SVC	7	5	D	3
BKB+532	The *apples *came in a *box	SVA	7	6	D	3
BKB+533	The *apples *fell from the *bag	SVA	7	6	D	3
BKB+534	The *apples *fell off the *tree	SVA	7	6	D	3
BKB+535	The *apples *fell on the *floor	SVA	7	6	D	3
BKB+536	The *baby *cried a *lot	SVC	6	5	D	3
BKB+537	The *baby *drank some *milk	SVO	6	5	D	3
BKB+538	The *baby *drinks *milk	SVO	5	4	D	3
BKB+539	The *baby *fell on the *mat	SVA	7	6	D	3
BKB+540	The *baby has *big *blue *eyes	SVO	7	6	D	4
BKB+542	The *baby has *pretty *boots	SVO	7	5	D	3
BKB+543	The *baby *lies on the *bed	SVA	7	6	D	3
BKB+544	The *baby *made a *loud *noise	SVO	7	6	D	4
BKB+545	The *baby *needed some *milk	SVO	7	5	D	3
BKB+546	The *baby wants *cold *milk	SVO	6	5	D	3
BKB+547	The *baby wants *his *ball	SVO	6	5	D	3
BKB+548	The *baby wants *his *milk	SVO	6	5	D	3
BKB+549	The *baby *was *asleep	SV	6	4	D	3
BKB+550	The *baby *was *lovely	SVC	6	4	D	3
BKB+551	The *baby was *quite *noisy	SVC	7	5	D	3
BKB+552	The *baby *wears *small *shoes	SVO	6	5	D	4

BKB+553	The *baby wore a *blue *hat	SVO	7	6	D	3
BKB+554	The *baby wore a *pink *scarf	SVO	7	6	D	3
BKB+555	The *bag *fell on the *floor	SVA	6	6	D	3
BKB+556	The *bag *was on the *chair	SVA	6	6	D	3
BKB+557	The *bag *was on the *table	SVA	7	6	D	3
BKB+558	The *bag *was *pink	SVC	4	4	D	3
BKB+560	The *bag was *under the *tree	SVA	7	6	D	3
BKB+561	The *ball *broke the *fence	SVO	5	5	D	3
BKB+562	The *ball *came *down	SVA	4	4	D	3
BKB+564	The *ball *hit the *fence	SVO	5	5	D	3
BKB+565	The *ball *hit the *window	SVO	6	5	D	3
BKB+567	The *ball went *near the *door	SVA	6	6	D	3
BKB+569	The *basket *carried *fruit	SVO	6	4	D	3
BKB+570	The *basket *was *empty	SVC	6	4	D	3
BKB+571	The *basket *was *full	SVC	5	4	D	3
BKB+572	The *bath *water was *hot	SVC	6	5	D	3
BKB+573	The *bedroom *door was *open	SVA	7	5	D	3
BKB+574	The *bench is *in the *park	SVA	7	6	D	3
BKB+575	The *bench is *near the *tree	SVA	6	6	D	3
BKB+576	The *big *bag was *blue	SVC	5	5	D	3
BKB+577	The *big *bag was *full	SVC	5	5	D	3
BKB+578	The *big *boy *bumped his *head	SVO	6	6	D	4
BKB+579	The *big *boy *reads a *paper	SVO	7	6	D	4
BKB+580	The *big *bull was *dangerous	SVC	7	5	D	3
BKB+581	The *big *cat *sits near the *fence	SVA	7	7	D	4
BKB+582	The *big *cat was *lovely	SVC	6	5	D	3
BKB+584	The *big *dog got *away	SV	6	5	D	3
BKB+585	The *big *dog has *black *hair	SVO	6	6	D	4
BKB+586	The *big *dog *lies on the *ground	SVA	7	7	D	4
BKB+588	The *big *dog was *fast	SVC	5	5	D	3
BKB+589	The *big *fish has *blue *eyes	SVO	6	6	D	4
BKB+590	The *big *fish was *pretty	SVC	6	5	D	3
BKB+591	The *big *house was *empty	SVC	6	5	D	3
BKB+592	The *big *man was *dangerous	SVC	7	5	D	3
BKB+593	The *big *room's *empty	SVC	5	4	D	3
BKB+594	The *black *cat sits by the *fence	SVA	7	7	D	3
BKB+595	The *black *cat was *pretty	SVC	6	5	D	3
BKB+596	The *black *dog sits by the *tree	SVA	7	7	D	3
BKB+598	The *blue *shirt's *dirty	SVC	5	4	D	3
BKB+599	The *book *fell off the *shelf	SVA	6	6	D	3
BKB+600	The *book *fell on the *mat	SVA	6	6	D	3
BKB+601	The *book *was on the *shelf	SVA	6	6	D	3
BKB+602	The *book *was on the *table	SVA	7	6	D	3
BKB+603	The *book was *under the *chair	SVA	7	6	D	3
BKB+604	The *box *was on the *table	SVA	7	6	D	3
BKB+605	The *boy *broke his *bag	SVO	5	5	D	3
BKB+606	The *boy *broke his *leg	SVO	5	5	D	3
BKB+607	The *boy *broke the *chair	SVO	5	5	D	3
BKB+608	The *boy *caught a *cold	SVO	5	5	D	3
BKB+609	The *boy *chased the *dog	SVA	5	5	D	3
BKB+610	The *boy *climbed over the *fence	SVO	7	6	D	3

BKB+611	The *boy *climbed over the *wall	SVA	7	6	D	3
BKB+612	The *boy *climbed the *stairs	SVA	5	5	D	3
BKB+613	The *boy *climbed the *tree	SVO	5	5	D	3
BKB+616	The *boy *forgot his *coat	SVO	6	5	D	3
BKB+615	The *boy *fell on the *bus	SVA	6	6	D	3
BKB+617	The *boy *forgot *his lunch	SVO	6	5	D	3
BKB+618	The *boy *frightened the *cat	SVA	6	5	D	3
BKB+619	The *boy got *quite *wet	SVO	5	5	D	3
BKB+621	The *boy had a *toy *bus	SVO	6	6	D	3
BKB+624	The *boy has *brown *hair	SVO	5	5	D	3
BKB+625	The *boy has the *big *fish	SVO	6	6	D	3
BKB+628	The *boy *hurried to the *park	SVA	7	6	D	3
BKB+629	The *boy *hurried to the *train	SVO	7	6	D	3
BKB+630	The *boy *kicked the *tree	SVO	5	5	D	3
BKB+631	The *boy *knows the *way	SVO	5	5	D	3
BKB+632	The *boy *lay on a *rug	SVA	6	6	D	3
BKB+633	The *boy *likes *ice *cream	SVO	5	5	D	4
BKB+635	The *boy *lost his *gloves	SVO	5	5	D	3
BKB+636	The *boy *paid his *bill	SVO	5	5	D	3
BKB+638	The *boy *played in the *rain	SVA	6	6	D	3
BKB+639	The *boy *played with his *dog	SVA	6	6	D	3
BKB+640	The *boy *played with his *toy *train	SVO	7	7	D	4
BKB+641	The *boy *played with the *cat	SVA	6	6	D	3
BKB+642	The *boy *ran very *fast	SVA	6	5	D	3
BKB+643	The *boy *sat on the *bench	SVA	6	6	D	3
BKB+644	The *boy *sat on the *floor	SVA	6	6	D	3
BKB+645	The *boy *sat on the *table	SVA	7	6	D	3
BKB+646	The *boy *shouts at his *sister	SVA	7	6	D	3
BKB+647	The *boy *shut the *gate	SVO	5	5	D	3
BKB+648	The *boy *shuts the *window	SVO	6	5	D	3
BKB+649	The *boy *skates very *fast	SVC	6	5	D	3
BKB+651	The *boy *slipped in the *rain	SVA	6	6	D	3
BKB+652	The *boy *slipped near the *door	SVA	6	6	D	3
BKB+654	The *boy *slipped on the *mat	SVA	6	6	D	3
BKB+655	The *boy *slipped on the *snow	SVA	6	6	D	3
BKB+656	The *boy *stared at the *tree	SVO	6	6	D	3
BKB+657	The *boy *stood in the *rain	SVO	6	6	D	3
BKB+658	The *boy *stood near the *wall	SVA	6	6	D	3
BKB+659	The *boy *stood on the *chair	SVO	6	6	D	3
BKB+660	The *boy *stood on the *stairs	SVA	6	6	D	3
BKB+662	The *boy *talked to the *fireman	SVA	7	6	D	3
BKB+663	The *boy *talks to the *driver	SVA	7	6	D	3
BKB+664	The *boy *was at *home	SVA	5	5	D	3
BKB+666	The *boy *was *happy	SVC	5	4	D	3
BKB+667	The *boy was *quite *noisy	SVA	6	5	D	3
BKB+668	The *boy was *very *naughty	SVC	7	5	D	3
BKB+669	The *boy *washed his *hands	SVO	4	5	D	3
BKB+670	The *boy went in the *sweet *shop	SVA	7	7	D	3
BKB+671	The *boy *went to *school	SVA	5	5	D	3
BKB+672	The *boy wore a *black *shirt	SVO	6	6	D	3
BKB+673	The *boy wore a *brown *scarf	SVO	6	6	D	3

BKB+674	The *boy *wore his *shirt	SVO	5	5	D	3
BKB+675	The *boys*are *playing	SV	5	4	D	3
BKB+676	The *boy's *crossing the *road	SVA	6	5	D	3
BKB+677	The *boy's *hair is *brown	SVC	5	5	D	3
BKB+678	The *boy's *helping his *friend	SVA	6	5	D	3
BKB+679	The *boys *like *football	SVO	5	4	D	3
BKB+680	The *boy's *shouting in the *snow	SVA	7	6	D	3
BKB+681	The *boy's *walking *away	SVA	6	4	D	3
BKB+682	The *boy's *walking *home	SVA	5	4	D	3
BKB+683	The *boy's *watching the *game	SVO	6	5	D	3
BKB+684	The *bread *cost a *lot	SVO	5	5	D	3
BKB+685	The *bread *was *nice	SVC	4	4	D	3
BKB+686	The *broom *fell from the *window	SVA	7	6	D	3
BKB+688	The *broom's *near the *cupboard	SVA	6	5	D	3
BKB+690	The *broom's *near the *window	SVA	6	5	D	3
BKB+691	The *brown *bottle was *full	SVC	6	5	D	3
BKB+692	The *brown *cat *sits near the *tree	SVA	7	7	D	4
BKB+693	The *buckets *are *empty	SVC	6	4	D	3
BKB+694	The *bull *lay on the *grass	SVA	6	6	D	3
BKB+696	The *bus *comes *early	SVA	5	4	D	3
BKB+698	The *bus *driver went *too *fast	SVA	7	6	D	4
BKB+699	The *bus got *stuck in the *snow	SVA	7	7	D	3
BKB+700	The *bus had a *bad *crash	SVO	6	6	D	3
BKB+701	The *bus hit the *big *tree	SVO	6	6	D	3
BKB+702	The *bus *hit the *gate	SVO	5	5	D	3
BKB+703	The *bus *hit the *wall	SVO	5	5	D	3
BKB+704	The *bus *stopped near the *shop	SVA	6	6	D	3
BKB+705	The *bus *waited for the *boy	SVA	7	6	D	3
BKB+706	The *bus was *quite *noisy	SVC	6	5	D	3
BKB+707	The *bus *went *along	SVA	5	4	D	3
BKB+708	The *bus *went *quickly	SVA	5	4	D	3
BKB+711	The *cake *shop sells *cream	SVO	5	5	D	3
BKB+713	The *cakes *were *lovely	SVC	5	4	D	3
BKB+714	The *car *crashed into the *gate	SVA	7	6	D	3
BKB+715	The *car *door was *open	SVA	6	5	D	3
BKB+716	The *car *door was *shut	SVA	5	5	D	3
BKB+717	The *car *engine's *noisy	SVC	6	4	D	3
BKB+718	The *car *got *stuck in the *snow	SVA	7	7	D	4
BKB+719	The *car *hit the *lorry	SVO	6	5	D	3
BKB+720	The *car *hit the *sign *post	SVO	6	6	D	4
BKB+721	The *car *hit the *tree	SVO	5	5	D	3
BKB+722	The *car's *going *home	SVA	5	4	D	3
BKB+723	The *car's *moving *fast	SVA	5	4	D	3
BKB+725	The *cat *climbed on the *chair	SVA	6	6	D	3
BKB+726	The *cat *drank *from a *bowl	SVA	6	6	D	4
BKB+727	The *cat *drank some *milk	SVO	5	5	D	3
BKB+728	The *cat *drinks *milk	SVO	4	4	D	3
BKB+729	The *cat *followed the *child	SVA	6	5	D	3
BKB+730	The *cat has *some *milk	SVO	5	5	D	3
BKB+731	The *cat *hit the *fence	SVO	5	5	D	3
BKB+732	The *cat *jumped off the *gate	SVA	6	6	D	3

