A Human response to ambiguity: 
A psycholinguistic analysis

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Declaration

I hereby declare that this project is entirely my own work and that it has not been submitted as an exercise for a degree at any other university.

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“What have been thy answers? What but dark, ambiguous, and with double sense deluding?”

Milton
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Abstract

This thesis presents a structured analysis of ambiguity in everyday language situations and investigates the processes that are used for its resolution. Psycholinguistic experiments have generated conflicting answers over the years, but they have nonetheless brought us a step closer to understanding the mechanisms needed for language interpretation. The study on the human response to ambiguity compares children’s and adult’s intuitive judgements on a set of ambiguous sentences in an effort to determine the age at which children can detect this phenomenon.
Chapter 1

Introduction
1.1 Introduction

Linguists have debated over the way the human brain resolves ambiguity for decades, in an attempt to understand how the lexicon is stored and retrieved from the brain. If the complexity of ambiguity could be formally theorized, then the age old battle between an interactive model of language processing versus a model that is not influenced by higher-level semantic and cognitive processes, could be put to rest. The formal analysis of ambiguity has been a topic of interest for linguists for many years, dating as far back as the early 60s. The initial interest was in the time difference that arose when a subject read an ambiguous sentence in contrast to when a subject read an unambiguous sentence. It seemed to take longer for a subject to resolve an ambiguous sentence, indicating a higher complexity in the psycholinguistic processes involved in this type of resolution. Studies throughout the years have shown that there is a scale of difficulty on a cognitive level, in resolving certain types of sentences, like passives and inherent negatives. It is clear however, that as disambiguation is an important aspect of a native speaker’s linguistic competence, it is constantly applied in everyday language without the conscious effort of the speaker, raising the question as to whether it’s an innate predisposition we hold to language or whether it is acquired? It is a well-known fact that ambiguity is rife throughout spoken language, a fact that people often take advantage of. In the following sentence alone there are multiple cases of ambiguity.

“Could you pass me that thing over there please?”

“Could you...” could be taken literally to mean ‘are you able to’, in which a simple ‘yes’ or ‘no’ answer would suffice without ultimately leading to the desired effect of getting the object in question handed over, or as the intended meaning ‘will you” in its polite form.

“...that thing...” is a vague reference possibly due to a memory slip or maybe more interestingly, owing to a laziness of the linguistic processes involved in the retrieval of a word. “over there” is another vague reference, which may or may not be partially disambiguated with a deictic reference, but which all the same is not very specific and could potentially refer to an array of spatial locations. These types of ambiguous sentences may be due to the speed of spoken language. Perhaps it is quicker to be vague and allow the addressee to question the aspects of the conversation that need disambiguating to him/her. As could be imagined, a language with no ambiguity could turn out to be very long-winded and perhaps not very efficient. The example above might have to turn into:

“Pass me the clean spoon with the red handle which is sitting on the side of the stove, by the brass kettle, if it is possible for you to do so.”

Of course there are those that would argue that a language without ambiguity is impossible, unless the population used telepathic powers to mind-read one others’ intentions. How can a person ever be truly sure about what another person is trying to communicate? How do we know that the sentiments and feelings that represent happiness to us are the same that represent happiness to someone else? No two people are the same. We are moulded by the events we have experienced in the course of our lives and by the reasoning
we apply to these events, so it is hard to imagine that two people ever really comprehend each other’s realities. Language affords us the closest approximation to transmitting our views and our realities however, and maybe the widespread phenomenon of ambiguity is a testament to this lack of real communication. Yet surely it would have been in the interest of an evolving language to develop in an unambiguous way, so as to achieve a higher level of understanding? Was ambiguity a facet of language that emerged long after the initial establishing of a more specific type of language, or has it always been present due to a constraint in memory size or some other human limitation? Is it an advantage or disadvantage to language users?

If this is an unconscious process, then another question is raised. Is there a difference between perceiving ambiguities when a person is aware as opposed to unaware of it? Intuitively one would imagine that there is, and that this is reflected in the time difference there is in resolving ambiguities. If the subject knows that he/she is searching for more than one meaning it will take them longer to try and compute the various possible meanings, as they are aware of the potential the sentence has. Or is it the case that the various meanings of a word are always computed, but subconsciously, so that we only acknowledge the most feasible meaning(s) according to context or word frequency? These are but few of the questions that I will be focusing on in the following chapters.

1.2 Motivation

Ambiguity in language is an extremely interesting phenomenon and one that applies to all the fields of linguistics, all be it indirectly. There is ambiguity in the way words are pronounced, in their meaning, in the tonal qualities behind an utterance, in the way words are assembled to make a sentence... the list goes on and on, and little by little it becomes obvious that it is an extraordinary trend that has spread through phonetics, semantics and syntax, corrupting every aspect of linguistics. The most astonishing quality about ambiguity, is it’s ability to make itself invisible and go unnoticed by most people in their everyday lives. People communicate with each other every day and on face value, it seems to work surprisingly accurately, but when the subject is studied a little more thoroughly, it begins to seem like a miracle that people understand each other at all. (Cushing, 1994) conducted a study into the communication between airplane pilots and control tower officers and the results which he published in his book were startling. He describes numerous incidents of misunderstanding, some ending in tragic accidents, the most horrifying of these resulting in the death of 583 passengers. In this particular incident the ambiguity lay within the confusion caused by giving the pilot a trajectory plan that seemed like a command to take off, but which was intended as preparation given while the pilot awaited take off orders. Other incidents described are due to homophony\(^1\), terminology, which assigns unfamiliar meanings to familiar words, and assumptions, made on the basis of what one expects to hear, among other more technical reasons.

\(^1\)Homophony is the instance when two words which have different meanings sound alike
Even though the presence of ambiguity in this scenario can lead to fatal accidents, as has been mentioned, there still have been no changes in the systems used by pilots and air traffic controllers. Taking this into account, is it fair to say that it seems strange that ambiguity developed in a language that evolved to benefit our survival? It may have evolved due to the competitive nature of humans, perhaps an individual survival instinct, that isn’t interested in the community’s survival, but just of one’s own survival. This could suggest a language evolution hypothesis that supports ambiguity. Man made bonds with others through language to increase his chances of survival, but each individual’s own survival and prosperity was more important than the survival and prosperity of the other people in the group, thus language could have developed with a way of deceiving others to ultimately benefit oneself.

Being made aware of ambiguity and the consequences bad communication can cause, raised my interest in the subject. It was an awakening experience, like finally noticing the proverbial elephant in the room and wondering how on earth I had missed it before. Although the analogy is a bit simplistic, what I am trying to express in the least ambiguous way possible, is that when I took on this project I was astounded by the fact that I hadn’t noticed the regular occurrence of ambiguity that is hidden within most sentences. This is perhaps why ambiguity has developed to have such a tight grip on the spoken language, as most of the time, we simply just ignore it. Another facet of ambiguity that I was surprised to discover, was how invisible it can be even when the resolution is used as an explicit process for our own entertainment. Sharing a joke with a good friend, listening to a comedian; these are all instances of using disambiguation for amusement. It is hard to explain the process involved when a joke falls into place and the funny meaning of a seemingly serious utterance is exposed. Yet, the comedian isn’t disambiguating the sentence, he is actually doing the opposite. He is creating an environment for the sentence to seem sensible and tricking his audience into a false sense of ‘safety’, then ripping the carpet from under their feet by making them aware of the ambiguity, the meaning that is funny due to its unexpected unveiling. The comedian is using the audience’s lack of awareness to the ambiguity, in order to get a laugh. I find this process extremely curious, especially because it happens to every one of us, yet is still so hard to explain. What motivated me most to devote my thesis to this subject, is the versalitility of ambiguity. The instances of ambiguity I have just mentioned only scratch the surface of the countless disguises it can take and I couldn’t help but to try and delve deeper into the characteristics that make ambiguity so ambiguous.

1.3 Aims

The aim of this thesis is to give the reader a background in ambiguity and the extensive work that has been carried out in an effort to find a reasonable explanation that unifies the different types of ambiguity resolution. It is also my intention to examine the differences that exist between the way children resolve ambiguity and the way adults do. The critical language learning period is known to be the period within a person’s life, from childhood
CHAPTER 1. INTRODUCTION

until puberty, when the child acquires the skills (and perhaps the tools, depending on whether Chomsky’s innate predisposition of language is supported) to create grammatically correct utterances. It is believed that if a child has not had any contact with human language within this period, then they will never be able to make well-formed sentences or be able to express themselves verbally. There have been many sad discoveries of feral children, who for reasons of neglect were forced to live without human contact until discovered years later. Most of these children were closely observed after their discovery, and studied by enthusiastic linguists as they presented crucial evidence that would build the critical language acquisition period hypothesis. One of the most well-known cases was that of a little girl, Genie, who had been locked up in a room with very little human contact until the age of 12. Linguists desperately tried to teach her the language after her placement in a hospice and subsequently into a series of foster homes. It seems she did acquire language which allowed her to express her like or dislike for something and requests for other basic needs. She acquired many nouns, but unfortunately, because of the late stage of language stimulation, it seems her progress remained stagnant when it came to making grammatically coherent sentences (Newton, 2004). The assumption I am eager to examine, is that if children that are just coming to the end of the crucial language acquisition period have indeed acquired the grammatical knowledge they need to understand and replicate language, is it fair to say that they should be able to perceive ambiguities as well? Is the process of resolving ambiguity purely a grammatical process that is applied exhaustively until every meaning of a word/sentence is discovered, or is it a separate process that only happens when the potential for an ambiguity is perceived due to the unbiased context in conjunction with a person’s world-knowledge, suggesting that it is a processing technique that is acquired later on in life?

1.4 Overview

The different chapters in this thesis are primarily concerned with the different stages that are required to carry out an empirical psycholinguistics study on ambiguity. Chapter 2 gives an overview of ambiguity and it’s different traits. It allows the reader to be more aware of the everyday occurrence of ambiguity and perhaps appreciate why so many have devoted their careers to resolving the processes involved in understanding it. It also gives a brief description of the different types of ambiguity and the influences that surround it. Chapter 3 is concerned with the history in this field of linguistics and with the development of different experimental designs. It describes the evolution of different hypotheses as a result of empirical studies and highlights the need for different models of research to gather more accurate and well-rounded data. Chapter 4 concentrates on the occurrence of ambiguity in Sign Language. It is imperative that assumptions are questioned and re-examined frequently in an effort to keep an open mind about the supposedly concrete facts that build those assumptions. I felt it was necessary to investigate the occurrence of ambiguity in a language that is structured differently, but that retains the same grammatical complexity and level of expressivity of spoken language. I found a surprisingly small amount of research
on ambiguity in Sign Language, yet I was interested by the information I did manage to find as, against my better judgement, I expected to find that it would be just as rampant in SL as it is in spoken language. Having given a broad background on the knowledge acquired so far regarding ambiguity and the research involved in coming to these conclusions, Chapter 5 gives an insight into the study I have carried out on the human response to ambiguity. It draws attention to the concerns that an experimenter must take into account before setting an experiment, concentrating on the collection of intuitive data. It also explains the steps that were taken to ensure that the empirical study would yield the most reliable results. Chapter 6 describes the results and compares the answers between scripts in an attempt to determine any discrepancies between subjects belonging to different categories, age, gender or left/right handers. Finally, in Chapter 7 I will describe the conclusion to these findings and speculate on further research that I would like to see undertaken.
Chapter 2
Ambiguity
2.1 Different uses of ambiguity

There are many different types of ambiguity across spoken and written language, most of which are dealt with subconsciously by people in their everyday lives. Presumably the larger portion either going unnoticed or being resolved correctly. Ambiguity serves many different purposes, and although it seems more of a hindrance than an advantage to language users, it is rife among most spoken languages.

- **Humour and Sarcasm**

There are instances where ambiguity is used purposefully to add emphasis in a humorous way. Ambiguity is used as a means of creating unlikely scenarios that cause people to imagine funny scenes or unexpected images. There are different degrees of ambiguity used in humour, and comedians will often ambiguate a seemingly innocuous comment by changing their tone to make the less likely meaning more evident. In a well-known comedy series Friends, the difference in the stress patterns of the two sentences allows one of the characters to utter the same sequence of words twice, giving the second utterance the opposite meaning to the first, one disparaging and the other complimentary.