BKB+733	The *cat *jumped off the *chair	SVA	6	6	D	3
BKB+734	The *cat *jumped on the *bed	SVA	6	6	D	3
BKB+735	The *cat *jumped on the *curtains	SVA	7	6	D	3
BKB+736	The *cat *jumped on the *table	SVA	7	6	D	3
BKB+737	The *cat *jumped on the *wall	SVA	6	6	D	3
BKB+738	The *cat *lay on the *mat	SVA	6	6	D	3
BKB+739	The *cat *lay on the *rug	SVA	6	6	D	3
BKB+740	The *cat *lies on the *grass	SVA	6	6	D	3
BKB+741	The *cat *lies on the *ground	SVA	6	6	D	3
BKB+742	The *cat *played by the *door	SVA	6	6	D	3
BKB+743	The *cat *played in the *garden	SVA	7	6	D	3
BKB+744	The *cat *played in the *kitchen	SVA	7	6	D	3
BKB+745	The *cat *played with the *ball	SVO	6	6	D	3
BKB+746	The *cat *played with the *shoe	SVO	6	6	D	3
BKB+747	The *cat *played with the *stick	SVO	6	6	D	3
BKB+748	The *cat *played with the *toy	SVO	6	6	D	3
BKB+749	The *cat *ran *along	SVA	5	4	D	3
BKB+750	The *cat *sat by the *lady	SVA	7	6	D	3
BKB+751	The *cat *sat in the *kitchen	SVA	7	6	D	3
BKB+752	The *cat *sat near the *curtains	SVA	7	6	D	3
BKB+753	The *cat *sits by the *tree	SVA	6	6	D	3
BKB+755	The *cat *sits in the *corner	SVA	7	6	D	3
BKB+756	The *cat *sits on the *bench	SVA	6	6	D	3
BKB+757	The *cat *sits on the *fence	SVA	6	6	D	3
BKB+758	The *cat *sits on the *table	SVA	7	6	D	3
BKB+759	The *cat *sits *under the *tree	SVA	7	6	D	4
BKB+760	The *cat *sleeps in the *basket	SVA	7	6	D	3
BKB+761	The *cat *walked *across the *grass	SVA	7	6	D	4
BKB+762	The *cat *walks *across the *street	SVA	7	6	D	4
BKB+764	The *cat *was by the *sink	SVA	6	6	D	3
BKB+765	The *cat *was *hungry	SVC	5	4	D	3
BKB+766	The *cat's near the *front *door	SVA	6	6	D	3
BKB+768	The *chair is *in the *corner	SVA	7	6	D	3
BKB+769	The *cheese *pie was *hot	SVC	5	5	D	3
BKB+770	The *cheese *pie was *warm	SVC	5	5	D	3
BKB+771	The *chicken *jumped on the *floor	SVA	7	6	D	3
BKB+772	The *chicken *lay on *straw	SVA	6	5	D	3
BKB+773	The *chicken *sits by the *gate	SVA	7	6	D	3
BKB+778	The *child *called the *cat	SVA	5	5	D	3
BKB+780	The *child *climbed on the *chair	SVA	6	6	D	3
BKB+781	The *child *climbed over the *gate	SVA	7	6	D	3
BKB+783	The *child *drank *hot *milk	SVO	5	5	D	4
BKB+784	The *child *dropped his *sweet	SVO	5	5	D	3
BKB+785	The *child *eats an *orange	SVO	6	5	D	3
BKB+786	The *child *eats *sweets	SVO	4	4	D	3
BKB+787	The *child *fell off the *bed	SVA	6	6	D	3
BKB+788	The *child *found a *cat	SVO	5	5	D	3
BKB+790	The *child *frightened the *cat	SVA	6	5	D	3
BKB+792	The *child *grabs his *shoe	SVO	5	5	D	3
BKB+794	The *child has a *funny *face	SVO	7	6	D	3
BKB+796	The *child *jumped on the *bed	SVA	6	6	D	3

BKB+797	The *child *kicked the *door	SVO	5	5	D	3
BKB+798	The *child *kicked the *table	SVO	6	5	D	3
BKB+800	The *child *likes *reading	SVO	5	4	D	3
BKB+802	The *child *played in the *garden	SVA	7	6	D	3
BKB+803	The *child *ran *down the *path	SVA	6	6	D	4
BKB+804	The *child *shouts at *school	SVA	6	5	D	3
BKB+805	The *child *wanted a *sweet	SVO	6	5	D	3
BKB+806	The *child was *quite *noisy	SVC	6	5	D	3
BKB+808	The *children *all *shouted	SV	6	4	D	3
BKB+809	The *children are *cycling *home	SVA	7	5	D	3
BKB+811	The *children are *eating *fruit	SVO	7	5	D	3
BKB+812	The *children are *eating *sweets	SVO	7	5	D	3
BKB+813	The *children *are *happy	SV	6	4	D	3
BKB+815	The *children *are *hiding	SV	6	4	D	3
BKB+816	The *children *are *hungry	SV	6	4	D	3
BKB+817	The *children *are *laughing	SV	6	4	D	3
BKB+819	The *children *are *lovely	SVC	6	4	D	3
BKB+823	The *children *are *painting	SV	6	4	D	3
BKB+824	The *children *are *playing	SV	6	4	D	3
BKB+825	The *children are *quite *hungry	SVC	7	5	D	3
BKB+826	The *children are *quite *noisy	SVC	7	5	D	3
BKB+828	The *children are *running *fast	SVA	7	5	D	3
BKB+829	The *children are *running *home	SVA	7	5	D	3
BKB+830	The *children *are *shouting	SV	6	4	D	3
BKB+832	The *children *are *talking	SV	6	4	D	3
BKB+833	The *children are *too *noisy	SVC	7	5	D	3
BKB+834	The *children *ate *dinner	SVO	6	4	D	3
BKB+835	The *children *ate *sweets	SVO	5	4	D	3
BKB+836	The *children *ate the *jelly	SVO	7	5	D	3
BKB+837	The *children *ate the *pudding	SVO	7	5	D	3
BKB+838	The *children *broke the *fence	SVO	6	5	D	3
BKB+839	The *children *broke the *game	SVO	6	5	D	3
BKB+840	The *children *broke the *plates	SVO	6	5	D	3
BKB+841	The *children *broke the *window	SVO	7	5	D	3
BKB+842	The *children *came for *lunch	SVO	6	5	D	3
BKB+843	The *children *carry some *bread	SVO	7	5	D	3
BKB+848	The *children *drink *milk	SVO	5	4	D	3
BKB+849	The *children *dropped the *ball	SVO	6	5	D	3
BKB+850	The *children *dropped the *plates	SVO	6	5	D	3
BKB+851	The *children *fell on the *snow	SVA	7	6	D	3
BKB+852	The *children *got *wet	SVO	5	4	D	3
BKB+853	The *children had *some *fruit	SVO	6	5	D	3
BKB+854	The *children *help the *farmer	SVA	7	5	D	3
BKB+855	The *children *help the *father	SVA	7	5	D	3
BKB+857	The *children *hide near the *tree	SVA	7	6	D	3
BKB+858	The *children *knocked on the *door	SVA	7	6	D	3
BKB+859	The *children *like *cake	SVO	5	4	D	3
BKB+861	The *children *like *football	SVO	6	4	D	3
BKB+862	The *children *like *fruit	SVO	5	4	D	3
BKB+863	The *children *like *games	SVO	5	4	D	3
BKB+864	The *children *like *ice *cream	SVO	6	5	D	4

BKB+865	The *children *like *jelly	SVO	6	4	D	3
BKB+866	The *children *like *playing	SVO	6	4	D	3
BKB+867	The *children *like *pudding	SVO	6	4	D	3
BKB+869	The *children *like *shouting	SVO	6	4	D	3
BKB+870	The *children *like *snow	SVO	5	4	D	3
BKB+871	The *children *like *sweets	SVO	5	4	D	3
BKB+872	The *children *like the *clown	SVA	6	5	D	3
BKB+873	The *children *like the *game	SVO	6	5	D	3
BKB+874	The *children *like *toys	SVO	5	4	D	3
BKB+875	The *children *look at the *cows	SVA	7	6	D	3
BKB+876	The *children *paint a *picture	SVO	7	5	D	3
BKB+877	The *children *pick the *flowers	SVO	7	5	D	3
BKB+878	The *children *play *football	SVO	6	4	D	3
BKB+879	The *children *play in the *park	SVA	7	6	D	3
BKB+880	The *children *play on the *grass	SVA	7	6	D	3
BKB+881	The *children *played at *home	SVA	6	5	D	3
BKB+882	The *children *played by the *tree	SVA	7	6	D	3
BKB+883	The *children *played *cricket	SVO	6	4	D	3
BKB+884	The *children *played *games	SVO	5	4	D	3
BKB+885	The *children *played in the *car	SVA	7	6	D	3
BKB+886	The *children *played in the *rain	SVA	7	6	D	3
BKB+887	The *children *played in the *shop	SVA	7	6	D	3
BKB+888	The *children *played in the *snow	SVA	7	6	D	3
BKB+889	The *children *played on the *bus	SVA	7	6	D	3
BKB+891	The *children *played on the *train	SVA	7	6	D	3
BKB+892	The *children *played the *game	SVA	6	5	D	3
BKB+893	The *children *played with a *ball	SVA	7	6	D	3
BKB+894	The *children *played with *flowers	SVO	7	5	D	3
BKB+895	The *children *played with the *cat	SVA	7	6	D	3
BKB+896	The *children *played with the *clown	SVA	7	6	D	3
BKB+897	The *children *played with the *dog	SVA	7	6	D	3
BKB+898	The *children *played with the *paint	SVO	7	6	D	3
BKB+899	The *children *played with the *toys	SVO	7	6	D	3
BKB+900	The *children *played with *water	SVO	7	5	D	3
BKB+901	The *children *stared at the *fish	SVA	7	6	D	3
BKB+902	The *children *wait by the *door	SVA	7	6	D	3
BKB+903	The *children *wait by the *gate	SVA	7	6	D	3
BKB+904	The *children *wait for the *bus	SVO	7	6	D	3
BKB+905	The *children *washed the *car	SVO	6	5	D	3
BKB+906	The *children *watched the *football	SVO	7	5	D	3
BKB+907	The *children *watched the *game	SVO	6	5	D	3
BKB+908	The *children *went *away	SV	6	4	D	3
BKB+909	The *children *went on the *bus	SVA	7	6	D	3
BKB+910	The *children *went to *school	SVA	6	5	D	3
BKB+911	The *child's *eating some *sweets	SVO	7	5	D	3
BKB+912	The *Christmas *cake was *good	SVC	6	5	D	3
BKB+913	The *Christmas *games are *fun	SVC	6	5	D	3
BKB+914	The *Christmas *tree is *pretty	SVC	7	5	D	3
BKB+915	The *cleaner *cut her *finger	SVO	7	5	D	3
BKB+916	The *cleaner *dropped the *towel	SVO	6	5	D	3
BKB+917	The *cleaner *hurt her *leg	SVO	6	5	D	3