“You got an agency offer based on THAT play?!?”
“You got an agency offer based on that PLAY!!”

Phoebe ‘Friends’

Sarcasm is when a person says the opposite of what they really mean. It seems to be the surprise element of ambiguity, the hidden facet of a seemingly innocent sentence or joke, that causes people to laugh. The interesting thing about this type of ambiguity, is that unlike everyday language processing, where ambiguity resolution is thought to be a subconscious thing, ambiguity in humour is very much the opposite, relying heavily on world knowledge, often leaving some disgruntled people muttering:

“I don’t get it...”

Another interesting aspect, is that it often loses its appeal when it’s explained, suggesting that perhaps half the delight experienced when listening to a good joke could be the same kind of pleasure gained by completing a riddle or puzzle of some sort, mixed with a sense of community with the other people who are invited to share the joke. If the conscious processing of ambiguity is so satisfying, then why is it so deeply hidden from us when we deal with language everyday? Could this support the theory that ambiguity just isn’t noticed when the context of a conversation influences it’s meaning, making the other blind to us?
• *Puns and headlines*

Another use of ambiguity in society is found all over the daily newspapers. There is a lot of competition among newspapers and magazines to come up with the most daring pun, or the most shocking slogan, to catch their reader’s attention. However, nowadays the media must be careful, because making unfounded allegations is a serious offence, which could cost a newspaper a lot of money and a reporter his/her career. The solution, is to use cleverly manipulated ambiguous headlines to suggest something that the readers might find interesting, without actually having to take responsibility for the assumptions the readers make. This is a tactic which is popular with tabloids, renowned for their irresponsible reporting. Yet, countless instances of ambiguity can also be found within the pages of respected newspapers. After all, even well-established newspapers need to compete in their corner of the market, so headlines are often short and lacking in disambiguating grammatical features, sometimes resulting in comical puns:

“POLICE BEGIN CAMPAIGN TO RUN DOWN JAYWALKERS”
“TWO SOVIET SHIPS COLLIDE, ONE DIES”

In the first of these puns, the ambiguity lies within the double meaning of ‘to run down’, which is intended to mean that the police are hoping to ‘discourage’ or ‘stop’ jaywalkers. The obvious comical value comes from the fact that it can also be taken as the literal meaning of ‘to run down’. The second ambiguity is of the referential kind. At a glance, it seems that the article is reporting the death of a ship, as no people are mentioned, yet the impossibility of an inanimate object actually dying allows the reporter to assume that the reader can make a logical link between the verb ‘dying’ and the unmentioned crew member.

• *Deceit*

Ambiguity is a great method of saying something without actually having to say it and tabloids aren’t the first to have realised this. Ambiguity and question dodging has been used by politicians and people in power throughout history, and has been perfected as an art form by many. Politicians have even been known to take lessons to deal with unwanted questions asked at public press conferences. It is a remarkably successful way of confusing someone just long enough to move onto another subject, avoiding accusations of lying and misinforming the public, as it is hard to prove the private intentions of another person.
2.2 The human lexicon

The process of resolving ambiguity is intuitively connected with the way the brain stores the lexicon and the methods it uses to retrieve the information attached to a certain word. No matter what hypothesis is supported in the resolution of ambiguity, it cannot be proved in isolation of the other internal processes that are made use of in language comprehension, therefore it is important to give a brief explanation of these processes in order to understand how they interact with each other.

2.2.1 Written and spoken word recognition

Word recognition is an interesting topic, especially because the different ways in which we do this draw on different abilities. The main difference between written and spoken word perception, is that one is distributed through space and the other through time, the latter allowing us to re-scan or re-analyse when ambiguities are encountered (Lively, Pisoni, & Goldinger, 1994). Could the transient nature of the speech signal be the reason for ambiguity going unnoticed in everyday speech? Many current models of the word recognition process converge in their views on some basic processes. The activation process is one of these. The old idea of an exhaustive serial search through the mental lexicon seems untenable when compared with the efficiency and speed of word recall, especially when it is believed that an adult’s lexicon contains over 30,000 words. The parallel activation method is when the word-input is matched against a stored representation of the acoustic-phonetic structure of the word. As the first elements of the input are heard the words with matching acoustic-phonetic structures are activated to form the initial set from which the correct word will ultimately be chosen. As more and more of the input is heard, the set is reduced to contain the matching word. What linguists are trying to discover, is whether the disambiguation process begins after the word has been isolated or do external influences interact with this activation process to isolate not the word, but the biased meaning of the word.

- Word frequency
  The frequency of use of a word is a highly studied phenomenon in linguistics. It seems that high frequency words require less acoustic-phonetic information for recognition than low frequency words do, suggesting that high frequency words have lower activation thresholds, which allow them to be retrieved from the lexicon before low frequency words with higher activation thresholds. The only drawback to this theory is the way in which frequency is measured, which although is regarded as reliable, cannot be called accurate. Word frequency has normally been determined by counting the occurrence of words in written texts (Kucera & Francis, 1967), but the frequency of written as opposed to spoken words might be quite different. Nonetheless, this is an important aspect of lexicon retrieval as it has supplied interesting explanations as to why certain words are recognised before others. It is also useful as it plays an important part in ambiguity resolution, giving a stronger advantage to the more
frequent meaning being perceived. An ambiguous word has a hierarchy of meanings, the most frequent being the first to be activated when the word is encountered. The frequency of the meanings of ambiguous words can differ. A balanced ambiguous word is one that has two or more meanings at the higher echelons of the hierarchy, meaning that both are referred to, roughly the same amount of times in everyday language, for example ‘pipe’ meaning a ‘smoking pipe’ or a ‘plumbing pipe’. An unbalanced word refers to ambiguous words who instead have one meaning that is used more frequently than the other, for example ‘port’ which can take on the meaning of a ‘shipping port’ or that of a ‘wine-port’. Linguists have used the knowledge gathered on the retrieval of words from the lexicon, to test whether context can override the predisposition to recall the most frequently used meaning before the rarer meaning, and it is in this capacity that this particular characteristic can be of interest to the resolution of ambiguity.

• Activation theory

A word is stored in the brain as an item with syntactic, semantic, phonetic and orthographic values. This is basically the information about the word and it’s relationship with other words and with the world, real and virtual. It includes the form of a word and its arguments and semantic roles within sentences. The activation theory is the theory which governs association links between words. It is believed that when one word is uttered or heard in the vicinity of another, this information is stored as a link between the two words, which is strengthened according to how frequently this link is used. If a link is very strong, and one of the words is heard, it is possible that the other word is activated in the lexicon for easy retrieval. Priming studies have been carried out, where subjects were shown a sentence and then presented target words. These could be related to one of the interpretations of the sentence or completely unrelated. The responses were timed and the time it took was thought to reflect the degree of activation that neighbouring words or context had on a specific target word. For example, a subject might be shown a sentence resembling the following: “The church bought new pipes for the organ” and subsequently shown different target words, like music, heart or paper. Subjects showed slower reaction times to the unrelated words, suggesting that if a link between two words is strong enough, the activation threshold of the related words may be lowered, resulting in faster reaction times\footnote{For a complete discussion of priming methods see (Haberlandt, 1994).}.
CHAPTER 2. AMBIGUITY

- **Lexical Similarity Effects**

The lexical similarity effect concentrates on the relationships between words that are closely related phonetically (i.e. differ only in one letter) as opposed to the frequency of a word, which is concerned with the statistical distribution of that word. There are different degrees of lexical similarity between words and the scale given to these calculations, called the N-metric, was devised by (Coltheart, Develaar, Jonasson, & Besner, 1976) to determine how similar two words can be. Two words are said to be neighbours if they are lexically similar. This can include being visual neighbours (ex. sand and wand), auditory neighbours (ex. vote and vogue) or both (ex. bat and cat). It is important to note that the influence that the lexical similarity effect has on word recognition could in turn influence ambiguity resolution, as studies by (?) have shown that words that come from dense neighbourhoods tend to be recognised less accurately than words that come from sparse neighbourhoods, even though they are of the same frequency. This could therefore be an explanation as to why one meaning of a supposedly balanced word is chosen above the other. All these internal processes could play a bigger role than has yet been accredited to them, but it is difficult to measure just how constraining their influence is on ambiguity resolution. Yet, the difficult task of fitting all the pieces of the puzzle together is well underway, and as more and more new research generates new evidence, we begin to gain a clearer picture. Ambiguity research is not all as abstract as it sounds however, so let’s concentrate on the concrete facts that linguists have to work with.

2.3 Different types of ambiguity

2.3.1 Lexical ambiguity

There are different types of ambiguity, drawing on different grammatical aspects. The most obvious of these is lexical ambiguity. This is based on the semantic features of a word. Lexical ambiguity is when a word has more than one meaning and can thus be used in various circumstances. This type of ambiguity can be split up into different categories, including homonymy and homophony. Homonymy is when a word, both spoken or written, has more than one meaning. These meanings are believed to be graded on a scale of frequency of use and lexical similarity effects in the lexicon, which, together with context and bias, influence which meaning is chosen. Homophony, or oral ambiguity, is when two words denoting two different things have the same phonetic structure (i.e. sound the same). An example of homophony would be ‘flower’ and ‘flour’. This type of ambiguity only materialises in spoken language, as the spellings each word have, differentiate the two possible meanings. A comical example of lexical ambiguity (and language change between generations), is one that I heard happened to my sister recently. A student was being a little boisterous in class, so the teacher asked:

Teacher: “Do I look green to you?!”
Student: “No.. Miss.. you look fine...”
The teacher had clearly intended to ask a rhetorical question, asking whether the student had actually believed that she wouldn’t have noticed her cheeky behaviour. The age gap between teacher and student could not be bridged however, and the confused student thought she was being asked her opinion on whether the teacher looked sick. Unfortunately it didn’t help the situation when the student responded, as the teacher didn’t appreciate the comical aspect of the ambiguity.

2.3.2 Surface structure ambiguity

Surface and deep structure ambiguities are more reliant on the word’s grammatical role and it’s relationship with the other words within a sentence. Surface structure ambiguities are ambiguities that occur as a result of the way a sentence can be broken down. For example, in the sentence:
“Old men and women were given first priority on the lifeboats², the adjective ‘old’ can modify the noun men or it can modify the syntactic grouping ‘men and women’, allowing this sentence to be interpreted in two different ways depending on which distinctive syntactic structure is chosen. It is believed that this type of ambiguity can sometimes be disambiguated in speech by using distinct stress patterns, pitch, intonation and disjunctures for each possibility, but it has been observed that the context surrounding the ambiguous sentence will often override the intonation patterns leading the listener to believe that they heard the ‘correct’ stress correlates to the biased interpretation (?). This introduces another aspect to the invisibility of ambiguity; many instances of ambiguity go unnoticed as we simply hear what we expect to hear. This may seem of little importance, but it has been noted in memory recall studies, that what is thought to be heard is more important than what is actually heard, as this is what is stored in the short term memory for later referencing.

2.3.3 Deep structure ambiguity

Deep structure ambiguity differs from surface structure in its potential to be disambiguated with intonation changes. It occurs when a word can have more than one grammatical function in a sentence. In the example:
“Visiting relatives can be a nuisance³ the verb visiting can take on two different grammatical roles, the first denoting the verb ‘to go and visit’ and the second as an adjective modifying the noun ‘relatives’. This versatility gives the sentence two completely diverse interpretations. It has been found that this type of ambiguity is the most complex type to resolve, according to timing studies that have been carried out on this subject.

²This example is taken from (Kess & Hoppe, 1981).
³Another illustrative example taken from (Kess & Hoppe, 1981).
2.3.4 Intention

Other types of ambiguity also exist, but these are less reliant on grammatical roles and more reliant on the intentions of the speaker. There are many ambiguous utterances, that taken the circumstances surrounding us, we fail to notice consciously. In an utterance like: “It’s freezing in here!”
the speaker is not showing off their ability to make useless remarks, but is instead requesting that the other person in the room to do something about it, like close a window or turn the heating on, or it could be interpreted as a warning that the speaker is going to do something about it and that the other person better not complain. If we take another utterance:
“I cut my finger”
the ambiguity rests within the interpretation of the act being accidental or deliberate. A volitive state would result in worry for the speaker and perhaps therapeutic help being sought, an accidental interpretation could result in sympathy and a band aid. Ambiguity is also present in rhetorical questions, as even though a question is asked, an answer is not expected. The ambiguity surfaces when the addressee doesn’t understand the intention of the speaker and responds.