BKB+918	The *cleaner *made a *noise	SVO	6	5	D	3
BKB+919	The *cleaner *made the *bed	SVO	6	5	D	3
BKB+920	The *cleaner *shouts at the *boy	SVA	7	6	D	3
BKB+921	The *cleaner *slipped on the *floor	SVA	7	6	D	3
BKB+922	The *cleaner *slipped on the *stairs	SVA	7	6	D	3
BKB+924	The *cleaner *swept on the *stairs	SVA	7	6	D	3
BKB+925	The *cleaner *swept the *rug	SVA	6	5	D	3
BKB+926	The *cleaner *tidied the *house	SVO	7	5	D	3
BKB+927	The *cleaner *tidied the *room	SVO	7	5	D	3
BKB+928	The *cleaner *used a *bag	SVO	6	5	D	3
BKB+929	The *cleaner *used a *bucket	SVO	7	5	D	3
BKB+930	The *cleaner *was *angry	SV	6	4	D	3
BKB+931	The *cleaner *washed her *hands	SVO	6	5	D	3
BKB+932	The *cleaner *washed the *sink	SVO	6	5	D	3
BKB+933	The *cleaner *washed the *windows	SVO	7	5	D	3
BKB+934	The *clever *girls are *talking	SV	7	5	D	3
BKB+935	The *clever *girls *laughed	SV	5	4	D	3
BKB+936	The *clock *fell off the *wall	SVA	6	6	D	3
BKB+937	The *clock *suddenly *stopped	SVA	6	4	D	3
BKB+938	The *clock *was *noisy	SVC	5	4	D	3
BKB+939	The *clown *did a *handstand	SVO	6	5	D	3
BKB+940	The *clown had a *pink *flower	SVO	7	6	D	3
BKB+943	The *clown *made a *funny *noise	SVO	7	6	D	4
BKB+945	The *clown was *very *funny	SVC	7	5	D	3
BKB+946	The *coat *hangs on a *hook	SVA	6	6	D	3
BKB+947	The *coat's on a *wooden *chair	SVA	7	6	D	3
BKB+949	The *cold *milk's on the *shelf	SVA	6	6	D	3
BKB+950	The *cook *carried the *box	SVO	6	5	D	3
BKB+951	The *cook *carried the *cake	SVO	6	5	D	3
BKB+952	The *cook *carries the *apples	SVO	7	5	D	3
BKB+954	The *cook *cut his *finger	SVO	6	5	D	3
BKB+955	The *cook *cut some *potatoes	SVO	7	5	D	3
BKB+956	The *cook *dropped the *cake	SVO	5	5	D	3
BKB+957	The *cook *dropped the *potatoes	SVO	7	5	D	3
BKB+958	The *cook *fell in the *kitchen	SVA	7	6	D	3
BKB+959	The *cook *hurt his *hand	SVO	5	5	D	3
BKB+960	The *cook *likes *ice *cream	SVO	5	5	D	4
BKB+961	The *cook made *apple *pie	SVO	6	5	D	3
BKB+963	The *cook *slipped in the *kitchen	SVA	7	6	D	3
BKB+964	The *cook *stirs the *tea	SVO	5	5	D	3
BKB+965	The *cook *washed the *apples	SVO	6	5	D	3
BKB+966	The *cook *washed the *fruit	SVO	5	5	D	3
BKB+967	The *cook *wore his *hat	SVO	5	5	D	3
BKB+968	The *cook's *in the *kitchen	SVA	6	5	D	3
BKB+969	The *cow *followed the *path	SVA	6	5	D	3
BKB+970	The *cow is *running *quickly	SVA	7	5	D	3
BKB+971	The *cow *sits by the *gate	SVA	6	6	D	3
BKB+972	The *cow *sleeps on *straw	SVA	5	5	D	3
BKB+973	The *cow *was at the *gate	SVA	6	6	D	3
BKB+974	The *cows are *moving *quickly	SVA	7	5	D	3

BKB+975	The *cows are *running *fast	SVA	6	5	D	3
BKB+977	The *cows *made a *funny *noise	SVO	7	6	D	4
BKB+978	The *cows were *quite *noisy	SVC	6	5	D	3
BKB+979	The *cricket *team's *shouting	SV	6	4	D	3
BKB+980	The *daughter *bumped her *head	SVO	6	5	D	3
BKB+981	The *daughter *drank *milk	SVO	5	4	D	3
BKB+982	The *daughter *dropped her *bag	SVO	5	5	D	3
BKB+985	The *dinner *plate *broke	SVC	5	4	D	3
BKB+986	The *dinner *plate's *dirty	SVC	6	4	D	3
BKB+987	The *dinner *plate's in the *sink	SVA	7	6	D	3
BKB+988	The *dinner *was *ready	SVA	6	4	D	3
BKB+990	The *dog *came *home	SVA	4	4	D	3
BKB+991	The *dog *caught a *mouse	SVO	5	5	D	3
BKB+992	The *dog *drank *from a *saucer	SVA	7	6	D	4
BKB+993	The *dog *fetches the *ball	SVO	6	5	D	3
BKB+995	The *dog got *stuck in the *mud	SVA	7	7	D	3
BKB+999	The *dog *jumped on the *bench	SVA	6	6	D	3
BKB+1000	The *dog *kicked the *table	SVO	6	5	D	3
BKB+1001	The *dog *lay on the *roof	SVA	6	6	D	3
BKB+1002	The *dog *lies on the *grass	SVA	6	6	D	3
BKB+1003	The *dog *played in the *rain	SVA	6	6	D	3
BKB+1004	The *dog *played on the *bed	SVA	6	6	D	3
BKB+1005	The *dog *played with the *toy	SVO	6	6	D	3
BKB+1007	The *dog *sits near the *bench	SVA	6	6	D	3
BKB+1008	The *dog *sits near the *table	SVA	7	6	D	3
BKB+1009	The *dog *sits near the *tree	SVA	6	6	D	3
BKB+1010	The *dog *sleeps in the *garden	SVA	7	6	D	3
BKB+1011	The *dog *sleeps on the *bed	SVA	6	6	D	3
BKB+1012	The *dog *slipped on the *ice	SVA	6	6	D	3
BKB+1013	The *dog *slipped on the *snow	SVA	6	6	D	3
BKB+1015	The *dog *walked in the *rain	SVA	6	6	D	3
BKB+1017	The *dog *was *dangerous	SVC	6	4	D	3
BKB+1018	The *dog *was in the *park	SVA	6	6	D	3
BKB+1019	The *dog *was *lovely	SVC	5	4	D	3
BKB+1022	The *dog's *under the *tree	SVA	6	5	D	3
BKB+1023	The *dog's *very *noisy	SVC	6	4	D	3
BKB+1024	The *doll has *big *eyes	SVO	5	5	D	3
BKB+1026	The *doll has *blue *eyes	SVO	5	5	D	3
BKB+1028	The *drawer *was *open	SVC	5	4	D	3
BKB+1029	*The *drawer's *dirty	SVC	4	3	D	3
BKB+1030	The *driver *cleaned his *car	SVO	5	5	D	3
BKB+1031	The *driver *found a *dog	SVO	6	5	D	3
BKB+1033	The *driver *shouts at the *man	SVA	7	6	D	3
BKB+1034	The *driver *showed the *way	SVO	6	5	D	3
BKB+1035	The *driver *shut the *car *door	SVO	7	6	D	4
BKB+1037	The *driver *starts the *car	SVO	6	5	D	3
BKB+1038	The *driver *stayed for *tea	SVO	6	5	D	3
BKB+1039	The *driver *stopped *suddenly	SVA	7	4	D	3
BKB+1041	The *driver *waits by the *sign	SVA	7	6	D	3
BKB+1042	The *driver was *very *hot	SVC	7	5	D	3
BKB+1043	The *driver went *too *fast	SVC	6	5	D	3

BKB+1044	The *eggs *are in the *cupboard	SVA	7	6	D	3
BKB+1045	The *family *are *laughing	SV	7	4	D	3
BKB+1046	The *family *are *playing	SV	7	4	D	3
BKB+1049	The *family *came for *lunch	SVA	6	5	D	3
BKB+1051	The *family *like *cake	SVO	5	4	D	3
BKB+1052	The *family *like *chicken	SVO	7	4	D	3
BKB+1054	The *family *like *cows	SVO	5	4	D	3
BKB+1055	The *family *like *fruit	SVO	6	4	D	3
BKB+1057	The *farmer *came *back	SV	5	4	D	3
BKB+1058	The *farmer *carried a *box	SVO	7	5	D	3
BKB+1059	The *farmer *carried some *fruit	SVO	7	5	D	3
BKB+1061	The *farmer *carried the *eggs	SVO	7	5	D	3
BKB+1062	The *farmer *chased the *bull	SVO	6	5	D	3
BKB+1064	The *farmer *chased the *cow	SVO	6	5	D	3
BKB+1065	The *farmer *cleaned his *coat	SVO	6	5	D	3
BKB+1067	The *farmer *cleaned his *shoes	SVO	6	5	D	3
BKB+1069	The *farmer *cut his *finger	SVO	7	5	D	3
BKB+1070	The *farmer *cut his *hand	SVO	6	5	D	3
BKB+1072	The *farmer *dropped the *box	SVO	6	5	D	3
BKB+1073	The *farmer *dropped the *eggs	SVO	6	5	D	3
BKB+1076	The *farmer *hurt his *leg	SVO	6	5	D	3
BKB+1078	The *farmer *lost a *boot	SVO	6	5	D	3
BKB+1079	The *farmer *opens the *gate	SVO	7	5	D	3
BKB+1081	The *farmer *played with the *cow	SVA	7	6	D	3
BKB+1082	The *farmer *shut the *gate	SVO	6	5	D	3
BKB+1083	The *farmer *sits on the *ground	SVA	7	6	D	3
BKB+1084	The *farmer *slipped on the *snow	SVA	7	6	D	3
BKB+1085	The *farmer *slipped on the *straw	SVA	7	6	D	3
BKB+1086	The *farmer *stayed for *tea	SVO	6	5	D	3
BKB+1087	The *farmer *walks in the *rain	SVA	7	6	D	3
BKB+1088	The *farmer *walks *quickly	SVA	6	4	D	3
BKB+1089	The *farmer *was *funny	SVC	6	4	D	3
BKB+1090	The *farmer *was *hungry	SVC	6	4	D	3
BKB+1091	The *farmer *wore his *boots	SVO	6	5	D	3
BKB+1092	The *farmer's *coat was *dirty	SVC	7	5	D	3
BKB+1093	The *farmer's *holding a *stick	SVO	7	5	D	3
BKB+1094	The *farmer's *near the *gate	SVA	6	5	D	3
BKB+1095	The *farmer's *running *quickly	SVA	7	4	D	3
BKB+1096	The *farmer's *shoes were *dirty	SVC	7	5	D	3
BKB+1097	The *farmers *went to *market	SVA	7	5	D	3
BKB+1098	The *fast *car *hit a *wall	SVO	6	6	D	4
BKB+1100	The *father *came *back	SV	5	4	D	3
BKB+1101	The *father *forgot the *book	SVO	7	5	D	3
BKB+1102	The *father *forgot the *fruit	SVO	7	5	D	3
BKB+1104	The *father *found the *football	SVO	7	5	D	3
BKB+1105	The *father *goes up a *hill	SVO	7	6	D	3
BKB+1107	The *father *lost a *boot	SVO	6	5	D	3
BKB+1108	The *father *picked some *flowers	SVO	7	5	D	3
BKB+1109	The *father *reads a *paper	SVO	7	5	D	3
BKB+1110	The *father *sits with his *friend	SVA	7	6	D	3
BKB+1112	The *fire *engine came *quickly	SVA	7	5	D	3