2.4 Conclusion

It is thus apparent that ambiguity is hidden within most utterances we make, whether we realise it or not. It’s uses range from the desire to make someone laugh, to the desire to deceive and betray, and both these arguments could be applied to various hypotheses on language evolution, one supporting language emergence as a social bonding phenomenon (i.e. the gossiping hypothesis) and the other supporting a modified hypothesis of language emergence as a survival technique i.e. the life-or-death hypothesis. Either way, it is obvious that the need for ambiguity in language has always been present. The fact that so many different forms exist, is testament to this. In processing terms, ambiguity resolution is a grammatical mechanism that relies heavily on the capacity and ability of the human lexicon. When word retrieval and ambiguity resolution are examined together, a clearer picture comes into view. The theories that have been formulated on lexicon storage and retrieval, help linguists to better understand the reasoning behind the responses gathered from subjects in different experimental situations. In the following chapter, I will attempt to describe some of these studies.
Chapter 3

A history of the research on ambiguity
CHAPTER 3. A HISTORY OF THE RESEARCH ON AMBIGUITY

3.1 Introduction

As I have already mentioned, it is important to build the foundations of any science on a wide range of experiments to gain a broad view of the subject in question. In ambiguity, numerous methods of research have been carried out in order to formalise theories on the processes that interact to resolve ambiguity. There have been time-measuring tasks, grammatical tasks and even intuitive data collection tasks. These different research styles have been of great benefit to linguists as each method has yielded a different part of the puzzle. In this chapter I will describe early methods of research and comment on how they have contributed to the development of different hypotheses. I will also discuss how these methods have evolved over time and the degree of accuracy that these new studies allow.

3.2 Early methods of research

3.2.1 Sentence completion tasks

It is necessary, when studying ambiguity or indeed any other aspect of experimental science, to examine the work that has already been carried out to gain a better understanding of the experimental process and to try and avoid any problems or complications that have previously arisen. There have been many different types of studies conducted over the years, none without their fair share of criticisms. Sentence completion tasks were a popular method of researching the process involved in resolving different types of sentences. A subject is given a fraction of a sentence and asked to complete it; this gives the linguist the scope to examine time differences that arise in resolving different types of sentences, the complexity of the ambiguity type, the differences encountered when a subject is given a fraction of a clause, a whole clause, or a clause and a fraction of the sentence completion leading the subject and thus creating a bias toward a certain answer, and to test whether the ambiguity resolution is noticed on a conscious level. This type of study also allows linguists to analyse the clause as a primary perceptual unit. Sentence completion tasks that were carried out by (Garcia, 1976) and (Kess & Hoppe, 1981) on English speaking subjects, suggested that on a scale of complexity unambiguous items proved the easiest to resolve, followed by lexical and surface structure ambiguity, the most difficult being deep structure. When the same type of study was carried out in Japanese however the results were considerably different, showing that the processes used in ambiguity resolution are not universal throughout different languages. In English for example, homonyms (phonetic ambiguities), can be disambiguated through the spelling of the word, whereas in Japanese some words can remain ambiguous when written in their syllabic form, but can consequently be disambiguated when written in their 'Kanji' form (the Japanese language makes use of more than one alphabet\(^1\)). Unfortunately, these studies were often criticized as being too clinical, the main concern being that in a test situation where a subject is

\(^1\)For more information see (Kess & Hoppe, 1981)
asked to complete a sentence, an elevated awareness of the cognitive processes could result in an unnatural environment to test a natural phenomenon.

### 3.2.2 Sentence-picture tasks

Another type of study that was used to test ambiguity and to a certain extent memory and lexicon storage, was carried out by (Foss, Bever, & Silver, 1968). Subjects were shown a sequence of ambiguous and non-ambiguous sentences, and then shown pictures that corresponded with the meaning in different degrees and asked whether the picture matched the sentence. When an expected picture was shown, (i.e. if the picture depicted the unambiguous sentence, or the most common meaning of the ambiguous sentence) the subjects seemed to have no difficulty in answering and reaction times were short, suggesting that a second meaning of the ambiguous sentence hadn’t even been recognised. However, when an unexpected picture appeared (i.e. one depicting the least likely meaning) reaction times were longer. This could suggest that subjects access the most likely interpretation from a hierarchy of meanings, and when it doesn’t match the context it’s in, backtrack to find the next most likely interpretation, working their way down until they have found a match. This theory is analogous to the ‘garden path phenomenon’ supported by (Cairns, 1973) and (Cairns & Kamerman, 1975). An interesting aspect of this study is that when subjects were asked to recall sentences that had been presented to them earlier on, they recalled the sentences whose ambiguity had been noticed above unambiguous sentences or sentences whose ambiguity hadn’t been noticed, suggesting that because they were forced to analyse the less likely meanings, it was better encoded in their memory (Bock, 1978).

### 3.2.3 Target-phoneme tasks

The degree of ambiguity is greatly influenced by context and bias, and much research has been carried out to try and determine how to take these factors into account. As mentioned before, context is regarded as a blend of the pragmatic conditions and the linguistic surroundings the ambiguous item finds itself in. Different studies have examined different kinds of contexts, most being from a word up to a sentence long. One such study was carried out by (Swinney and Makes, 1976) using target phoneme monitoring, yet another method to try and determine the complexity of ambiguity. Phoneme monitoring is a classic technique that was very popular in the past. It involved the subject listening to a sentence and attempting to locate a particular phoneme. When the phoneme was detected the subject had to press a button and thus the reaction times were recorded. The results showed longer reaction times for ambiguous words preceded by a neutral context, as would perhaps be expected, as the context would not constrain the ambiguous item to one specific meaning. It was also noted that single word contexts are not as powerful as longer contexts in reducing the probability of more than one meaning being found. Increasing the number of context words creates a stronger possibility that any of them will uphold a direct relationship with the ambiguous lexical item, thus increasing the chances of bias. (Suls & Weisberg, 1970) tested context influence on ambiguity by asking subjects to read
a passage up to 70 words long and subsequently asking them questions about the rela-
tional links they made between the passage and the ambiguous word. This was an unusual
study to undertake as most linguists concentrated on smaller context samples. The results
pointed toward a single reading hypothesis, the long context biasing the ambiguous word,
but it in no way disproved the likelihood of multiple readings being processed in different
circumstances. Results from other experiments seem to in fact support the multiple read-
ing hypothesis in circumstances where the prior ‘biasing’ context is limited to one word.
Complexity levels seemed to remain the same, suggesting both meanings are present. The
main drawback of this method of analysis was the large number of variables that influenced
both the phoneme monitoring task itself and the interpretation of the time it took. This
is why it yielded so many varying results. Nowadays, it has virtually disappeared from
lexical sentence processing experiments, but still retains it’s uses for auditory tasks.

3.2.4 Colour-naming tasks

(Conrad, 1974) suggested a compromise on the single and multiple reading hypotheses,
proposing a context-independent processing stage, the context only playing a part in the
disambiguation later on in the resolution of the sentence. A colour naming task was used,
where the length of time it took a subject to name a given colour or the colour of the
ambiguous word, was directly correlated to the complexity of the ambiguity, much like the
phoneme monitoring task. These studies did not escape criticism however; again it was
believed that the test- like environment drew more attention and focus to a process that
would normally be subconscious, influencing the results.

3.2.5 Dichotic-listening task

A completely different type of study was carried out by (Lackner & Garrett, 1972) as an
attempt to create an experiment whose intention wasn’t obvious, and therefore decrease
the chances of in- accurate results. To a certain extent, this was managed, as no subject
was reported to have known what the study was about when questioned afterwards. The
downfall was perhaps the complexity of the task; subjects heard an ambiguous sentence
in one ear and slightly later heard the disambiguating context in the other ear, at a level
just below threshold. They were then asked to formulate what they had just heard in their
own words. It was found that both meanings could be transmitted by changing the biasing
context, suggesting a multiple reading theory. As I mentioned already, the only complaint
was that the subjects found the task very difficult, leading to some criticisms on whether
the same process occurs in more natural situations or whether the pressure caused by the
experiment raised their attention to the meanings. This is unfortunately a question that
is difficult to answer with certainty.
3.3 The evolution of different theories

3.3.1 Early theories

There have been various theories on ambiguity resolution, the core of which, still hold true to this day, perhaps though viewed differently. Although linguists searched for a clear cut answer to ambiguity resolution, more than one theory was proved plausible in the face of countless experiments that were carried out in this field. To many frustrated linguists, this was perhaps their weakness. Different experiments seemed to support different views, however, a consensus on the two leading theories was reached. The first was the multiple meaning theory. When an ambiguity is encountered, multiple meanings of the word are activated in all contexts, implying that all the options are recalled, and only then do the other components in a sentence/utterance influence the final decision. The second was the single meaning hypothesis, a context dependent model. This supported a more interactive comprehension and resolution system, in which all components of the sentence play a part simultaneously in it’s resolution. Since even the earliest experiments, a contrast was noted in resolving different types of ambiguity, the main focus being on three different grammatical types. In early studies conducted by (McKay & Bever, 1967), lexical, surface structure and deep structure levels of ambiguity were found to yield different results when compared in empirical studies, but as more and more studies were carried out, the results proved inconsistent. Nevertheless, it was this early experimentation that awoke a pointed interest in the psycholinguistic field of ambiguity resolution. McKay and Bever had formalised three theories:

- Suppression hypothesis
- Fusion hypothesis
- Oblivion hypothesis

The suppression hypothesis supported a single meaning theory, to the exclusion of others. The fusion hypothesis supported a type of multiple meaning theory where both meanings were perceived contributing to a fused interpretation, and the oblivion hypothesis supported neither theory, stating instead that neither reading was believed to have been perceived until the unambiguous context had narrowed down the scope to one meaning. Although elements of these hypotheses are discernible throughout ambiguity research, it was and to a certain extent still is, the need to unify ambiguity resolution into a set pattern, without taking circumstances into account, that caused the disputes between certain theories to go on for so long. Another consideration, was that experiments carried out by (Kess & Hoppe, 1981, p. 31), showed a difference between processing sentences that contained a single ambiguity, (i.e. had two possible meanings) as opposed to sentences that contained multiple meanings. Studies showed longer processing times for the multiple meaning sentences, which could have been due to two different processes: if we assume each added ambiguity adds a different meaning, we would reason that it would be more...
complex to compute, lessening its chances of detection. If instead the context dependent hypothesis is considered, then a multiple meaning hypothesis would increase the difficulty of resolution by increasing the chances of the context becoming ambiguous also.