BKB+1113	The *fire *engine is *red	SVC	6	5	D	3
BKB+1114	The *fire *engine went *past	SVA	6	5	D	3
BKB+1115	The *fire *engine's *too *noisy	SVC	7	5	D	4
BKB+1116	The *fire *was *dangerous	SVC	6	4	D	3
BKB+1117	The *fireman *came *quickly	SVA	6	4	D	3
BKB+1119	The *fireman *was *hungry	SV	6	4	D	3
BKB+1120	The *fireman *wore his *coat	SVO	6	5	D	3
BKB+1122	The *five *friends *argued	SV	5	4	D	3
BKB+1123	The *five *men are *dancing	SV	6	5	D	3
BKB+1124	The *five *men are *helping	SV	6	5	D	3
BKB+1127	The *flowerpot *was *pretty	SVC	7	4	D	3
BKB+1128	The *flowers *are in *water	SVA	7	5	D	3
BKB+1129	The *flowers *are on the *shelf	SVA	7	6	D	3
BKB+1131	The *flowers *grow in the *ground	SVA	7	6	D	3
BKB+1132	The *flowers *were *lovely	SVC	6	4	D	3
BKB+1133	The *football *boots are *dirty	SVC	7	5	D	3
BKB+1135	The *football *was *dirty	SVC	6	4	D	3
BKB+1136	The *footballer *bumped his *head	SVO	7	5	D	3
BKB+1137	The *footballer *drank *water	SVO	7	4	D	3
BKB+1139	The *footballer *hurt his *hand	SVO	7	5	D	3
BKB+1140	The *footballer *hurt his *leg	SVO	7	5	D	3
BKB+1143	The *front *door was *green	SVC	5	5	D	3
BKB+1144	The *front *door was *open	SVC	6	5	D	3
BKB+1145	The *fruit *fell off the *table	SVA	7	6	D	3
BKB+1146	The *fruit *grows on the *tree	SVA	6	6	D	3
BKB+1147	The *fruit *lies on the *table	SVA	7	6	D	3
BKB+1149	The *garden *bench was *broken	SVC	7	5	D	3
BKB+1152	The *garden *fence was *pretty	SVC	7	5	D	3
BKB+1153	The *garden had *nine *trees	SVO	6	5	D	3
BKB+1154	The *garden has *nice *flowers	SVO	7	5	D	3
BKB+1106	The *father *kicked the *ball	SVO	6	5	D	3
BKB+1160	The *girl *broke the *game	SVO	5	5	D	3
BKB+1161	The *girl *broke the *mug	SVO	5	5	D	3
BKB+1162	The *girl *bumped her *head	SVO	5	5	D	3
BKB+1164	The *girl *carries *two *books	SVA	6	5	D	4
BKB+1166	The *girl *chased the *cat	SVA	5	5	D	3
BKB+1167	The *girl *chased the *dog	SVA	5	5	D	3
BKB+1170	The *girl *drinks *from her *cup	SVA	6	6	D	4
BKB+1171	The *girl *fell in the *pond	SVA	6	6	D	3
BKB+1172	The *girl *fell on the *floor	SVA	6	6	D	3
BKB+1173	The *girl *has a *doll	SVO	5	5	D	3
BKB+1174	The *girl has a *new *book	SVO	6	6	D	3
BKB+1175	The *girl has *black *hair	SVO	5	5	D	3
BKB+1176	The *girl has *brown *eyes	SVO	5	5	D	3
BKB+1178	The *girl *held her *book	SVO	5	5	D	3
BKB+1179	The *girl *held her *doll	SVO	5	5	D	3
BKB+1180	The *girl *held the *cat	SVO	5	5	D	3
BKB+1181	The *girl *hides by the *tree	SVA	6	6	D	3
BKB+1182	The *girl *holds her *shoes	SVO	5	5	D	3
BKB+1183	The *girl is *very *clever	SVC	7	5	D	3
BKB+1184	The *girl *kicked the *ball	SVO	5	5	D	3

BKB+1186	The *girl *looked at the *book	SVA	6	6	D	3
BKB+1187	The *girl *looked at the *door	SVA	6	6	D	3
BKB+1188	The *girl *looks at the *flowers	SVA	7	6	D	3
BKB+1189	The *girl *looks *happy	SVC	5	4	D	3
BKB+1190	The *girl *lost her *brother	SVA	6	5	D	3
BKB+1191	The *girl *meets her *mother	SVA	6	5	D	3
BKB+1192	The *girl *opens the *window	SVO	7	5	D	3
BKB+1193	The *girl *plays at *home	SVA	5	5	D	3
BKB+1194	The *girl *plays with a *ball	SVO	6	6	D	3
BKB+1195	The *girl *plays with her *doll *house	SVO	7	7	D	4
BKB+1196	The *girl *plays with her *friend	SVA	6	6	D	3
BKB+1197	The *girl *plays with her *sister	SVA	7	6	D	3
BKB+1198	The *girl *plays with the *dog	SVA	6	6	D	3
BKB+1199	The *girl *plays with the *puppy	SVA	7	6	D	3
BKB+1200	The *girl *ran to her *brother	SVA	7	6	D	3
BKB+1201	The *girl *ran to her *mother	SVA	7	6	D	3
BKB+1202	The *girl *ran to *school	SVA	5	5	D	3
BKB+1203	The *girl *reads her *letter	SVO	6	5	D	3
BKB+1204	The *girl *sat on a *bench	SVA	6	6	D	3
BKB+1205	The *girl *sat on the *chair	SVA	6	6	D	3
BKB+1206	The *girl *stands in the *corner	SVA	7	6	D	3
BKB+1207	The *girl *stands in the *garden	SVA	7	6	D	3
BKB+1208	The *girl *stands in the *kitchen	SVA	7	6	D	3
BKB+1209	The *girl *stood by the *sink	SVA	6	6	D	3
BKB+1210	The *girl *stood in the *sweet *shop	SVA	7	7	D	4
BKB+1211	The *girl *swept the *floor	SVA	5	5	D	3
BKB+1212	The *girl *talks to her *father	SVA	7	6	D	3
BKB+1213	The *girl *waits near the *bench	SVA	6	6	D	3
BKB+1214	The *girl *walks *along the *path	SVA	7	6	D	4
BKB+1215	The *girl *wanted some *money	SVO	7	5	D	3
BKB+1216	The *girl *was at *home	SVA	5	5	D	3
BKB+1217	The *girl *was *frightened	SVC	5	4	D	3
BKB+1218	The *girl *went for *lunch	SVA	5	5	D	3
BKB+1220	The *girl *went on *holiday	SVO	7	5	D	3
BKB+1222	The *girl *went to *sleep	SVA	5	5	D	3
BKB+1223	The *girl *went to the *shop	SVA	6	6	D	3
BKB+1224	The *girl wore a *blue *dress	SVO	6	6	D	3
BKB+1225	The *girl wore a *pink *coat	SVO	6	6	D	3
BKB+1226	The *girl wore a *yellow *scarf	SVO	7	6	D	3
BKB+1227	The *girls *are *playing	SV	5	4	D	3
BKB+1228	The *girls are *playing *cricket	SVO	7	5	D	3
BKB+1229	The *girls *are *working	SV	5	4	D	3
BKB+1230	The *girl's *calling her *mother	SVA	7	5	D	3
BKB+1231	The *girls *cycle *along	SVA	7	4	D	3
BKB+1232	The *girl's *game is *over	SVA	6	5	D	3
BKB+1233	The *girl's *hair is *long	SVC	5	5	D	3
BKB+1234	The *girl's *helping her *mother	SVA	7	5	D	3
BKB+1235	The *girls *played in the *snow	SVA	6	6	D	3
BKB+1236	The *girl's *running on the *road	SVA	7	6	D	3
BKB+1237	The *girl's *running to *school	SVA	6	4	D	3
BKB+1238	The *girls *tells a *story	SVO	6	5	D	3

BKB+1239	The *girls *tidied the *house	SVO	6	5	D	3
BKB+1241	The *girls *went on *holiday	SVA	7	5	D	3
BKB+1242	The *glass *bowl was *full	SVC	5	5	D	3
BKB+1243	The *glass *jar *broke	SV	4	4	D	3
BKB+1244	The *glass*jug *broke	SV	4	4	D	3
BKB+1245	The *glass *plate *broke	SV	4	4	D	3
BKB+1246	The *gloves *are *green	SVC	4	4	D	3
BKB+1247	The *gloves *are *pink	SVC	4	4	D	3
BKB+1248	The *good *boy's *running	SV	5	4	D	3
BKB+1250	The *grass *was *green	SVC	4	4	D	3
BKB+1251	The *grass was *very *wet	SVC	6	5	D	3
BKB+1253	The *green *pears are *nice	SVC	5	5	D	3
BKB+1255	The *grocer *drives a *small *van	SVO	7	6	D	4
BKB+1256	The *hot *kettle *broke	SV	5	4	D	3
BKB+1258	The *house had a *nice *door	SVO	6	6	D	3
BKB+1259	The *house has *five *rooms	SVO	5	5	D	3
BKB+1260	The *house *was *empty	SVC	5	4	D	3
BKB+1261	The *house was near the *bus *stop	SVA	7	7	D	3
BKB+1262	The *house was *near the *park	SVA	6	6	D	3
BKB+1263	The *house was *near the *station	SVA	7	6	D	3
BKB+1264	The *house was near the *sweet *shop	SVA	7	7	D	3
BKB+1265	The *house *was on *fire	SVA	5	5	D	3
BKB+1266	The *house was *very *dirty	SVC	7	5	D	3
BKB+1267	The *husband *brings some *string	SVO	6	5	D	3
BKB+1268	The *husband *brings the *fruit	SVO	6	5	D	3
BKB+1269	The *husband *cleaned his *shoes	SVO	6	5	D	3
BKB+1270	The *ice *cream fell on the *floor	SVA	7	7	D	3
BKB+1271	The *ice *cream *melted	SV	5	4	D	3
BKB+1272	The *ice *cream *melted *quickly	SVA	7	5	D	4
BKB+1273	The *ice *cream *van came *back	SV	6	6	D	4
BKB+1274	The *ice *cream *van comes *early	SVA	7	6	D	4
BKB+1276	The *ice *cream *van's *coming	SV	6	5	D	4
BKB+1277	The *ice *cream *van's in the *park	SVA	7	7	D	4
BKB+1280	The *jam *was *sweet	SVC	4	4	D	3
BKB+1281	The *jug's *on the *table	SVA	6	5	D	3
BKB+1282	The *kettle's *quite *noisy	SVC	6	4	D	3
BKB+1283	The *kitchen *chair is *black	SVC	6	5	D	3
BKB+1284	The *kitchen *cupboard *broke	SV	6	4	D	3
BKB+1285	The *kitchen *door *broke	SV	5	4	D	3
BKB+1286	The *kitchen *door was *open	SVC	7	5	D	3
BKB+1287	The *kitchen *sink was *clean	SVC	6	5	D	3
BKB+1288	The *kitchen *sink's *dirty	SVC	6	4	D	3
BKB+1289	The *kitchen *table was *black	SVC	7	5	D	3
BKB+1290	The *kitchen was *very *hot	SVC	7	5	D	3
BKB+1291	The *kitchen *window *broke	SV	6	4	D	3
BKB+1292	The *kitchen *window was *shut	SVC	7	5	D	3
BKB+1293	The *ladder *falls on the *floor	SVA	7	6	D	3
BKB+1294	The *ladder *fell on the *ground	SVA	7	6	D	3
BKB+1296	The *ladder's *in the *garden	SVA	7	5	D	3
BKB+1297	The *ladder's *quite *dangerous	SVC	7	4	D	3
BKB+1298	The *lady *broke her *leg	SVO	6	5	D	3

BKB+1299	The *lady *broke her *mug	SVO	6	5	D	3
BKB+1301	The *lady *broke the *toy	SVO	6	5	D	3
BKB+1304	The *lady *closed the *door	SVO	6	5	D	3
BKB+1305	The *lady *crashed the *car	SVO	6	5	D	3
BKB+1306	The *lady *cut her *finger	SVO	7	5	D	3
BKB+1307	The *lady *cut her *hair	SVO	6	5	D	3
BKB+1308	The *lady *cut her *hand	SVO	6	5	D	3
BKB+1309	The *lady *cut the *cake	SVO	6	5	D	3
BKB+1314	The *lady *dropped her *bag	SVO	6	5	D	3
BKB+1315	The *lady *dropped her *purse	SVO	6	5	D	3
BKB+1317	The *lady *drove up the *road	SVO	7	6	D	3
BKB+1318	The *lady *falls on the *snow	SVA	7	6	D	3
BKB+338	*She *finished her *dinner	SVO	6	4	PP	3
BKB+1320	The *lady *forgot her *purse	SVO	7	5	D	3
BKB+1321	The *lady *forgot the *bread	SVO	7	5	D	3
BKB+1322	The *lady *found her *purse	SVO	6	5	D	3
BKB+1324	The *lady *grabs the *bag	SVO	6	5	D	3
BKB+1325	The *lady has *brown *eyes	SVO	6	5	D	3
BKB+1327	The *lady *helped her *son	SVA	6	5	D	3
BKB+1328	The *lady *hurried *home	SVA	6	4	D	3
BKB+1329	The *lady *knocked the *window	SVA	7	5	D	3
BKB+1330	The *lady *knows the *way	SVO	6	5	D	3
BKB+1332	The *lady *likes *fruit	SVO	5	4	D	3
BKB+1334	The *lady *likes *shopping	SVO	6	4	D	3
BKB+1335	The *lady *likes *strawberries	SVO	7	4	D	3
BKB+1336	The *lady *likes the *baby	SVO	7	5	D	3
BKB+1337	The *lady *looked at the *clock	SVA	7	6	D	3
BKB+1338	The *lady *looked *away	SVA	6	4	D	3
BKB+1340	The *lady *lost her *scarf	SVO	6	5	D	3
BKB+1341	The *lady *opens the *door	SVO	7	5	D	3
BKB+1342	The *lady *packed her *shoes	SVO	6	5	D	3
BKB+1344	The *lady *picked some *flowers	SVO	7	5	D	3
BKB+1345	The *lady *played with the *dog	SVO	7	6	D	3
BKB+1346	The *lady *plays with the *boy	SVA	7	6	D	3
BKB+1347	The *lady *reads a *book	SVO	6	5	D	3
BKB+1348	The *lady *sat on the *bed	SVA	7	6	D	3
BKB+1349	The *lady *shouts at the *child	SVA	7	6	D	3
BKB+1351	The *lady *shut the *door	SVO	6	5	D	3
BKB+1352	The *lady *sits on the *bed	SVA	7	6	D	3
BKB+1353	The *lady *sits on the *bus	SVA	7	6	D	3
BKB+1354	The *lady *sits on the *chair	SVA	7	6	D	3
BKB+1355	The *lady *sits on the *train	SVA	7	6	D	3
BKB+1356	The *lady *sits with her *son	SVA	7	6	D	3
BKB+1357	The *lady *slipped on the *floor	SVA	7	6	D	3
BKB+1358	The *lady *slipped on the *ice	SVA	7	6	D	3
BKB+1359	The *lady *spoke to her *friend	SVA	7	6	D	3
BKB+1360	The *lady *stared at the *clock	SVA	7	6	D	3
BKB+1361	The *lady *stared at the *sky	SVA	7	6	D	3
BKB+1362	The *lady *stayed for *lunch	SVA	6	5	D	3
BKB+1363	The *lady *stayed for *pudding	SVA	7	5	D	3
BKB+1364	The *lady *stayed for *supper	SVA	7	5	D	3

BKB+1365	The *lady *stops her *car	SVO	6	5	D	3
BKB+1366	The *lady *suddenly *shouts	SVA	7	4	D	3
BKB+1367	The *lady *tidied her *house	SVO	7	5	D	3
BKB+1368	The *lady *waits in the *rain	SVA	7	6	D	3
BKB+1369	The *lady waits *near the *tree	SVA	7	6	D	3
BKB+1370	The *lady *walked *quickly	SVA	6	4	D	3
BKB+1371	The *lady *walked *slowly	SVA	6	4	D	3
BKB+1372	The *lady *walked to *work	SVA	6	5	D	3
BKB+1373	The *lady *wanted *flowers	SVO	7	4	D	3
BKB+1374	The *lady *was *asleep	SV	6	4	D	3
BKB+1376	The *lady *was *pretty	SVC	6	4	D	3
BKB+1377	The *lady *washed her *mug	SVO	6	5	D	3
BKB+1381	The *lady *went *shopping	SVA	6	4	D	3
BKB+1383	The *lady wore a *black *dress	SVO	7	6	D	3
BKB+1384	The *lady wore a *brown *dress	SVO	7	6	D	3
BKB+1385	The *lady wore a *green *hat	SVO	7	6	D	3
BKB+1386	The *lady *wore a *scarf	SVO	6	5	D	3
BKB+1387	The *lady wore *brown *gloves	SVO	6	5	D	3
BKB+1388	The *lady *wore her *gloves	SVO	6	5	D	3
BKB+1389	The *lady *wore her *shoes	SVO	6	5	D	3
BKB+1390	The *lady *writes a *letter	SVO	7	5	D	3
BKB+1391	The *lady *writes a *story	SVO	7	5	D	3
BKB+1392	The *lady's *bag was *empty	SVC	7	5	D	3
BKB+1393	The *lady's *buying a *car	SVO	7	5	D	3
BKB+1394	The *lady's *buying a *house	SVO	7	5	D	3
BKB+1396	The *lady's *by the *corner	SVA	7	5	D	3
BKB+1397	The *lady's *coat was *wet	SVC	6	5	D	3
BKB+1398	The *lady's *eating *cake	SVO	6	4	D	3
BKB+1399	The *lady's *making *bread	SVO	6	4	D	3
BKB+1400	The *lady's *making *dinner	SVO	7	4	D	3
BKB+1403	The *lady's *making *pudding	SVO	7	4	D	3
BKB+1404	The *lady's *making some *bread	SVO	7	5	D	3
BKB+1405	The *lady's *running *quickly	SVA	7	4	D	3
BKB+1406	The *lady's *watching the *game	SVA	7	5	D	3
BKB+1407	The *leaves *stuck on his *shoe	SVA	6	6	D	3
BKB+1408	The *letter *fell from a *book	SVA	7	6	D	3
BKB+1410	The *little *baby's *hungry	SVC	7	4	D	3
BKB+1411	The *little *baby's *noisy	SVC	7	4	D	3
BKB+1412	The *little *baby's *pretty	SVC	7	4	D	3
BKB+1413	The *little *girl *knows the *way	SVO	7	6	D	4
BKB+1414	The *little *girl likes *sweets	SVO	6	5	D	3
BKB+1415	The *little *girl *stayed for *tea	SVA	7	6	D	4
BKB+1416	The *little *girl's *painting	SVO	6	4	D	3
BKB+1417	The *lorry *carried *flowers	SVO	7	4	D	3
BKB+1418	The *lorry *carried some *bread	SVO	7	5	D	3
BKB+1419	The *lorry *comes *early	SVA	6	4	D	3
BKB+1420	The *lorry *drove down the *street	SVA	7	6	D	3
BKB+1421	The *lorry had a *bad *crash	SVO	7	6	D	3
BKB+1422	The *lorry *hit a *bus	SVO	6	5	D	3
BKB+1423	The *lorry *hit a *car	SVO	6	5	D	3
BKB+1424	The *lorry *stopped *suddenly	SVA	7	4	D	3

BKB+1425	The *lorry was *quite *long	SVC	6	5	D	3
BKB+1426	The *lorry was *quite *noisy	SVC	7	5	D	3
BKB+1427	The *lorry *went *along	SVA	6	4	D	3
BKB+1429	The *lorry went *too *fast	SVA	6	5	D	3
BKB+1430	The *lorry's *very *dirty	SVC	7	4	D	3
BKB+1431	The *lunch *box is *empty	SVC	6	5	D	3
BKB+1432	The *machine *was *dangerous	SVC	7	4	D	3
BKB+1433	The *man *broke the *shelf	SVO	5	5	D	3
BKB+1434	The *man *broke the *stick	SVO	5	5	D	3
BKB+1435	The *man *carried a *knife	SVO	6	5	D	3
BKB+1437	The *man *cleaned his *car	SVO	5	5	D	3
BKB+1438	The *man *cleaned the *house	SVO	5	5	D	3
BKB+1439	The *man *cleaned the *room	SVO	5	5	D	3
BKB+1440	The *man *cleaned the *street	SVO	5	5	D	3
BKB+1441	The *man *drove a *lorry	SVO	6	5	D	3
BKB+1444	The *man *grabs a *spoon	SVO	5	5	D	3
BKB+1445	The *man has *blue *eyes	SVO	5	5	D	3
BKB+1446	The *man has *green *eyes	SVO	5	5	D	3
BKB+1448	The *man *kicked the *ball	SVO	5	5	D	3
BKB+1450	The *man *lost his *coat	SVO	5	5	D	3
BKB+1452	The *man *shut the *gate	SVO	5	5	D	3
BKB+1453	The *man *sits in the *car	SVA	6	6	D	3
BKB+1454	The *man *spoke to his *son	SVA	6	6	D	3
BKB+1455	The *man *stared at the *clock	SVA	6	6	D	3
BKB+1456	The *man *suddenly *spoke	SVA	6	4	D	3
BKB+1457	The *man *tells a *story	SVO	6	5	D	3
BKB+1458	The *man *tied his *shoes	SVO	5	5	D	3
BKB+1459	The *man *tied the *string	SVO	5	5	D	3
BKB+1461	The *man *waits for his *son	SVO	6	6	D	3
BKB+1462	The *man *walks in the *rain	SVO	6	6	D	3
BKB+1463	The *man *washed the *plates	SVO	5	5	D	3
BKB+1464	The *man *went *out	SV	4	4	D	3
BKB+1465	The *man *wore a *coat	SV	5	5	D	3
BKB+1466	The *man *works in the *sweet *shop	SVA	7	7	D	4
BKB+1467	The *man's *drinking *tea	SVO	5	4	D	3
BKB+1468	The *man's *painting the *door	SVO	6	5	D	3
BKB+1469	The *man's *painting the *gate	SVO	6	5	D	3
BKB+1471	The *man's *painting the *window	SVO	7	5	D	3
BKB+1472	The *man's *quite *hungry	SVC	5	4	D	3
BKB+1473	The *man's *walking *home	SVA	5	4	D	3
BKB+1474	The *marmalade *was *sweet	SVC	6	4	D	3
BKB+1477	The *milk *bottle *broke	SV	5	4	D	3
BKB+1478	The *milk was *by the *eggs	SVA	6	6	D	3
BKB+1480	The *milkman *comes *early	SVA	6	4	D	3
BKB+1481	The *milkman *drives a *small *car	SVO	7	6	D	4
BKB+1482	The *milkman *lost his *way	SVO	5	5	D	3
BKB+1483	The *milkman *ran *along	SVA	6	4	D	3
BKB+1484	The *milkman *shut the *gate	SVO	6	5	D	3
BKB+1485	The *milk's *on the *shelf	SVA	5	5	D	3
BKB+1487	The *mirror *hangs on the *wall	SVA	7	6	D	3
BKB+1488	The *money *box was *empty	SVC	7	5	D	3