3.3.2 Current theories

The psycholinguistic field of ambiguity resolution has benefited greatly from years and years of research, and although it is hard to find an answer that satisfies everyone and so far impossible to prove any theory conclusively, it has led linguists to a much broader understanding of what the process entails. It is clear that more than one specific process is at play, and that different circumstances lead to different ways in dealing with certain aspects of language. New theories have emerged, which although retaining the essence of the hypotheses that were first put forward, encompass a more general view of language processing, taking into account the surrounding influences. Much like the single reading theory, the context dependent model is when only one reading is recognised due to the constraining influence of the context that surrounds the ambiguous lexical item. The multiple meaning approach, is when more than one meaning is discerned, and one is chosen according to the context. This differs from the first, in that the process is split in two halves; the first retrieves all the possible meanings from the lexicon and the second decides which word is the appropriate one, whereas the context dependent theory is a process in which one specific meaning is retrieved according to the context. The latter could be explained by the activation hypothesis. The third theory is based on the relative frequency of use of the ambiguous word. It has been observed in various studies that frequently used words require less time for identification that words that are used less frequently. This is not surprising, as it is easier to recognise and use a familiar word than one that has just been acquired. This could be due to the fact that it’s semantic values have a considerably smaller number of established links with other words in the lexicon, having been used less frequently, thus increasing the activation threshold. It is becoming clearer that these theories are only plausible when viewed as intricate parts of a larger system working in conjunction to resolve ambiguity. The context dependent model is used when the context precedes the word, and more successfully still the longer the context. The multiple meaning approach is used when the context follows the word, or when the word is found in isolation and the relative frequency theory is used in either of the above cases to highlight the most frequent choice over the other. Simply put, there is strong compelling evidence that points to both multiple and single reading hypotheses, but this is not as contradicting as it first seemed. Strong influences like the frequency of a word and the context surrounding it, control which process is more likely to be used.
CHAPTER 3. A HISTORY OF THE RESEARCH ON AMBIGUITY

3.4 Current Methods

3.4.1 Eye Gaze

The advances in technology have made it possible for linguists to avoid the unnatural situation created by colour monitoring or dichotic listening tasks, like those mentioned above\textsuperscript{2}. Eye gaze studies seem to be a much more unobtrusive way of analysing a subject's reaction times. A subject is asked to read a sentence and the length of time his/her eyes rest on a specific word is correlated to the difficulty found in processing that word. Eye gaze studies carried out by (Rayner & Sereno, 1994), focused principally on the effect context had on ambiguous words with meanings of varied frequencies. Two separate studies were undertaken, one concentrated on the effects of context following the ambiguous word, and the other on the effects of context preceding the ambiguous word. Both examined the consequences of dominant biased context and subordinate-biased context. This is when the context is biased toward the most frequent meaning and the least frequent meaning, respectively. The results were very interesting.

• **Context preceding the ambiguous item:**
  The dominant-biased sentences seemed to show no time difference in eye gaze between balanced and unbalanced homographs, whereas the subordinate-biased sentences seemed to result in longer gaze durations on unbalanced homographs. This is what Rayner called reordered access, a theory stating that when the context is biased toward the less frequent meaning, a decrease in the activation threshold is caused, allowing the subordinate meaning to compete with the dominant meaning, ultimately turning the unbalanced ambiguous word to a balanced one.

• **Context following the ambiguous item:**
  When the context follows the ambiguous item, it was found that subjects tend to gaze longer at balanced ambiguous words than at unambiguous control words, which is hardly surprising, as the two possible meanings battle it out until one is chosen according to the context, but what is interesting, is that the study didn’t show the same difference between unbalanced ambiguous words and ambiguous control words. This supports the relative frequency theory, suggesting that when a meaning of a word is more frequent than the other it is the favoured choice. As Rayner’s experiment proved, the position of the context in relation to the ambiguous item is yet another factor to take into account. Other studies support this theory, but it is not consistent, as it is hard to define what exactly constitutes as context. Context can vary between one word, a clause, a sentence, a play, a book, a conversation... making it impossible to record what is retained to aid disambiguation. An experiment was conducted by

\textsuperscript{2}See section on early methods
(Simpson, 1981) on the degree of bias that context can have on an ambiguous word. Unbiased context, context that is weakly biased toward one meaning and context that is strongly biased toward one meaning were all examined, but again there were criticisms based on the inability to accurately describe qualitative differences among contexts that lead to biased or unbiased distinctions. Nonetheless, as more studies are carried out, the foundations for future theories are strengthened.

3.5 Conclusion

It is has been a long running debate, with no clear-cut outcome. Experiments including sentence completion tasks, phoneme/colour monitoring, priming and eye gaze techniques have been used, but all under the criticism of being too clinical for them to present a realistic representation of what is actually happening inside the brain. And even though time monitoring has shown us that generally ambiguous sentences lead to lower performance levels, it is impossible to say why this is happening. Is it due to the multiple activation of different meanings, or is it caused by trying the first meaning activated, verifying it against the context, failing, therefore leading to the activation of the second meaning and so on and so forth? The main reason for the difficulties encountered in this sort of undertaking, is the huge range of unknowns, the divisions and sub-divisions that make up the layers of complexity of language processing. The context, bias, world-knowledge and individual differences that influence a sentence and the subject processing the sentence are all extremely hard to measure in an accurate way, and that’s before taking the different types of ambiguity into consideration. Some linguists have tried to measure the degree of ambiguity in words. (Kooij, 1971) did this by calculating the number of meanings a word had and by checking what type of ambiguity they demonstrated (i.e. synonymous or homonymous...) and graded the word on a scale accordingly, but this was never regarded as more than a guideline, as it could not be proven accurate. The individual differences in language knowledge borne by individual experience, just seem too great to show a clear picture. Some findings suggest that ambiguous words are easier to recognise than unambiguous words, perhaps because they are stored twice in the lexicon resulting in easier retrieval, or because they are more frequent, and due to being heard more often are higher up in the hierarchy than less frequently used words. Findings also show that it is easier to retrieve two meanings of a word when they are related in some way, for example ‘plow’, which whether functioning as a noun or a verb has connotations with soil, digging or farming, instead of ‘plant’ whose meanings represent two separate entities, ‘living plant’ and ‘power plant’. This is just one example of the extensive variety of ambiguity and ambiguity resolution, so it’s easy to see why linguists have encountered so many problems in coming up with a concrete answer to the resolution of ambiguity. The only conclusive derivation we can put forward, is that a constellation of influences act on the process involved in ambiguity resolution. It is possible that all meanings are activated, but in different degrees depending on the frequency of the different meanings of the ambiguous item and depending on the surrounding context, and the scale of constraint it can exert.
on a word.
Chapter 4

The occurrence of ambiguity in Sign Language
4.1 Introduction

It is often the case that linguists will take a sample of languages to draw their results from, when exploring phenomena of natural language. They will draw up experiments and carry them out in as many languages as possible to draw conclusions as to whether it is universal or solely attributed to the particular language they’re concentrating on. It isn’t unusual therefore, to back their claims up by experimenting in sign language, the only other human language that is structurally diverse, but yet retains the same infinite combinatorial potential that spoken language has. As spoken language and sign language have developed in different ways, it is interesting to compare and contrast the processes required of this level of communication. In this section, I shall examine some linguistically controversial facets of language processing and I shall explore studies on these internal procedures, that have been carried out in both spoken language and sign language to compare the differences found between the two, with a special focus on ambiguity and the processes linked with lexicon storage and retrieval.

4.2 Lexicon storage and word recognition

The theories that have been formulated on ambiguity resolution are an extension to the studies that have been carried out on word recognition, as the ability to resolve ambiguity presupposes a capability to recognise the word and retrieve it’s various meanings from the lexicon where they are stored. It is believed, that when a word is read or heard, the activation process begins immediately, the first phoneme activating all the words that are a potential match. Each succeeding phoneme, creating a new subset of possible matches, as the activation levels of the words that no longer fit the phoneme sequence, decrease. The subset is eventually reduced to the corresponding word. This theory of word recognition is supported by (Marsh & Emmorey, 2000) and (McClelland & Elman, 1986)\(^1\). This implies some kind of acoustic signal mapped onto the meaning or various meanings of a word. Studies of this sort have also been carried out to explore word recognition in sign language (Grosjean, 1981), (Emmorey & Corina, 990b). A sign is normally composed of four different characteristics occurring more or less simultaneously, whose meaning corresponds to a unique constellation of these components. These are place of articulation, hand configuration, orientation of the target sign and movement. Results show that movement is the last of the sign components to be perceived and coincides with recognition of the word, suggesting that activation of all meanings that match the initial component(s) of the sign takes place, and that as more fragments of the succeeding component are perceived, the potential meanings of the sign are reduced, until one is left. The interesting difference between sign and word recognition, is that sign recognition seems to be split up into two phases: the hand configuration and articulation being the initial components which set off the activation processes, and the movement of the sign subsequently leading to the retrieval of the meaning. This is in contrast with English, which contains no single phonological

\(^1\)For more information see (Emmorey, 2002)
feature that leads directly to the meaning of a word. Another interesting aspect is that, although signs tend to be longer than words, recognition times turned out to be shorter, as it seems that only 35 per cent of a sign is needed for identification, compared to 83 per cent of a word. The reason for this is that the phonological information transmitted at the start of a sign is not normally shared amongst many signs, whereas the same string of phonemes can correspond to the beginning of numerous lexical entries, thus activating more possibilities in the word recognition process.

4.3 Word frequency and its effects on word recognition and ambiguity

As I have mentioned before, it is believed that word frequency plays an important role in ambiguity resolution, the most frequent meaning tending to be activated before the less frequent (I do not claim that this theory is maintained by all linguists, but it is plausible). There seems to me, to be a clear link between frequency in ambiguity resolution and frequency in word recognition. Studies show that words that tend to be more common in everyday language, (i.e. with a higher rate of frequency) are recognised faster and more accurately than less common words. The reasoning behind it being that the activation threshold of a high frequency word is lower than that of a low frequency word, thus needing less stimulus information to be activated (Emmorey, 2002). The same phenomenon occurs in SL. The only discrepancy between studies in spoken language and sign language is in the way that the frequency of a word is measured. The frequency of a lexical representation is calculated by counting its occurrence in written texts or in databases of speech recordings, whereas calculating the frequency of a sign is a more difficult process. It is achieved by asking sign language users to rate a word in their perception of how often it is used. This clearly leaves a lot to be desired, as it can only be regarded as a rough estimate. Yet the results of word/sign frequency having an effect on recognition times are strikingly similar. Both show faster recognition times for frequent words or signs that are perceived to be more frequent, and both show longer times for non-words and non-signs which have a beginning or initial hand configuration corresponding to a real word or sign, than for non-words and non-signs which have nothing in common with real words/signs. This could either be due to the fact that the brain is searching every possible meaning or that the lexical representation of a real word/sign has been activated. This brings us back to a familiar debate. Which comes first? Does the brain carry out an exhaustive search for meanings or does it look for clues before it’s search? In ambiguity resolution, does the brain look for all meanings regardless of context, or does it use extra information in the context to narrow its search? Or better still, does it just choose the meaning, which has the lowest activation threshold, and then decide on the correct meaning according to the context? An interesting aspect of word recognition is the tip-of-the-tongue phenomenon, which has been studied in both spoken and signed languages. These kinds of occurrences are quite frequent in spoken language, especially when trying to recall proper names. People might sometimes
remember the first letter of a name, but fail to recall the whole name as a unit. “TOTs may arise when there is a breakdown in the connection between semantic and phonological representations, suggesting a two-phase access process for lexical retrieval.” (Levelt, 1989)

A study was carried out by (Marslen-wilson, 1987), which induced TOF (top-of-the-finger) experiences in deaf signers. As would be intuitively expected, the same results were found in finger spelt words as for TOT experiences in speech. More impressively, signers would recall some aspects of a sign, for example handshape and articulation, but forget the movement, suggesting that the sign is not stored as a whole unit, but rather that semantic information can be accessed without the necessary phonological information, supporting the two-phase sign perception or recall theory mentioned earlier.

4.4 Lexical Ambiguity in Sign Language

It is a well-known fact that ambiguity is rife throughout spoken languages. Synonymy and homonymy both play a big part in it. Is this a regular occurrence in sign language as well? We would imagine that the lack of homonymy in itself would reduce a great deal of it, but what of synonymy? Compared to the years of extensive experimenting and probing that has taken place in the name of ambiguity research on spoken language, it is quite surprising to find such a lack of interest in the same field in sign language.

A test was carried out by (Emmorey, 2002), where a number of dictionaries of different sign languages and an English dictionary, were used to take a random sampling of words from. These were then compared with each other to see how many meanings the lexical representations and signs contained. The results showed considerable differences. Whereas 20 per cent of English words displayed ambiguous tendencies, only 6 per cent of ASL, 7 per cent of BSL and 4 per cent Navajo SL signs were found to be ambiguous. Another factor to take into account is that these figures are further reduced in SL communication through ‘paralinguistic’ methods like facial expressions or mouthing the spoken word.

It is clear that further investigation into these phenomena must take place before a more comprehensive view of ambiguity in SL can begin to take shape, but it is nonetheless an interesting topic for future research, which may hold the key to the long raging debate.

4.5 Pronouns in Sign Language

Deictic function in a language can be described as pointing to a spatial location to indicate time, location and referent. Sign language takes advantage of this method of referencing and it is interesting to explore the effects it has on the language in relation to the ambiguity present in this form of indexing. I will be concentrating on person and location referencing, and therefore will not mention time deixis again. In spoken language, there are different kinds of pronouns. There are personal pronouns, which conceptually point to a person, whether they be present or not, and demonstrative pronouns, which normally refer to something that is in the general proximity of the speaker, and which is often followed
by eye gaze, head nod or pointing toward the object being discussed. In Sign language, there is no such boundary. Personal pronouns are closer to what a speaker would think of as a demonstrative pronoun, as it is a physical deictic reference that is used to refer to someone. First and second person pronouns, be it in spoken or sign language, have always been thought to refer to the participants of the discourse taking place, and these are manifested in SL by directing the sign toward the chest of the speaker for first person singular, or toward the chest of the addressee, for second person singular. This would seem a simpler way of encoding the notion of person as a part of discourse, especially for a child acquiring a language. Let’s take a simple conversation being observed by a young child, between it’s mother and father:

Mother: “I am quite tired today”
Father: “Yes, you seem a bit tired. I didn’t sleep too well last night either.”
Mother: “You didn’t? That’s strange.”

The roles of the pronoun, ‘I’ and ‘you’ have each referred to two different entities, making hard for the child to understand the abstract use of pronouns. It is for this reason that children often use proper names to refer to themselves or other people. This ambiguity doesn’t seem to transpire in children who grow up learning SL. Deictic reference doesn’t pose a problem to children, it seems in fact, that using location to identify something facilitates their learning. This explains why the deictic referencing pronouns used in SL don’t normally pose problems for children. In SL it is the spatial location of the participants that is important, not their roles in the conversation (Ahlgren, 1990) This is not to say however, that children who sign do not come across this type of ambiguity at all; when telling a story, for example, the movement towards one’s own chest, which normally signifies ‘I’ can refer to the person who is hypothetically speaking. This is called role-shifting, and is the equivalent of ‘John said, “I’m hungry!”’ where the first person sing pronoun refers to John, not the person telling the story (Meier, 1990). This however, tends to be a later step in child language acquisition. Although this seems to suggest lower ambiguity levels in SL, as does indeed seem to be the case intuitively, the fact that deictic referencing is used to signify both location and person can at times create some confusion. Third person pronouns, or indeed pronouns that refer to someone other that the addressee or the addressed in a discourse, are formed by picking a spatial location in the signing space to refer to that person. Con- sequently, when a reference is made, the signer will either gaze, direct the sign or point while producing a nominal sign, towards that specific location. The problem arises, when the person being discussed changes location in the story being told and therefore has two distinct corresponding locations. To quote a clear example from (Emmorey, 2002, p. 56):

NIGHT WE-TWOa TALK THEREa HISa ROOM. PROa aBAWL-OUT1st. 1st TELLa I SORRY. PROa FORGIVE ME. MORNING, I GOb OUTb Y-A-R-Db 1stSEEb PROb AGAIN. bBAWL-OUT1st AGAIN. STRANGE. BEFORE, PROa aTELL1st PROa FORGIVE ME. MORNING PROb ANGRy AGAIN.
This example clearly demonstrates two different pronouns (spatial referents) being used to refer to the same person located in two different locations in the story being told. Ambiguity can also appear, when this type of double indexing co-occurs with the narrative changing focus and having its location as a topic. If, in the previous example, a statement was made about the yard, the PROb would have been used as it’s referent ‘it’, causing confusion as to what was being talked about, the person in the yard or the yard itself. Context would restrict this type of ambiguity, but it is nonetheless a disadvantage to using deictic referencing as a system for pronoun indication.

4.6 Conclusion

Ambiguity is a topic that probably won’t be resolved satisfactorily in the near future. New methods must be found to increase the accuracy level of the experiments carried out and linguists must also factor in extensive research into the same fields in differing languages such as established sign languages, to try and encompass a broader understanding of the processes involved, and emerging languages such as pidgin dialects and emerging sign languages (for example Nicaraguan SL), to compare the frequency of ambiguity and explore the reasons why there seems to be such large discrepancies between the two. This could help us to understand why ambiguity is so prominent in spoken language. If language organises itself for the good of the population’s growth and prosperity, why is it so ambiguous? Does this not inhibit the process we all must go through in acquiring language? And if there is a viable explanation for these questions, why then did it not happen in sign language? If they are able to disambiguate signs with facial expressions, why then didn’t the speaking community learn to disambiguate signs with hand gestures? Perhaps the answer lies in the fact that spoken languages can take place across multiple channels written texts, speeches, face-to-face conversations, telephone calls. Ambiguities that arise in some of these circumstances tend to disappear when the environment is changed. Homonymy is eradicated in written texts, as it is purely an acoustic-phonological type of ambiguity. Synonymy is decreased by context, and facial and body expressions play a major part in spoken interaction, even though most of the time we are unaware of it. Until further research is undertaken, these are but suggestions, and it is clear that there is a large area of sign language that could prove useful in formalising theories about ambiguity, which has been largely neglected. It is also obvious that ambiguity resolution needs to be approached with an open mind, taking into account all it’s aspects and the circumstances in which it arises.
Chapter 5

Empirical study: a discussion
5.0.1 Introduction

Psycholinguistics has only really developed since the questioning of introspective judgements on linguistic data was recognised as a semi-valid means of providing information on the acceptability of sentences. Chomsky was one of the first to embrace personal opinion on a given corpus of data as a valuable insight to the internal processes involved in language use, and the new information made available by his innovative inclusion of this facet of linguistic research has contributed a lot to contemporary theories on this subject. Disagreement on research methods developed soon after the emergence of generative linguistics. The reliability of personal judgements was in doubt, as often research showed variance across subjects and indeed in the approaches that subjects took to a sentence when judging it for the second time. Yet, even given these reservations, this method of research was being used more and more by linguists who seemed to tolerate its informality. The instability of these, then newly discovered methods, was examined by various linguists. (Labov, 1974) found that there was a widespread disagreement in judgements of different subjects and that there was even a considerable difference between prescriptive judgements of grammatical acceptability given by linguists as opposed to those given by naive subjects. He also found that subjects’ judgements didn’t always agree with their natural linguistic behaviours, raising questions about the reliability of intuitive data. Having said this, not all sentence judgements studied in psycholinguistics can be characterised this way. There have also been many instances of high stability across subjects who are asked to rank the acceptability of a sentence, and many argue that the benefits of collecting intuitive information about the grammaticality of sentences far outweigh the limitations. There are various ways in which linguists have tried to overcome the limitations caused by different influencing factors clouding what could be a valuable judgement. The key is to try and control the variance that can occur, so that it can work as part of the experiment and not against it. There are three main categories of variance one must take into account while conducting a psycholinguistic study.

5.1 Variance

5.1.1 Subject-related variance

As is the case among a person’s abilities and skills in any field, no individual person can represent the capabilities of an entire population. Differences among subjects abound and can be attributed to the countless influences that a person comes up against in the course of their life. These can be as subconscious as the dialects they possess or as explicit as the amount of formal grammatical training they have undergone. Personal intuitions can vary for obvious reasons that can be controlled, and pose few problems to linguists, for example testing a subject pool of different non-English speaking nationalities judging grammaticality on an English sentence wouldn’t give us any great insight into the internal processes involved in language processing, as could have been guessed. The less-obvious ones, however, are often poorly understood and can cause problems for experimenters.
• **Repetition of stimuli**

A variance that has been the cause of much debate, is that subjects seem to be inconsistent when they have to make repeated judgements or assessments of the same stimulus. This seems to arise in different types of psychological studies. It is normally overcome by collecting the subject’s responses to repeated instances of the same stimulus, as is practised in psychophysics experiments, where it has been proven that subjects will routinely give varied responses to different presentations of a single stimulus (Cowart, 1997). A mean of these responses is then calculated. However, this is problematic for psycholinguistic studies, as it is hard for a person to judge the same sentence repeatedly without adopting some sort of answering strategy and thus making the experiment unnatural. Different studies have been conducted where subjects are given a script of sentences to judge, and then after repeated time intervals, which can be anything between 3 seconds and a week, are given the same script but perhaps in a different order to calculate the mean of both sets of responses. These studies have yielded different results and contrasting hypotheses on the processes behind these results (Nagata, 1988). One hypothesis is that the repetition of a sentence will lead the subject to find it more and more acceptable. This is based on the theories behind language change, but some linguists argue that the short time sequence in which the stimulus is repeated in conjunction with the fact that it is repeated by the same source, will negate this effect. Another hypothesis is that with each repetition a subject will find more and more errors within the sentence as there is more time to scrutinise it. A third hypothesis is that the repetitions will increase a subject’s confidence in their initial decision, which would lead to a polarization of judgements. This type of study is very time consuming of course, but seems to yield more accurate results. Unfortunately, it was impossible to conduct repeated assessments of the subjects’ responses in the experiment on the human response to ambiguity that has been described below due to the lack of resources.

• **Field Dependency**

An interesting variance that has been studied in psychological assessments, and which has an interesting effect on grammaticality judgements, is that of field dependency. It seems that people can be characterised into two classes due to cognitive differentiation. This is reflected in the way they perceive language in conjunction with the world surrounding them. A field dependent person seems to blend aspects of the world around them and “experience it globally” (Schuetze, 1996, p. 107), whereas a field independent person regards the world in a more systematic way, comparing and analysing the different components separately. This affects grammaticality on judgements concerning the repeated stimulus effect, as field dependent people are more easily influenced to change their decision due to external influences. It would also seem that they pay more attention to the context setting of the sentence, while field
independent people use structural differentiation to break down a sentence. These are important influences to take into account, and the ideal way to do this would be to test the subjects with psychological assessments and determine their dependence tendencies, before undergoing the linguistic experiments, and consequently compare the results. Again, this is time consuming for both the subjects and the experimenters, so it seems that on this issue it is best to trust the studies that have been undertaken in the past, and be aware that these differences exist when studying the information gathered from different subjects.

- **Handedness**

It has been long suspected that right-handed people use different cognitive abilities to left-handed people, due to the side of the brain that has been developed for manoeuvring tasks. What is most surprising, is that it seems there is also a difference between people who are ‘pure background right-handers’ (i.e. those whose families are all right-handed) and people who are ‘mixed background right-handers’ (i.e. those who have a left-hander in the family). These two categories tend to correlate with field dependence tendencies, and seem to show similar differences in processing. Pure right-handers, like field independent people, seem to rely heavily on the structure of a sentence, whereas mixed background right-handers seem to have a less localised method of processing based more on lexical and conceptual knowledge than structural dependence. This could be due to the language centre in the brain being in more frequent contact with the centres in the brain that contain other types of knowledge. Studies carried out by (Cowart, 1989) demonstrated this trait, in the variance of grammaticality judgements\(^1\). Ideally, if I had had a large subject pool to choose from, I would have chosen the same number of left and right-handed people, but unfortunately this was not the case. It is hard to make a conclusive judgement on the response variance between these two groupings with the discrepancies in subject number, but it would be an interesting project to undertake in a study of ambiguity resolution.

- **Linguistic knowledge/training**

A great source of criticism in collecting grammaticality judgements, is that of the trained linguist setting the standard for a supposedly well-formed sentence. It might not be hard to grade the prescriptive grammaticality of a sentence, but how are linguists to grade the nature of a sentence? How are they to judge what someone else perceives of a sentence as different degrees of right or wrong? Surely linguists aren’t immune to the personal variance that has been discussed thus far? These aren’t the only questions that are raised. It is an instinctive fact that when a person concentrates on something for too long their judgement gets clouded; a sort of mist

\(^{1}\text{See (Schuetze, 1996, p. 110) for a brief explanation of these experiments.}
sets in and soon the brain gets tired and confused and doesn’t recognise what it’s looking at any more. ‘Obsessing’ over whether something is correct enough to yield the desired results blunts the very process, by either inadvertently finding the results that have been expected as opposed to those that are truly being represented, or by rendering the sentence on the experiment unnatural due to the lack of spontaneity on the experimenter’s part.