BKB+1489	The *money *box was *full	SVC	6	5	D	3
BKB+1490	The *money *fell on the *floor	SVA	7	6	D	3
BKB+1491	The *money was in *her *purse	SVA	7	6	D	3
BKB+1492	The *mother *came *back	SV	5	4	D	3
BKB+1493	The *mother *clears the *room	SVA	6	5	D	3
BKB+1494	The *mother *cut her *finger	SVO	7	5	D	3
BKB+1496	The *mother has *black *hair	SVO	6	5	D	3
BKB+1498	The *mother *likes *bananas	SVO	7	4	D	3
BKB+1500	The *mother *lost her *gloves	SVO	6	5	D	3
BKB+1501	The *mother *lost her *raincoat	SVO	7	5	D	3
BKB+1502	The *mother *made a *cake	SVO	6	5	D	3
BKB+1503	The *mother *met some *friends	SVA	6	5	D	3
BKB+1504	The *mother *reads a *book	SVO	6	5	D	3
BKB+1505	The *mother *tied the *scarf	SVO	6	5	D	3
BKB+1506	The *mother *took the *money	SVO	7	5	D	3
BKB+1507	The *mother *went *out	SV	5	4	D	3
BKB+1508	The *mothers *making *bread	SVO	6	4	D	3
BKB+1509	The *mouse *ran *away	SVA	5	4	D	3
BKB+1510	The *mouse *ran near the *door	SVA	6	6	D	3
BKB+1511	The *mouse *sits by the *door	SVA	6	6	D	3
BKB+1512	The *mouse *was in the *kitchen	SVA	7	6	D	3
BKB+1513	The *mouse was *quite *noisy	SVC	6	5	D	3
BKB+1514	The *mouse was *quite *small	SVC	5	5	D	3
BKB+1518	The *naughty *boy *broke the *door	SVO	7	6	D	4
BKB+1519	The *naughty *boy *broke the *fence	SVO	7	6	D	4
BKB+1520	The *naughty *boy *kicked the *bench	SVO	7	6	D	4
BKB+1521	The *naughty *boy *tells a *lie	SVO	7	6	D	4
BKB+1522	The *naughty *boy was *hungry	SVC	7	5	D	3
BKB+1523	The *naughty *girl *kicked the *gate	SVO	7	6	D	4
BKB+1524	The *naughty *girl *sits *down	SVO	6	5	D	4
BKB+1525	The *naughty *girl *sleeps	SV	5	4	D	3
BKB+1382	The *lady *went to *work	SVA	6	5	D	3
BKB+1527	The *naughty *girl was *noisy	SVC	7	5	D	3
BKB+1528	The *naughty *girl's *coming *home	SVA	7	5	D	4
BKB+1529	The *new *house was *lovely	SVC	6	5	D	3
BKB+1531	The *nice *lady *found her *bag	SVO	6	6	D	4
BKB+1535	The *old *chair *broke	SV	4	4	D	3
BKB+1536	The *old *gate *broke	SV	4	4	D	3
BKB+1537	The *old *glove has a *small *hole	SVO	7	7	D	4
BKB+1538	The *old *gloves are *brown	SVC	5	5	D	3
BKB+1539	The *old *gloves are *wet	SVC	5	5	D	3
BKB+1540	The *old *man *fell on the *floor	SVA	7	7	D	4
BKB+1542	The *old *man is *hurt	SV	5	5	D	3
BKB+1543	The *old *man *shut the *door	SVO	6	6	D	4
BKB+1545	The *old *table *broke	SV	5	4	D	3
BKB+1546	The *old *woman *argued	SV	6	4	D	3
BKB+1547	The *old *woman *washed her *hair	SVO	7	6	D	4
BKB+1548	The *old *woman went *home	SVA	6	5	D	3
BKB+1549	The *orange *ball's *bouncing	SV	6	4	D	3
BKB+1550	The *orange *fell on the *floor	SVA	7	6	D	3
BKB+1551	The *orange *marmalade's *good	SVC	7	4	D	3

BKB+1553	The *oranges are *quite *small	SVC	7	5	D	3
BKB+1555	The *oven *door was *broken	SVC	7	5	D	3
BKB+1556	The *oven *door was *hot	SVC	6	5	D	3
BKB+1557	The *oven *door was *warm	SVC	6	5	D	3
BKB+1559	The *paint *dripped on the *table	SVA	7	6	D	3
BKB+1561	The *paint *was *wet	SVC	4	4	D	3
BKB+1564	The *painting *hangs on the *wall	SVA	7	6	D	3
BKB+1565	The *park has *three *benches	SVA	6	5	D	3
BKB+1566	The *pears are *quite *sweet	SVC	5	5	D	3
BKB+1568	The *pears *fell off the *tree	SVA	6	6	D	3
BKB+1569	The *pears *fell on the *floor	SVA	6	6	D	3
BKB+1570	The *pears *grow on *trees	SVA	5	5	D	3
BKB+1571	The *people *played *games	SVO	5	4	D	3
BKB+1572	The *pepper was *too *hot	SVC	6	5	D	3
BKB+1573	The *picture *fell off the *wall	SVA	7	6	D	3
BKB+1574	The *picture *hangs on the *wall	SVA	7	6	D	3
BKB+1575	The *picture *was *pretty	SVC	6	4	D	3
BKB+1577	The *pink *flowers are *pretty	SVC	7	5	D	3
BKB+1579	The *pink *ice *cream *melted	SVC	6	5	D	4
BKB+1580	The *pink *sweet was *lovely	SVC	6	5	D	3
BKB+1581	The *plant *needed some *water	SVO	7	5	D	3
BKB+1582	The *plant *was *pretty	SVC	7	4	D	3
BKB+1583	The *plants *grow in the *garden	SVA	7	6	D	3
BKB+1584	The *plate *fell off the *table	SVA	7	6	D	3
BKB+1585	The *plate *fell on the *floor	SVA	6	6	D	3
BKB+1586	The *plate is *on the *table	SVA	7	6	D	3
BKB+1587	The *police *are *laughing	SV	6	4	D	3
BKB+1588	The *police *are *listening	SV	7	4	D	3
BKB+1589	The *police *are *looking	SV	6	4	D	3
BKB+1591	The *police are *quite *noisy	SVC	7	5	D	3
BKB+1592	The *police are *running *fast	SVA	7	5	D	3
BKB+1593	The *police *are *shouting	SV	6	4	D	3
BKB+1594	The *police *are *talking	SV	6	4	D	3
BKB+1595	The *police *are *watching	SV	6	4	D	3
BKB+1597	The *police *broke the *fence	SVO	6	5	D	3
BKB+1598	The *police *came *suddenly	SVA	7	4	D	3
BKB+1599	The *police *chased the *boy	SVA	6	5	D	3
BKB+1601	The *police *climbed the *ladder	SVO	7	5	D	3
BKB+1602	The *police *closed the *road	SVO	6	5	D	3
BKB+1603	The *police *found a *box	SVO	6	5	D	3
BKB+1604	The *police *found a *knife	SVO	6	5	D	3
BKB+1605	The *police *found a *sharp *knife	SVO	7	6	D	4
BKB+1606	The *police *found the *driver	SVA	7	5	D	3
BKB+1607	The *police *found the *man	SVO	6	5	D	3
BKB+1608	The *police *found the *money	SVO	7	5	D	3
BKB+1609	The *police *frightened the *man	SVA	7	5	D	3
BKB+1610	The *police *heard a *noise	SVO	6	5	D	3
BKB+1611	The *police *kicked the *door	SVO	6	5	D	3
BKB+1612	The *police *knew the *story	SVO	7	5	D	3
BKB+1613	The *police *knew the *way	SVO	6	5	D	3
BKB+1614	The *police *knocked on the *door	SVA	7	6	D	3

BKB+1615	The *police *ran down the *street	SVA	7	6	D	3
BKB+1616	The *police *stopped the *car	SVO	6	5	D	3
BKB+1617	The *police *stopped the *driver	SVA	7	5	D	3
BKB+1618	The *police *went *along	SVA	6	4	D	3
BKB+1619	The *policeman *came *quickly	SVA	7	4	D	3
BKB+1620	The *policeman *crashed his *car	SVO	7	5	D	3
BKB+1621	The *policeman *found the *cat	SVO	7	5	D	3
BKB+1622	The *policeman *lost his *way	SVO	7	5	D	3
BKB+1623	The *policeman *packed his *bag	SVO	7	5	D	3
BKB+1625	The *policeman *stayed for *tea	SVA	7	5	D	3
BKB+1626	The *policeman *was *happy	SV	6	4	D	3
BKB+1627	The *policeman's *getting *cold	SVC	7	4	D	3
BKB+1628	The *pond has *five *fishes	SVO	6	5	D	3
BKB+1630	The *postman *broke the *gate	SVO	6	5	D	3
BKB+1631	The *postman *came *back	SV	5	4	D	3
BKB+1632	The *postman *came *early	SV	6	4	D	3
BKB+1633	The *postman *came to the *door	SVA	7	6	D	3
BKB+1634	The *postman *carried his *bag	SVO	7	5	D	3
BKB+1635	The *postman *carries *letters	SVO	7	4	D	3
BKB+1636	The *postman *climbed the *hill	SVO	6	5	D	3
BKB+1637	The *postman *comes *back	SV	5	4	D	3
BKB+1638	The *postman *drives a *van	SVO	6	5	D	3
BKB+1640	The *postman *fell on the *floor	SVA	7	6	D	3
BKB+1641	The *postman *fell on the *ground	SVA	7	6	D	3
BKB+1642	The *postman *finished *early	SVA	7	4	D	3
BKB+1643	The *postman *helps the *driver	SVA	7	5	D	3
BKB+1644	The *postman *knocked on the *door	SVA	7	6	D	3
BKB+1645	The *postman *lost his *bag	SVO	6	5	D	3
BKB+1646	The *postman *lost his *way	SVO	6	5	D	3
BKB+1647	The *postman *met some *friends	SVA	6	5	D	3
BKB+1648	The *postman *showed the *way	SVO	6	5	D	3
BKB+1649	The *postman *sits on the *bench	SVA	7	6	D	3
BKB+1650	The *postman *slipped on the *snow	SVA	7	6	D	3
BKB+1651	The *postman *starts the *engine	SVO	7	5	D	3
BKB+1652	The *postman *talks to the *boy	SVA	7	6	D	3
BKB+1653	The *postman *walked in the *rain	SVO	7	6	D	3
BKB+1654	The *postman *walked on the *road	SVA	7	6	D	3
BKB+1655	The *postman *walks *along	SV	6	4	D	3
BKB+1656	The *postman *walks *quickly	SVA	6	4	D	3
BKB+1658	The *postman *was *happy	SVC	6	4	D	3
BKB+1659	The *postman *was *hungry	SVC	6	4	D	3
BKB+1661	The *postman *waves at the *child	SVA	7	6	D	3
BKB+1662	The *postman *went in the *shop	SVA	7	6	D	3
BKB+1663	The *postman *wore his *coat	SVO	6	5	D	3
BKB+1664	The *postman's *coat was *wet	SVC	6	5	D	3
BKB+1666	The *postman's *shoes are *dirty	SVC	7	5	D	3
BKB+1667	The *potatoes *were *brown	SVC	6	4	D	3
BKB+1668	The *pretty *girl got *ready	SVO	7	5	D	3
BKB+1669	The *pudding *was *good	SVC	5	4	D	3
BKB+1670	The *pudding *was *lovely	SVC	6	4	D	3
BKB+1671	The *pudding was *very *hot	SVC	7	5	D	3

BKB+1672	The *pudding was *very *sweet	SVC	7	5	D	3
BKB+1673	The *pudding's *too *hot	SVC	5	4	D	3
BKB+1674	The *puppy *caught a *mouse	SVO	6	5	D	3
BKB+1675	The *puppy *closed his *eyes	SVO	6	5	D	3
BKB+1676	The *puppy *drank from a *bowl	SVA	7	6	D	3
BKB+1677	The *puppy *lies on the *grass	SVA	7	6	D	3
BKB+1678	The *puppy *sits by the *chair	SVA	7	6	D	3
BKB+1679	The *puppy *sits by the *door	SVA	7	6	D	3
BKB+1681	The *rain *came *early	SVA	5	4	D	3
BKB+1682	The *rain *falls at *Christmas	SVA	6	5	D	3
BKB+1683	The *raincoat's *quite *wet	SVC	5	4	D	3
BKB+1684	The *red *apples were *lovely	SVC	7	7	D	3
BKB+1685	The *rice *pudding was *hot	SVC	6	5	D	3
BKB+1686	The *room was *quite *cold	SVC	5	5	D	3
BKB+1687	The *room was *very *clean	SVC	6	5	D	3
BKB+1688	The *room was *very *hot	SVC	6	5	D	3
BKB+1689	The *room's *getting *hot	SVC	5	4	D	3
BKB+1690	The *room's *very *cold	SVC	5	4	D	3
BKB+1691	The *room's *very *dirty	SVC	6	4	D	3
BKB+1692	The *room's *very *hot	SVC	5	4	D	3
BKB+1693	The *school *bus *waits by the *gate	SVA	7	7	D	4
BKB+1694	The *school *bus was *empty	SVC	6	5	D	3
BKB+1695	The *school *bus was *full	SVC	5	5	D	3
BKB+1696	The *school *bus went *early	SVA	6	5	D	3
BKB+1697	The *school *children are *noisy	SVC	7	5	D	3
BKB+1699	The *school *children went *away	SVA	7	5	D	3
BKB+1700	The *school had *nine *rooms	SVO	5	5	D	3
BKB+1701	The *school *shuts for *Christmas	SVA	6	5	D	3
BKB+1702	The *school *was on *fire	SVC	5	5	D	3
BKB+1703	The *scissors *are *dangerous	SVC	6	4	D	3
BKB+1704	The *scissors are *on the *chair	SVA	6	6	D	3
BKB+1705	The *shirt *was *wet	SVC	4	4	D	3
BKB+1706	The *shoes were *very *clean	SVC	6	5	D	3
BKB+1707	The *shop *sells *books	SVO	4	4	D	3
BKB+1708	The *shop *sells *butter	SVO	5	4	D	3
BKB+1710	The *shop *sells *sweets	SVO	4	4	D	3
BKB+1711	The *shop *shut for *Christmas	SVA	6	5	D	3
BKB+1712	The *shop *was by the *corner	SVA	7	6	D	3
BKB+1713	The *shop's *across the *road	SVA	6	5	D	3
BKB+1714	The *shop's *near the *park	SVA	5	5	D	3
BKB+1715	The *sign *hangs *above the *door	SVA	7	6	D	4
BKB+1717	The *silly *boy's *kicked the *ball	SVO	7	6	D	4
BKB+1718	The *silly *boy's *laughing	SV	6	4	D	3
BKB+1719	The *small *bag was *empty	SVC	6	5	D	3
BKB+1720	The *small *boy *shouted	SV	4	4	D	3
BKB+1722	The *small *boy was *happy	SVC	5	5	D	3
BKB+1723	The *small *boy was *running	SV	5	5	D	3
BKB+1724	The *small *boy's *getting *cold	SVC	6	5	D	4
BKB+1725	The *small *boy's *playing	SV	5	4	D	3
BKB+1726	The *small *cat *sleeps	SV	4	4	D	3
BKB+1727	The *small *cat was *cold	SVC	5	5	D	3