• **Age and sex**

Age and gender variance have not been conclusively studied in this aspect of cognitive processing, even though much study has gone into gender differences when it comes to spatial learning tasks and some verbal tasks. There have been preliminary findings that show that women find it easier to use new information to refine current understanding, whereas men find it easier to simply choose between two competing hypotheses. The problem is that it’s hard to define whether these processing preferences are due to biological or social conditions, but it is nonetheless present and therefore must be taken into account.

• **Other types of variance**

Other inter-subject differences that have been discovered over the years seem to correlate to the profession or artistic preferences of a subject. Of course these seem to be tied as well, due to the fact that the brain is exercised in different ways depending on the tasks a subject carries out from day to day. There are differing views on the subject of language faculty being tied to other faculties of knowledge. Chomsky has made his separatist view clear, maintaining that the language centre of the brain is completely distinct to other faculties. Yet, a tie between different cognitive centres could explain why personal variance, like a person’s creativity levels, could bear on empirical results and should not be dismissed until further research is carried out in this area. Is it possible that musicians use the same methods of processing to separate different elements of a classical piece of music as they do to disambiguate a sentence? They both involve separating a piece of data and analysing its different components. Would the every day tasks they undertake serve as practice for different abilities that on the surface don’t seem related? Another interesting observation is that if the level of creativity and imagination of a subject is correlated to their abilities in language recognition and processing, does this show in the responses given by children to sentence stimuli? Or could this effect be negated by the world knowledge they have yet to acquire?

5.1.2 **Task-related variance**

Task-related variances are the differences that are found amongst the scripts. They are the differences the experimenter tries to control in order to create the variance that is
expected to be discerned by the subjects, to back up or negate the claim being studied. In the case of the ‘human response to ambiguity’ experiment, the variation created lays within the context surrounding the lexical item. This manipulation is expected to influence the meaning retrieved by the subject with regards to the ambiguous word and so forms a basis to compare how the unbiased context is judged. Differences may also be found between the scripts given to the children and those given to the adults, in order to elicit the most accurate results and these adjustments were made in response to the feedback attained from the pilot studies I first conducted. They are described below.

5.1.3 Paralinguistic variance

Paralinguistic variance (or extraneous systematic variance (Cowart, 1997)) are the differences in the conditions of the experimental settings. This type of variance can also be controlled to a degree. One of the ways of doing this, is to ensure that if there are different groups participating in the experiment (i.e. groups that have some fundamental difference), that there is the same number of subjects in each group to render the results more objective. Ideally, the study would be tailored to contain the same male/female, right-handed/left-handed, pure background/ mixed background ratios, but this is only possible in large scale experiments, where the choice of subjects is abundant. A different aspect of paralinguistic variance to take into account is the state of mind of study participants. The length of a study is an important factor to consider. It is possible that subjects might answer the first few exercises unsuccessfully as they are getting used to the questions being asked of them, suggesting the questionnaire should be long enough to exclude the first few responses and still have a decent number of test sentences. Yet, at the same time, the questionnaire mustn’t be too long, as the subjects might lose interest in the task at hand. It is necessary in the collection of intuitive data, that the participants aren’t overly tired, stressed or uncomfortable with the situation as these factors could all influence the final conclusions of such a study.

5.1.4 Summary

Basically the aim in a psycholinguistic experiment is to gather valuable information about subjects’ judgements on certain sentences to determine whether there is a ‘reliable difference’ that is not due to the error variance (i.e. the sum of known and controlled variances). Although error variance is an obstacle due to its abstract qualities, when treated carefully and controlled to the best of our abilities, it can act as a yardstick against which reliability of data is estimated. Therefore it is crucial when planning an empirical study of this kind, to factor in and measure how much of the variance can be ascertained before examining the results and making a final conclusion.
5.2 Overview of the empirical study

The empirical study on the human response to ambiguity is an experiment which highlights the different methods of processing that children and adults use to resolve ambiguity and the conclusions that we can make from their responses to test sentences. The study also concerns itself with the role of context in a sentence, and the degree of influence that context has on retrieving one or more meanings of an ambiguous lexical item. The experiment was carried out in a questionnaire format, for ease of distribution and collection. Printed questionnaires allowed for the experiment to be conducted on a large number of subjects simultaneously, using different versions of the questionnaire, which was ideal for the classroom setting the children were tested in. There were slight differences between the experiment conducted on the children and that conducted on the adults, but the discrepancies were kept to a minimum so that accurate comparisons could be made between the two.

5.2.1 Adult questionnaire

As mentioned above, there are three main types of ambiguity, so it was imperative to include an equal number of each in the experiment to examine any differences that may arise between these categories, and to be able to judge whether within this scale of difficulty, there are differences between what children find hard to process and what adults find hard to process. Each script of the experiment included fifteen sentences; five representing lexical ambiguity, five representing surface structure ambiguity and five representing deep structure ambiguities. Each of these sentences belonged to a token set of three sentences containing varying degrees of biasing context; the first was unbiased, allowing for an open interpretation of the ambiguous item, the second and third were biased toward different meanings, allowing for the inspection of the constraining influence held by biasing context. Therefore, the experiment was made up of three different scripts, each containing an instance of the token set in one of it’s surrounding contexts, but never containing two instances of the same token set in the same script. The sentences were distributed randomly in this way, so that no clues as to the nature of the experiment were given away. Five filler sentences were also inserted into the scripts randomly, for various reasons. Filler sentences can provide a benchmark for each subject’s judgements, allowing the experimenter to compare other responses to the more ‘stable’ filler sentence responses. They can also disguise a pattern that might otherwise be discerned by the subject, avoiding strategic answering that could be criticised as clinical and unnatural and ultimately be of no use to the experimenter. The method of sentence distribution within an experimental questionnaire is important, as it ensures that each subject judges the same amount of sentences in each category, representing a more realistic range of judgements. Subjects who undertook the experiment weren’t given a time limit to give their responses, this was for various reasons. The fact that it was a written questionnaire allowed people to complete the study where and when they pleased, in an effort to create a safe and comfortable environment yielding more natural results. Another factor taken into account was that there have been many
timed-response studies on ambiguity in the past, so it is necessary to focus on different aspects of ambiguity resolution, like the effects of context and other influencing factors, to further our general knowledge on the subject. It was important to find the right instructions that would elicit the same target information from all the subjects without revealing the underlying nature of the study. There were three questions asked of each sentence. The first was concerned with how the subject would paraphrase the sentence, the aim being to collect any relevant disambiguating information that the subject could provide. This does not always prove satisfactory however, as some subjects tend to repeat the ambiguous item or much of the original sentence. The second question was a safety net for this foreseen obstacle. The subject was asked to give three or more words that would be associated to the test sentence, relying on semantic associations between words to disambiguate the sentence by demonstrating what meaning was actually perceived by the subject. The third question was an acceptability question, concerned with whether the subject found the sentence natural or not. The subjects were asked whether they would correct a foreigner speaking English, if they were to hear them uttering the sentence in question. The question was composed this way to try and control the criteria that the subjects would base their assumptions on, to ensure that they wouldn’t try to analyse it grammatically using the prescriptive rules they were taught in school, but instead, set a more laid-back environment where the judgement was based on what sounded natural to the ear. Some personal information was asked, in an effort to pinpoint group similarities between responses, however the subjects were reassured that the study was anonymous\(^2\).

The information that was asked concentrated on age, which was important due to the nature of the child/adult division the experiment is concerned with, gender, handedness and linguistic background. A non linguistic background was favoured, to avoid criticisms on the linguistic training and experience of subjects and to avoid the possible over analysis of the sentences, which might raise awareness of the presence of ambiguity in the unbiased sentences, which could in turn lead to unnatural responses. The other factors were simply noted, to compare the findings against.

### 5.2.2 Child questionnaire

The child questionnaires differed slightly to the adult questionnaires, as allowances were made for the need of more explicit instructions and simpler explanations of the task at hand. The scripts were of the same format, each containing five instances of the three different types of ambiguity. Some sentences were simplified, purely by choosing synonyms or different phrasing of the sentence, but they retained the same meaning and the changes were minor ones. I felt that information could have been lost in translation if the children didn’t understand a fragment of the sentence that was taken for granted as been obvious to adults, and early responses from pilot studies proved this to be true. A more significant alteration made to the children’s version of the experiment, was the lack of filler sentences.

\(^2\)The bearing this personal information could have on the responses is discussed in the ‘subject-variance’ section of this chapter.
Due to the short attention span of children between the 11-12 age group, it was felt that the questionnaire was simply too long to elicit attentive responses the whole way through, so the five filler sentences were taken out, and the children were asked orally to guess what the experiment had been about. They had not perceived the aim of the study, so it didn’t seem that leaving out the filler sentences had been a disadvantage to the answers in this respect. Although the adults weren’t given a time limit to complete the study, it was decided to give the children a time span in which to fill out the questionnaire. The experiment was carried out in a 5th/6th class classroom during school time, as it was concluded that they would be more attentive in this type of setting, safe in the knowledge that they weren’t missing out on play time. Therefore the time limit was given as forty minutes, which was enough for all but one of the children, a very thorough answering little girl who probably wrote the most colourful answers of all the scripts that were examined. The children were each handed out a questionnaire, and read out the instructions. These were somewhat different to the adult questionnaire instructions. The children were asked to describe the image that came into their heads when they read the sentence and then were asked to write three or more words that were associated with this image. An example sentence was then discussed as a group exercise and the children were asked to raise their hands if they had different ideas or images to describe when they read the sentence. This was useful to demonstrate to the children the variety of opinions that existed within the class and more importantly to highlight the fact that it was not a test and that any answer they wrote down was valid. The instruction solicited appropriate responses overall and the experiment was carried out satisfactorily (of course the distribution of sweets after the questionnaire was widely appreciated by the children, who then decided that it had been a worthwhile experience). The drawbacks of handing out written questionnaires to children of this age, seemed to be the variance between subjects in their reading/writing skills, but unfortunately an oral experiment would have used up too much of the children’s time. The fact that spelling leaves a little to be desired among children of this age, means that some interpretation is involved in reading the answers, but for the most part this is a welcome distraction.

5.3 Conclusion

It is important while setting a psycholinguistic experiment where the collection of intuitive data is being relied on for the interpretation of various sentences, that all the external influences that could have a bearing on the linguistic processes used, are taken into account. The difficult aspect of this seemingly simple task, is that many of these influencing factors are hidden from plain view, so it is important to maintain a certain standard of uniformity throughout experiments whose results are going to be compared with each other. It is also important to gather the appropriate information about the subjects participating in the experiment to be able to find reasons for the discrepancies in their answers and to support or contradict existing theories on this variance. Every aspect of the experiment must be scrutinised to provide the most reliable answers and to narrow the margin for error in the
interpretation of the results collected.
Chapter 6

Empirical study results
6.1 Introduction

Taking the variance considerations into account while creating the questionnaire helps determine a certain degree of reliability in the results collected. It is important to keep an unbiased opinion while examining the responses for trends and common inclinations. Linguists have been blamed for moulding responses to suit their views on language processing in the past, so the utmost care has been taken to present the real facts.

6.2 Procedure

The questionnaire was rewritten several times in an effort to make the instructions and the test sentences sound natural. This sounds like a paradoxical process, but as I have mentioned before, what is natural to one person does not represent what is natural to others. It was interesting to hear the constructive feedback that I received from the pilot studies that were carried out. As the person setting the questionnaire, it was obvious that I had detached myself from the complexity of the task, and as subjects who didn’t know the nature of the study, it amazed me to have to issue repeated re-assurances that the study was not an intelligence test. So it is plain to see the worries that plague both sides of an empirical study of this sort, but it is also clear that they are problems that can be fixed with a simple re-drafting of the study. The final questionnaires contained clear instructions that explained what was needed of the subjects in a friendly and relaxed tone. The children’s questionnaire contained instructions better suited to elicit the right information from the children, by asking them to describe the picture that appeared in their heads when they read the sentence. Some sentences were also changed, due to feedback from pilot studies. Words that were thought to be unusual for a child to use were replaced by simpler synonyms, but the essence of the sentence was always retained.

6.2.1 Frequency analysis

As I mentioned before, it is important to factor in the influence that the frequency of use of a word has on ambiguity resolution, yet it is difficult to estimate how frequently words are used in the vernacular. I felt it was important to carry out a perception study to try and determine which of the ambiguous lexical items that were used in the main empirical study were recognised as being more frequent than others in everyday language use. The problem with this kind of study is that, unlike trying to measure the frequency of the word being used, it is the frequency of the various meanings in a word that must be calculated. It was thus impossible to ask the subjects to grade on a scale which meaning is used more frequently, as the suggestion of possible answers might cloud others that could have come to mind. It was decided to carry out a face to face interview instead, where subjects were asked to prime words from the isolated ambiguous words, thus negating the effects of context or bias. This method had to be modified slightly for the deep structure ambiguities,
as questioning associated words didn’t necessarily demonstrate what grammatical category the word was taking on. The subjects were instead asked to describe the scene that was played in their minds as they heard the word. This helped to establish what their perceptions were about the word. For example, for the word ‘training’, which could take the role of a noun modifier in “The training staff are on minimum wage” or as a verb in “Training staff in this company involves teaching them about client relations among other things.”

subjects were asked to describe what they imagined when they heard the ambiguous word and it was then possible to determine who was carrying out the action in the scene they imagined, thus pointing to one of the meanings. If the subject imagined that he/she was training a newly acquired member of staff, the verb was primed. If the subject instead imagined having to put up with a bossy manager, the noun modifier was taken to have been primed. A further safety precaution was taken, by asking different subjects about their perceptions of the deep structure ambiguity when they appeared with different neighbouring words. For example, a subject would be asked what their perceptions were on the word ‘flying’ in conjunction with birds and planes. It seemed that the semantic associations that were made when hearing two words together were different according to which word followed the ambiguous item. When flying birds was heard, the word was primed as a descriptive modifier or adjective more frequently, whereas when flying planes was heard, subjects seemed to perceive the active verb ‘to fly’ more frequently. This occurrence will be explained in more detail in the analysis of the responses below.

The advantage of questioning subjects orally about their feelings on certain words is that they are denied the opportunity to re-read the question and perhaps change their mind. It is a study about the most frequent meaning of a word, so it is important that the subjects don’t over-analyse the question and that they give their first instinctive responses. Twenty people were interviewed and the average of their judgements was then calculated. If both meanings were primed an equal amount of times, then the ambiguous word was labeled \textit{balanced}, suggesting that context alone was the main bias for one meaning being chosen above others. If one meaning was primed before the other then it was concluded that it was \textit{unbalanced}. This instead seems to create the most interesting results, as the real force of biasing can be inspected by observing whether subjects will choose the meaning that the context primes or that which is most frequent. In this way, the added information about the ambiguous word allows a more thorough examination of the context influence, as one could only hazard a guess as to which meaning will be favoured. A scale of balance of meanings was then calculated from the ratios of the amount of times the first meaning was primed to the amount of times the second meaning was primed. The scale stretched from 1-4, 1 being the most balanced an ambiguous word can be, when both meanings are primed the same amount of times, and 4 being the least balanced a word can be, when the same meaning was primed over the other by each subject. It was interesting to find, that in one particular instance (for the term ‘striking’) the results seemed to suggest that the word was a balanced one, but not between the two meanings that were biased by the
context on the main study. It seemed that when heard in isolation, the word primed a meaning that had been ignored in the main study, even in the unbiased context sentence. This serves to show that there is a high degree of dependency between word frequency and context. It must be noted however, that the frequency study was only conducted on adults. This might lead to differing results between the results of the two studies when we compare them, as children’s realities may be very different than adults’ realities\(^1\).

![Frequency table](image)

**Figure 6.1**: This bar chart is a calculation of the frequency of the words that are used in the ‘Human Response to Ambiguity’ study described below.

\(^1\)‘Reality’ refers to what surrounds a person every day. The worries of a parent who has to support his/her family and pay the bills is very different to the worries a child has about not getting enough play time or having to eat spinach for dinner.
6.3 Aims

The aim of conducting these three studies in conjunction with one another is to contrast the findings and examine any real differences between a child’s perception of ambiguity and an adult’s perception of the same phenomenon.

6.4 Children’s results

As I have mentioned above, this part of the study was conducted with a classroom of twenty children whose average age was 11.3. Most children were between the ages of 10-12, but it must be noted that the group included a 14 year old boy who was a non native English speaker. There were three left handed students in the classes that undertook the experiment and the male to female ratio was 11:9. None of the children had an idea as to the nature of the experiment\(^2\). These studies have proved to be interesting on more than a linguistic level. The answers that the children gave turned out to be much more imaginative and consequently more insightful than those given by the adults. I found that the older subjects tended to be more reserved in their responses and although the children were given a time constraint in which to fill out the questionnaire, it was the adults who rushed the process, often resulting in marginally satisfying answers. Some of the discrepancies might have been due to the difference in the way the instructions were given and I am regretful that I didn’t use the mind image explanation in the adult questionnaires as well. The word ‘paraphrase’ in the adult instructions may be reminiscent a school-type tests and in retrospect, this might not have suited everyone. However, most people gave answers that were able to be categorised upon their examination. The most concise way to lay out the results of the questionnaire is to split the results into different categories and investigate the degree of influence context really has on ambiguous words. I will examine the responses to the ambiguous word surrounded by the unbiased context and surrounded by the biased contexts and investigate the degree of difficulty the different types of ambiguity demonstrate, the influence frequency of use has on the decision between the choice of meanings and the influence that experience in one’s own native language has on detecting ambiguities and resolving them accordingly. I will also try to determine whether personal differences like gender and handedness show any relevant variance.

6.4.1 Unbiased context

It is expected that the words found in sentences containing unbiased contexts yield the most interesting results and allow us to speculate about why subjects chose the specific meaning they chose.

\(^2\)See Section 5.3.2 for a description of what the experiment entailed.
Figure 6.2: This bar chart shows the breakdown of the children’s responses to the test sentences.

- **Balanced words**

Only four words that made up the set of ambiguities used in the experiment, seemed to be judged as balanced. These were the words *organ, copy, belting* and *closing*. These perceptions didn’t match up exactly with the judgements the younger subjects gave, but there might be some explanations for this. The children seemed to perceive the image of a *church organ* when they were asked to describe the scene that played in their head when they read the sentence. They favoured this meaning at a ratio of 2:1, which isn’t a considerable difference, when compared on the scale of how balanced the word is. If the study was conducted on a larger number of students, the answers may have generated a more balanced result. The second word produced
less varied results, as the ratio between meanings was 5:1, the most frequent being *copybook*. This is quite self explanatory, but nonetheless very revealing. It is a clear indication that children exist in a different ‘reality’ to adults. Their experiences limit the range of meanings they can detect and process, and words or meanings that may be frequent to them may not be frequent to adults. This does not negate the effect frequency has on ambiguity resolution, it simply means that the meanings of some words don’t hold the same frequency values for children as they do for adults. Presumably, with time as the child develops it will have more contact with ‘adult’ words, slowly shifting the weight of one meaning to the one which is used more frequently in it’s adulthood. This highlights an important aspect of word frequency. It changes in accordance with the evolution of languages and should never be regarded as a constant, hence the interest in conducting the second study. This is a possible explanation for the variance between the two studies, which we must take into account, as the frequency test was conducted on adults alone and may not reflect children’s perceptions correctly. Another explanation could be that frequency does not affect ambiguity resolution as much as expected, but this will become clearer when the rest of the results are examined. The last word to be considered, *closing*, generated the opposite of what the frequency results would have lead us to believe. The active verb *to close* was primed every time by the children who came across the unbiased sentence. This lead me to wonder was the degree of bias at the lower end of the unbiased scale, and whether it would have generated a more productive result if the word sequence had perhaps been ‘sliding doors’ as it might have represented the ideas of ‘a sliding door’ or ‘the act of sliding a door’ more evenly. I was unwilling to use this phrase however, as I felt that it might have conjured up the film that was released only a few years ago that bears the same name. In fact the film title and connected advertising image was incorrectly conjured up by some of the subjects giving their perceptions on the frequency of the word pairing ‘closing doors’, thus negating other images and connected meanings that may have sprung to mind. This presents another problem; while examining ambiguity resolution, it is important that popular turns of phrase and idioms aren’t used as often their idiomatic meaning can be primed before their literal meaning and that opens another huge can of worms. The fact that the words are balanced, means that there is an equal chance of either being chosen in an unbiased context, therefore it is no great revelation when one is chosen over the other, as either have an equal chance of being primed. I have given some possibilities as to why the experiment yielded the results it did in this respect, but the next section should generate more definite outcomes in the battle between frequency of use and context and which of these tends to win out in the resolution of ambiguity.

- **Unbalanced words**

The most unbalanced words were those whose meanings didn’t seem to compete for selection, as one was constantly chosen above the other when heard in isolation.
There were three such words in the experiment, bank, revolting and tiring. The children’s results were amazingly close to the perception of the word’s frequencies in natural language. The words bank and tiring both had a clearly favoured meaning, whereas revolting, the third highly unbalanced ambiguous item, showed another interesting aspect about children’s world knowledge affecting the resolution process. The children chose the adjective ‘revolting’ over the verb ‘to revolt’ at a 3:0 ratio, but the same number simply shied away from giving any sort of response. When they were later questioned on their lack of response, they said that they didn’t know what to write down or that it was too difficult. As they answered all or most of the other questions in the correct fashion, it is assumed that the difficulty arose in their knowledge of the word and its meanings, again showing the limits that linguistic experiments must restrain from overstepping. The most frequent meaning ‘disgusting’ was primed every time by the children who did answer, either supporting the word frequency theory or simply indicating that it is the most likely meaning that the children have acquired at this age. So far the results seem to be in accordance with the word meaning frequency theory, yet there are discrepancies among the results. There are certain ambiguous words, that although being labeled slightly unbalanced in the frequency study, seem to transpire as extremely unbiased in the children’s results. Words like mouse, visiting and training constantly showed responses that favoured one meaning over the other in the children’s questionnaire. The animate mouse was favoured over the computer mouse, the active meaning of the word ‘visiting’ in “I was visiting my sister” was chosen over it’s passive meaning, “The visiting priest recited mass”, and in the same manner the active meaning of the word ‘training’ in “The athlete was training all day long” was chosen as opposed to the passive, descriptive meaning, “Voice training is very tedious”. There seems to be a trend in the response to deep structure ambiguities. As I mentioned in Section 6.2 even one contextual word can prime one meaning over another and in the same way, the meanings evoked by the contextual information, even if only one word long, can be ignored and go unnoticed if the context isn’t there to point them out. In deep structure ambiguities, the younger subjects seemed to choose the active verb meaning of the word more consistently than the descriptive adjective form. This could be for various reasons. It is a studied phenomenon that toddlers begin developing a sense of themselves at around the age of 20-24 months. What this means is that before this age, the baby doesn’t realise that it is a human being, part of a larger society. The toddler begins to recognise itself in the mirror or in photographs, and it begins to feel self-conscious emotions, like embarrassment or pride. It is evident that although this realisation takes place at an early age, children retain the egotist concept that they are the centres of the universe for quite some time after that. It is a development mechanism, which works in favour of the child, giving it time to learn how to deal with its emotions and allowing it to develop the coping strategies it’ll need in the future. It is the process that makes sure that a child understands itself, so that it can consequently with the aid of parents’ guidance, understand others and be successfully integrated into society. The results from the childrens’ questionnaires could
suggest that this trait is still evident in children between the ages of 10 and 12, as they seemed to favour the active verb ‘to do something’, which could indicate why they see characters carrying out the actions in their mind’s eye rather than perceiving the ambiguous word as being the descriptive state of the following word. Another hypothesis for the preference of the active meaning of the deep structure ambiguities, is that the three examples that supported this peculiarity are all constrained by the accompanying noun. In the sentences containing *visiting, training* and *closing* an image of something being done is normally conjured up. If the sentence that contains ‘flying’ were changed to ‘flying birds’ it is unexpected that the active sense of the verb ‘to fly’ would be conjured up at all. So even though the sentences are supposed to be unbiased, a degree of bias will always exist depending on the reality of the subjects who judge them. It is thus possible that the word immediately connected to the ambiguous word exert some sway on the meaning primed.