BKB+1728	The *small *dog was *frightened	SVC	6	5	D	3
BKB+1729	The *small *girl *plays with her *toy	SVO	7	7	D	4
BKB+1730	The *small *girl's *quite *cold	SVC	5	5	D	4
BKB+1731	The *small *milkman *slipped	SV	5	4	D	3
BKB+1733	The *snow *came *down	SV	4	4	D	3
BKB+1734	The *snow *falls on the *ground	SVA	6	6	D	3
BKB+1735	The *snow *lay on the *bench	SVA	6	6	D	3
BKB+1737	The *snow *lay on the *ground	SVA	6	6	D	3
BKB+1740	*The *snow *melted	SV	4	3	D	3
BKB+1741	The *snow *melted *quite *quickly	SVA	7	5	D	4
BKB+1742	The *snow was *quite *dangerous	SVC	7	5	D	3
BKB+1743	The *snow was *quite *pretty	SVC	5	5	D	3
BKB+1744	The *spoon *fell on the *floor	SVA	6	6	D	3
BKB+1745	The *spoon *is *dirty	SVC	5	4	D	3
BKB+1746	The *strawberries *were *nice	SVC	6	4	D	3
BKB+1747	The *strawberry *cake was *good	SVC	7	5	D	3
BKB+1749	The *strawberry *sweet was *nice	SVC	7	5	D	3
BKB+1751	The *sweet *jar was *empty	SVC	6	5	D	3
BKB+1752	The *sweet *shop *closed for *lunch	SVA	6	6	D	4
BKB+1753	The *sweet *shop sells *cakes	SVO	5	5	D	3
BKB+1754	The *sweet *shop was *open	SVC	6	5	D	3
BKB+1755	The *sweets are *in the *cupboard	SVA	7	6	D	3
BKB+1756	The *table *cloth's *dirty	SVC	6	4	D	3
BKB+1757	The *table *cloth's *yellow	SVC	6	4	D	3
BKB+1758	The *table has *nine *chairs	SVO	6	5	D	3
BKB+1759	The *teacloth *hangs on a *hook	SVA	7	6	D	3
BKB+1760	The *teacloths *hanging *up	SV	6	4	D	3
BKB+1761	The *thin *dog *chased the *cat	SVA	6	6	D	4
BKB+1762	The *thin *dog *lay on the *grass	SVA	7	7	D	4
BKB+1763	The *thin *dog *looked at the *gate	SVA	7	7	D	4
BKB+1764	The *thin *dog *played in the *park	SVA	7	7	D	4
BKB+1765	The *thin *dog *ran *along	SVA	6	5	D	4
BKB+1766	The *thin *dog *sat by the *door	SVA	7	7	D	4
BKB+1767	The *thin *dog *sits on the *floor	SVA	7	7	D	4
BKB+1768	The *thin *dog was *running	SV	6	5	D	3
BKB+1769	The *thin *dog's *hungry	SV	5	4	D	3
BKB+1770	The *thin *dog's *quite *noisy	SVC	6	5	D	4
BKB+1774	The *three *boys came *home	SV	5	5	D	3
BKB+1775	The *three *cats are *playing	SV	6	5	D	3
BKB+1776	The *three *girls are *dancing	SV	6	5	D	3
BKB+1777	The *three *girls are *playing	SV	6	5	D	3
BKB+1778	The *three *girls are *shopping	SV	6	5	D	3
BKB+1780	The *three *girls are *working	SV	6	5	D	3
BKB+1781	The *three *girls *left *home	SV	5	5	D	4
BKB+1782	The *three *sisters *argued	SV	6	4	D	3
BKB+1783	The *tiny *fish was *pretty	SVC	7	5	D	3
BKB+1784	The *tomatoes are *quite *sweet	SVC	7	5	D	3
BKB+1785	The *tomatoes *are *small	SVC	6	4	D	3
BKB+1786	The *towel was *very *wet	SVC	6	5	D	3
BKB+1787	The *toy *car is *pink	SVC	5	5	D	3
BKB+1788	The *toys *are on the *floor	SVA	6	6	D	3

BKB+1789	The *toys *are on the *table	SVA	7	6	D	3
BKB+1790	The *train *comes *early	SVA	5	4	D	3
BKB+1791	The *train *went *early	SVA	5	4	D	3
BKB+1793	The *tree *fell on the *lorry	SVA	7	6	D	3
BKB+1794	The *two *boys are *eating	SV	6	5	D	3
BKB+1795	The *two *boys *left *home	SVA	5	5	D	4
BKB+1796	The *two *cats are *fighting	SV	6	5	D	3
BKB+1797	The *two *children are *talking	SV	7	5	D	3
BKB+1798	The *two *children *argued	SV	6	4	D	3
BKB+1799	The *two *children *swept the *floor	SVA	7	6	D	4
BKB+1800	The *two *farmers are *waiting	SV	7	5	D	3
BKB+1801	The *two *farmers are *working	SV	7	5	D	3
BKB+1803	The *two *girls came *home	SVA	5	5	D	3
BKB+1805	The *van *crashed into the *gate	SVA	7	6	D	3
BKB+1806	The *van had a *big *crash	SVO	6	6	D	3
BKB+1807	The *washing *machine's *empty	SVC	7	4	D	3
BKB+1808	The *washing *machine's *full	SVC	6	4	D	3
BKB+1809	The *washing *machine's *noisy	SVC	7	4	D	3
BKB+1810	The *water *machine *broke	SV	6	4	D	3
BKB+1811	The *water's *very *cold	SVC	6	4	D	3
BKB+1812	The *wife *spoke to her *husband	SVA	7	6	D	3
BKB+1815	The *woman *dropped her *basket	SVO	7	5	D	3
BKB+1816	The *woman *dropped her *money	SVO	7	5	D	3
BKB+1817	The *woman *stirs the *tea	SVO	6	5	D	3
BKB+1820	The *wooden *box *broke	SV	5	4	D	3
BKB+1821	The *yellow *pears were *sweet	SVC	6	5	D	3
BKB+1822	The *yellow *pot was *empty	SVC	7	5	D	3
BKB+1823	The *young *boy *broke his *mug	SVO	6	6	D	4
BKB+1824	The *young *boy *broke the *window	SVO	7	6	D	4
BKB+1825	The *young *boy *fell	SV	4	4	D	3
BKB+1826	The *young *boy *found some *money	SVO	7	6	D	4
BKB+1827	The *young *boy *left his *money	SVO	7	6	D	4
BKB+1828	The *young *boy *played with his *toy	SVO	7	7	D	4
BKB+1829	The *young *boy tells a *story	SVO	7	6	D	3
BKB+1830	The *young *boy wore his *coat	SVO	6	6	D	3
BKB+1833	The *young *children are *funny	SVC	7	5	D	3
BKB+1834	The *young *children are *noisy	SVC	7	5	D	3
BKB+1835	The *young *children are *painting	SVO	7	5	D	3
BKB+1836	The *young *girl likes *dolls	SVC	5	5	D	3
BKB+1837	The *young *girl *played *games	SVO	5	5	D	4
BKB+1838	The *young *girl *played with her *doll	SVO	7	7	D	4
BKB+1839	The *young *girl was *quite *sweet	SVC	6	6	D	4
BKB+1840	The *young *girls are *running	SV	6	5	D	3
BKB+1841	The *young *people *shouted	SV	6	4	D	3
BKB+1842	*They *ate at the *table	SVA	6	5	PP	3
BKB+1843	*They ate *green *jelly	SVO	5	4	PP	3
BKB+1844	*They *ate in the *garden	SVA	6	5	PP	3
BKB+1847	*They *ate the *cake	SVO	4	4	PP	3
BKB+1848	*They ate the *lemon *cake	SVO	6	5	PP	3
BKB+1849	*They *ate the *pudding	SVO	5	4	PP	3
BKB+1850	*They *ate the *rice	SVO	4	4	PP	3

BKB+1851	*They *ate the *strawberries	SVO	6	4	PP	3
BKB+1852	*They *ate the *sweets	SVO	4	4	PP	3
BKB+1853	*They *broke a *window	SVO	5	4	PP	3
BKB+1854	*They *broke all the *toys	SVO	5	5	PP	3
BKB+1855	*They *broke the *game	SVO	4	4	PP	3
BKB+1856	*They *called the *fire *engine	SVO	6	5	PP	4
BKB+1858	*They *finished *eating	SVO	5	3	PP	3
BKB+1859	*They *finished *playing	SVO	5	3	PP	3
BKB+1861	*They *finished the *game	SVO	5	4	PP	3
BKB+1862	*They *followed the *car	SVO	5	4	PP	3
BKB+1863	*They *followed the *postman	SVA	6	4	PP	3
BKB+1864	*They *followed the *sign	SVO	5	4	PP	3
BKB+1865	*They had a *lovely *Christmas	SVO	7	5	PP	3
BKB+1866	*They had a *lovely *dinner	SVO	7	5	PP	3
BKB+1867	*They had *dropped the *bag	SVO	5	5	PP	3
BKB+1868	*They had some *apple *pies	SVO	6	5	PP	3
BKB+1869	*They had some *cold *milk	SVO	5	5	PP	3
BKB+1871	*They *had some *strawberries	SVO	6	4	PP	3
BKB+1872	*They had *two *milk *bottles	SVO	6	5	PP	4
BKB+1873	*They *heard a *car *crash	SVO	5	5	PP	4
BKB+1874	*They *laughed a *lot	SVA	4	4	PP	3
BKB+1883	*They *made a *snowman	SVO	5	4	PP	3
BKB+1884	*They *met for *one *hour	SVA	5	5	PP	4
BKB+1886	*They *painted the *box	SVO	5	4	PP	3
BKB+1887	*They *painted the *cupboard	SVO	6	4	PP	3
BKB+1888	*They *painted the *door	SVO	5	4	PP	3
BKB+1889	*They *painted the *fence	SVO	5	4	PP	3
BKB+1890	*They *painted the *garden *chair	SVO	7	5	PP	4
BKB+1891	*They *painted the *shelf	SVO	5	4	PP	3
BKB+1893	*They *painted the *table	SVO	6	4	PP	3
BKB+1894	*They *painted the *window	SVO	6	4	PP	3
BKB+1896	*They *played for *one *hour	SVA	5	5	PP	4
BKB+1900	*They *played in the *park	SVA	5	5	PP	3
BKB+1901	*They *played in the *tree *house	SVA	6	6	PP	4
BKB+1902	*They *played with the *clown	SVA	5	5	PP	3
BKB+1903	*They *sat on the *grass	SVA	5	5	PP	3
BKB+1904	*They saw the *two *cars *crash	SVO	6	6	PP	4
BKB+1905	*They *stared at the *big *dog	SVA	6	6	PP	4
BKB+1906	*They *stared at the *driver	SVA	6	5	PP	3
BKB+1907	*They *stared at the *fish	SVA	5	5	PP	3
BKB+1908	*They *took his *raincoat	SVO	5	4	PP	3
BKB+1910	*They *took some *matches	SVO	5	4	PP	3
BKB+1911	*They *waited at *home	SVA	5	4	PP	3
BKB+1912	*They *waited for the *bus	SVO	6	5	PP	3
BKB+1913	*They *walked *across the *garden	SVA	7	5	PP	4
BKB+1914	*They *walked *across the *path	SVA	6	5	PP	4
BKB+1915	*They *walked *across the *road	SVA	6	5	PP	4
BKB+1916	*They *walked in the *park	SVA	5	5	PP	3
BKB+1917	*They *walked in the *rain	SVA	5	5	PP	3
BKB+1919	*They *wanted some *food	SVO	5	4	PP	3
BKB+1922	*They *washed the *fruit	SVO	4	4	PP	3

BKB+1923	*They *watched the *Christmas *play	SVO	6	5	PP	4
BKB+1927	*They went *past the *house	SVA	5	5	PP	3
BKB+1933	*They're *buying some *butter	SVO	6	4	PP	3
BKB+1934	*They're *buying some *cold *meat	SVO	6	5	PP	4
BKB+1935	*They're *buying some *fruit	SVO	5	4	PP	3
BKB+1936	*They're *buying some *onions	SVO	7	4	PP	3
BKB+1937	*They're *buying some *pears	SVO	5	4	PP	3
BKB+1938	*They're *buying some *strawberries	SVO	7	4	PP	3
BKB+1939	*They're *buying some *tomatoes	SVO	7	4	PP	3
BKB+1942	*They're *coming for *dinner	SVA	6	4	PP	3
BKB+1943	*They're *crossing the *path	SVA	5	4	PP	3
BKB+1944	*They're *cycling along the *path	SVA	7	5	PP	3
BKB+1945	*They're *cycling along the *road	SVA	7	5	PP	3
BKB+1946	*They're *cycling down the *hill	SVA	6	5	PP	3
BKB+1947	*They're *cycling in the *park	SVA	6	5	PP	3
BKB+1948	*They're *cycling on the *street	SVA	6	5	PP	3
BKB+1949	*They're *drinking *milk	SVO	4	3	PP	3
BKB+1951	*They're *eating at the *table	SVO	7	5	PP	3
BKB+1952	*They're *eating *bread	SVO	4	3	PP	3
BKB+1953	*They're *eating *dinner	SVO	5	3	PP	3
BKB+1954	*They're *eating *pudding	SVO	5	3	PP	3
BKB+1958	*They're *looking at the *baby	SVA	7	5	PP	3
BKB+1959	*They're *looking at the *cake	SVA	6	5	PP	3
BKB+1961	*They're *looking at the *clouds	SVA	6	5	PP	3
BKB+1962	*They're *looking at the *flowers	SVA	7	5	PP	3
BKB+1963	*They're *looking at the *garden	SVA	7	5	PP	3
BKB+1964	*They're *looking at the *gate	SVA	6	5	PP	3
BKB+1966	*They're *looking at the *plant	SVA	6	5	PP	3
BKB+1968	*They're *looking at the *train	SVA	6	5	PP	3
BKB+1969	*They're *looking at the *tree	SVA	6	5	PP	3
BKB+1972	*They're *playing in the *snow	SVA	6	5	PP	3
BKB+1973	*They're *playing on *holiday	SVA	7	4	PP	3
BKB+1975	*They're *running *away	SVA	5	3	PP	3
BKB+1978	*They're *running near the *park	SVA	6	5	PP	3
BKB+1980	*They're *running on the *snow	SVA	6	5	PP	3
BKB+1981	*They're *running *past the *bus	SVA	6	5	PP	4
BKB+1982	*They're *running *past the *corner	SVA	7	5	PP	4
BKB+1983	*They're *running *past the *door	SVA	6	5	PP	4
BKB+1986	*They're *shopping for a *chair	SVO	6	5	PP	3
BKB+1987	*They're *shopping for *eggs	SVO	5	4	PP	3
BKB+1988	*They're *shopping for *food	SVO	5	4	PP	3
BKB+1989	*They're *shopping for *potatoes	SVO	7	4	PP	3
BKB+1990	*They're *shopping for *shoes	SVO	5	4	PP	3
BKB+1991	*They're *shopping for *sweets	SVO	5	4	PP	3
BKB+1992	*They're *walking to *school	SVA	5	4	PP	3
BKB+1993	*They're *walking to the *shop	SVA	6	5	PP	3
BKB+1994	*They're *watching the *cricket	SVO	6	4	PP	3
BKB+1996	*They're *watching the *game	SVO	5	4	PP	3
BKB+1997	*Two *children are *going *out	SVA	7	5	N	4
BKB+1998	*Yellow *flowers are *lovely	SVC	7	4	N	3
BKB+1999	*Yellow *pears *fell off the *tree	SVA	7	5	N	4

BKB+2000	*Young *children like *playing	SVO	6	4	N	3
BKB+2001	The *two *girls are *watching	SV	6	5	D	3
BKB+2016	The *boy *found *his coat	SVO	5	5	D	3
BKB+2021	*Mother *stayed in the *shop	SVA	6	5	N	3
BKB+2024	*She *hides in the *shop	SVA	5	5	PP	3
BKB+2025	*Mother *fetches her *bag	SVO	6	4	N	3
BKB+2032	The *eggs *fell on the *floor	SVA	6	6	D	3
BKB+2033	*Father *waved from the *bus	SVA	6	5	N	3
BKB+2036	*His *football *shirt was too *big	SVC	7	6	PP	4
BKB+2039	The *young *girl *fell	SV	4	4	D	3
BKB+2047	The *ice *cream was too *sweet	SVC	6	6	D	3
BKB+2048	*His *new *coat was too *big	SVC	6	6	PP	4
BKB+2050	*Mother *waits by the *fence	SVA	6	5	N	3

Appendix D: Level 4 BKB sentences

Sentence number	Level 4 Sentence
BKB4_1	Father bought a paper from the shop
BKB4_2	Father called the fireman quickly
BKB4_3	Father came home and tidied the house
BKB4_4	Father came home late from work
BKB4_5	Father carried the Christmas tree in the snow
BKB4_6	Father cleaned his shirt in the washing machine
BKB4_7	Father cut his hand with the sharp knife
BKB4_8	Father forgot to go shopping after work
BKB4_9	Father found the paper on the kitchen table
BKB4_10	Father played football in the garden with his son
BKB4_11	Father washed the plates in the kitchen sink
BKB4_12	He helped his wife cook dinner in the kitchen
BKB4_13	He went to work on the bus
BKB4_14	He wore his gloves in the snow
BKB4_15	He wore his shirt at Christmas
BKB4_16	Her hair got wet in the rain
BKB4_17	Her shoe got stuck in the snow
BKB4_18	Mother cut her hand with the sharp scissors
BKB4_19	Mother drinks tea in the kitchen
BKB4_20	Mother forgot to brush her hair in the morning
BKB4_21	Mother found the small puppy in the big garden
BKB4_22	Mother goes shopping for flowers in the market
BKB4_23	Mother helped the driver find the new road
BKB4_24	Mother looked in the mirror to brush her hair
BKB4_25	Mother made dinner for the family
BKB4_26	Mother made jelly for the young children
BKB4_27	Mother plays a game with her children
BKB4_28	Mother reads a story to the young children
BKB4_29	Mother reads her paper in the garden
BKB4_30	Mother shouted at the cleaner who forgot to tidy the house
BKB4_31	Mother shouted at the naughty childen

BKB4_32	Mother shouted when the naughty cat jumped on the table
BKB4_33	Mother waits for a train at the station
BKB4_34	Mother waits for her husband at work
BKB4_35	Mother waves to her children at the school gate
BKB4_36	Mother went shopping for a new dress
BKB4_37	She argued with her sister for one hour
BKB4_38	She cut the Christmas cake with the sharp knife
BKB4_39	She cycled to school in the rain
BKB4_40	She drinks milk with a straw
BKB4_41	She drinks tea from a mug
BKB4_42	She found the money in her purse
BKB4_43	She reads her book on the school bus
BKB4_44	She wears her hat in the snow
BKB4_45	She went shopping for a new dress
BKB4_46	She wore her gloves in the snow
BKB4_47	She wore her raincoat in the cold rain
BKB4_48	She wore her scarf in the snow
BKB4_49	Somebody shouted at the naughty boy
BKB4_50	The apples fell from the broken bag
BKB4_51	The bench got wet in the rain
BKB4_52	The big box was under the lovely Christmas tree
BKB4_53	The big dog made an angry noise in the garden
BKB4_54	The big garden had nine apple trees
BKB4_55	The boy forgot his lunchbox at school
BKB4_56	The boy kicked the ball in the garden
BKB4_57	The cake shop shuts for one hour at lunch
BKB4_58	The car got stuck in the snow
BKB4_59	The children ate strawberries in the garden
BKB4_60	The children made a big snowman at Christmas
BKB4_61	The children played games in the car
BKB4_62	The children wear gloves in the snow
BKB4_63	The children were frightened when the big dog jumped
BKB4_64	The cleaner used a ladder to clean the windows
BKB4_65	The cook cut her finger with the sharp knife
BKB4_66	The cook made a cake for the young girl

BKB4_67	The family ate Christmas dinner and played games
BKB4_68	The family played games in the garden
BKB4_69	The farmer carried a big box of potatoes
BKB4_70	The farmer shouted as the bull chased the children
BKB4_71	The farmers boots got dirty in the mud
BKB4_72	The farmers coat got wet in the rain
BKB4_73	The father ate his lunch in the garden
BKB4_74	The father climbed the ladder to clean the roof
BKB4_75	The father played games with his children
BKB4_76	The five children were playing in the garden
BKB4_77	The husband brings his wife some pink flowers
BKB4_78	The husband cooked dinner for his wife
BKB4_79	The lady drives home from work
BKB4_80	The lady hurt her leg in the garden
BKB4_81	The lady suddenly stops her car
BKB4_82	The lady walked to work in the rain
BKB4_83	The lady walked to work slowly
BKB4_84	The lady was running across the snow and slipped
BKB4_85	The man washed the plates in the sink
BKB4_86	The nice people came too early for dinner
BKB4_87	The postman carried a big box of letters
BKB4_88	The school bus got stuck in the snow
BKB4_89	The school closed early for Christmas holidays
BKB4_90	The six people sat at the table for dinner
BKB4_91	The small boy lost his mother in the park
BKB4_92	The small girl was frightened when the light went out
BKB4_93	The three girls paid for the bill at dinner
BKB4_94	The young boy ate his lunch at school
BKB4_95	The young boy drinks milk in the kitchen
BKB4_96	The young boy forgot his football shirt at school
BKB4_97	The young boy forgot to wash his face in the morning
BKB4_98	The young boy forgot to wash his hands at lunchtime
BKB4_99	The young boy helped his father in the garden
BKB4_100	The young boy played games with his father
BKB4_101	The young children ate pink jelly for pudding

BKB4_102	The young children got lost for three hours in the park
BKB4_103	The young children have dinner at the kitchen table
BKB4_104	The young children play in the snow at Christmas
BKB4_105	The young girl found her doll on the floor
BKB4_106	The young girl hurt her hand at school
BKB4_107	The young girl waits by the gate for her mother
BKB4_108	The young girl wanted some sweets from the shop
BKB4_109	They played football in the park
BKB4_110	They're pushing an old car up a hill