An interesting finding was that the frequency of word associations doesn’t seem to have an effect on the meaning primed by children in reference to the ambiguous word *weeping*. This could be primed as a noun modifier in ‘weeping willow’ or as a verb in ‘crying willow’, which is in itself interesting, as it requires the subject to invent a fantastical reality in which trees can feel emotions and yet, this did not have an effect on the resolution of the sentence. This word was found to be unphased by frequency or context, receiving responses on either end of the scale. The contrast in the interpretation of this word was found to be when it was surrounded by the context that was biased toward the verb ‘crying’, but which yielded both meanings by most children. However, if the verb *weeping* had been used in conjunction with ‘girl’, it is feasible that ‘willow’ would not have been primed.

It must be noted that the unbiased context sentences did reflect a degree of awareness of the ambiguities, but it was extremely low. It was calculated that among the unbiased materials 6.6 per cent of the sentences surrendered both their meanings to the discerning children who noticed the phenomenon. All the children were later asked did they have an idea of what the experiment was investigating and none seemed aware of it’s nature.

### 6.4.2 Biased context

The biased context sentences were introduced into the study to investigate whether context always held the final sway over the meaning chosen. As many as 87 per cent of the biased sentences generated the results that corresponded to the biased interpretation, which supports the theory that context plays a big part in the resolution of ambiguity, be it in the interactive processing of all the sentence components simultaneously or be it in influencing all the meanings of the ambiguous word that have been retrieved from the lexicon. There seemed to be a similar percentage between biased and unbiased words being misunderstood or being left unanswered. This is quite a curious occurrence. The level of misunderstanding for the unbiased sentences was calculated at 7.1 per cent whereas the
level of misunderstanding for the biased sentences stood at 5.4 per cent. The slight difference in these figures could be attributed to the fact that while reading a sentence containing an unknown word surrounded by unbiased context, the subject cannot rely on inference processes to estimate a correct meaning, whereas in a sentence that contains biased context, the subject is not solely relying on the knowledge of the key word. The other 5.6 per cent of sentences were those that were judged unusually. Some yielded surprising results, where the opposite meaning to the biased context was primed. These interpretations don’t seem to be related to gender or handedness as a mixture of male and female, and right handed and left handed subjects made part of this small percentage. Others seemed to have found a completely different meaning that was not biased even by the biasing contexts, but these were isolated instances. An unusual occurrence, which reminded me of just how easy it is to become complacent when examining other people’s judgements, is described below as I felt it was an anecdote that proved an important aspect of language. As I mentioned before, the word ‘weeping’ primed both meanings when it was situated in an unbiased context. An answer that one of the children wrote in response to the context biased toward the adjective ‘weeping’ modifying the noun ‘willow’ sheds some light on the hidden power of context mixed with a little carelessness or perhaps some over enthusiasm:

‘The weeping willow stood tall and lonely in the centre of the field.’

1) Read this sentence and describe the picture that comes into your head in your own words.
   “The tall, lonely, sad widow stood bravely in the middle of the field.”

2) Write 3 or more words that come to your mind when you read this sentence.
   “Death, country, lonely.”

The context containing the words tall and lonely were obviously recognised before the word was properly read, allowing the subject to come to her own conclusions about the sentence and it’s meaning. An even more remarkable fact is that I didn’t notice her alteration in the choice of noun until I examined the answers the second time, which shows the sheer power that expectation has over reality in language.
6.5 Adult’s results

The adult’s questionnaires took on a slightly different format to the children’s study, however not so different that it would jeopardise an accurate comparison of the two. As mentioned above\(^3\), the adult questionnaire included five filler sentences to hide the nature of the experiment from the more inquisitive eye. The questions were the unmodified version, asking the subject to paraphrase the test sentence, give three words connected with that sentence and give their opinions on whether the sentence was natural or not. Twenty subjects were tested, standardising the subject number of each study. The average age of the adult subjects was 25, although their individual ages ranged from 16-50. The handedness factor was also standardised across the experiments, so that there were the same number of right-handers and left-handers in the children’s study and the adult’s study. The gender ratio varied somewhat between the studies. The adult female to male ratio was 12:8, which contrasted with the children’s experiment female to male ratio of 9:11.

6.5.1 Unbiased context

It is imperative that both studies are examined in the same way, so that observations may be made on the reliable variance between the two. I will categorise my findings on the adult experiment as I have previously with the children’s one, investigating the processes that interact with each other while resolving ambiguities set in different types of contexts. The frequency analysis of the ambiguous words used in the main experiments will act as interesting guidelines, if we are to believe that the word frequency hypothesis. As the frequency results were based on the intuitive data collected from adult subjects, it is expected that there will be less discrepancies between answers.

\(^3\)See Section 5.3.1
Upon examination of the balanced words in the ambiguity experiment, it was concluded that frequency played a primary role in the choice of meaning. A curious finding was discovered when the third supposedly balanced word was investigated. The opposite of what I would have expected from the results of the frequency analysis of the word was found to be true. Although the word ‘closing’ was judged balanced by subjects, one meaning was repeatedly picked over the other in the corresponding unbiased ambiguous sentence. The interesting aspect is that the children behaved in the same way as the adults in respect to this particular word, choosing the active form of the ambiguous word every time. This confirmed my fears that perhaps the
context carried a degree of bias, even though I had not noticed it when I drew up the experiment. This again demonstrates the difficulty in drawing up a completely unbiased and accurate experiment. It was found that the opposite was discovered for the word ‘flying’. Although the both meanings were primed in the frequency analysis study at a ratio of 2:1, it seemed that placed in the context of an unbiased sentence, subjects chose both meanings an equal amount of times. The difference between these two figures was small however and given more subjects, I feel it would have level out.

- Unbalanced words

It is clear from the first glance that the adult’s responses to the ambiguity study are more closely correlated to the frequency analysis of the words they responded to. Out of the four words that were deemed unbalanced by the calculations of the afore mentioned study, three generated constant responses choosing one meaning over the other, suggesting that one meaning had a clear advantage over the other due to it’s higher frequency value. The most frequent meaning was chosen every time, due to it’s low activation threshold together with the fact that there was no biasing context to raise the activation threshold of the other potential meaning. The word revolting however, was the one that although having being labeled ‘unbalanced’ was treated slightly differently. When the word is heard in isolation, it primes the adjective. This could be because there is no subject mentioned, and in the English language, verbs are seldom heard without their accompanying subjects, whereas adjectives can take the role of exclamations when found in isolation (ex. “Wonderful!”). When the phrase “The peasants are revolting” is heard, the activation threshold of the less frequent meaning may be lowered due to the presence of the subject, causing a battle for selection. This process does not seem to have completely overpowered the word frequency influence however, and the more frequent meaning was discerned four times out of five. There were yet other words that although being deemed unbalanced (on scale 2 or 3) yielded one meaning above the other in the ambiguity experiment. One of these is discussed in the section above\(^4\). The other provides fascinating evidence of the difference between a child’s and an adult’s points of view and how it can affect ambiguity resolution. Although adults primed both meanings for the word ‘weeping’ in the frequency analysis test, it was found that when it was heard in conjunction with the word ‘willow’ only the noun modifier was primed, even though the context included the word ‘lonely’, which was designed to create a focus opening the possibility for it to mean ‘upset’ or ‘crying’. The children didn’t seem to have a problem with accepting the fact that a willow could cry, even though the context didn’t make it explicit, and chose both meanings the same number of times. The adults seemed to take more cajoling however, as they didn’t have a problem with discerning the tree as an animate being in the biasing context, but yet could not fathom the idea in an unbiased context, resulting in the noun modifier meaning

\(^4\)See Section 6.5.1
being chosen every time. It seems that within a child’s ‘reality’ there is an openness to things that have not been experienced, whereas adults tend to take a less liberal view on things. There were some cases in the unbiased sentences, were subjects chose a completely different meaning to those that had been analysed in the frequency test. For the word ‘paper’, subjects primed exam paper as well a sheet of paper and newspaper, and for the word ‘mouse’ one subject primed a toy mouse, which is closer to the animate meaning of the word, but is nonetheless another alternative. This was a welcome phenomenon, as it supported the fact that the surrounding context didn’t restrict the possibility of meanings that could be perceived.

6.6 Biased Context

The adult questionnaire responses to the biased sentences demonstrated that 94 per cent of these sentences yielded the biased interpretations. That is quite an imposing figure, which serves to show how reliant ambiguity detection and resolution is on the context. Very few ambiguities were detected consciously by the subjects, in fact this figure only amounted to 5 per cent of the sentences read. The other 1 per cent was attributed to when the opposite meaning to the biasing context was perceived. This is clearly an unusual phenomenon, showing that if context is constraining enough, it leads the subject to ignore the other meaning. It seems safe to say, based on these findings that if word frequency plays a part in the resolution of ambiguity in biased contexts, then it must be a secondary one. The precedence is given to context, and perhaps if it had been more loosely biased, frequency would have gotten more credit in the process.

6.7 Conclusion

The role of word frequency in the resolution of ambiguity in unbiased sentences is an important one. Without the context, the human brain uses the frequency of a word to narrow down the options it has in search for the right meaning. Yet, the power of word frequency is strongly diminished when in the presence of biasing context. This seems to be the main influencing factor that subjects rely on to resolve often unnoticed ambiguities. It is likely that different processes take place depending on what is available to the subject, for example it is possible that at a subconscious level the brain retrieves all the possible meanings and that only then the most satisfying one is chosen according to context and other external influences. Yet surely this would indicate that every time a sentence was biased toward the less frequent meaning, the ambiguity would be perceived. This was not shown by the studies carried out. The large majority of subjects didn’t perceive ambiguities within the biased sentences, which seems to support a more interactive cognitive model that takes all the factors into account including word frequency and lexical associations that the words in the context contain allowing one meaning to be primed while ignoring the other. There were a few differences between the scripts collected from the children and
those filled out by the adults. Some have been described above. One of the characteristics that surprised me most was the difference in the answering techniques employed. I had expected to have difficulty in eliciting the right information from the children, but it was the adults I had trouble with. I found the children’s responses to be extremely informative, as they had no qualms about describing exactly what they thought the sentence meant, no matter how imaginative and unorthodox. I also found that if children were faced with the inability to answer the question, they would simply leave the space blank, whereas adults seemed to just rewrite the test sentence given to them, even though that was not what was asked of them. They were noticeably more self-conscious about the responses they gave. It is possible that the adults knew that their answers would be scrutinised, yielding reserved, less constructive answer. I found this surprising, as it was obvious that it was a waste of time, but adults seemed to prefer this approach rather than leaving a blank space. Overall though, excluding the sentences or words that the children didn’t understand, an occurrence that I would put down to their limited knowledge of words, both children and adults showed that context and frequency affected their resolution of ambiguity, all be it in different ways. The processes that contribute to resolving ambiguous sentences are an obvious capability that children have. Together they form a developing mechanism that is refined as the child acquires more and more world knowledge. This allows the child to decipher more complex ambiguities. A clear example of this is the cleverly scripted show known as ‘The Simpsons’. Countless innuendos are hidden in every showing, yet they are cleverly disguised to suit a family audience, thus taking advantage of the child’s inability to disambiguate due to lack of world knowledge and allowing the producers to market the programme appealing to a wide audience range. However, the child of 11-12 years old does not have a problem in disambiguating simpler sentences whose possible meanings are known to him/her, suggesting that the processes that are being used at this age are the same the child will continue to use later in life. An interesting topic of future research in this area would be to try and determine at what age disambiguation begins. Is there a common onset of this process? Is there a variation in this ability due to handedness or social class and education? The answers could reveal more about how the process is divided. Perhaps the order in which the various skills are acquired will help in the quest for answers on the processes behind ambiguity resolution.
Chapter 7

Conclusion
CHAPTER 7. CONCLUSION

7.1 Achievements

This project was undertaken with a view of researching the field of ambiguity with special emphasis being placed on the psycholinguistic processes that are involved in it’s resolution. My aim was to present a clear, structured account of the background of ambiguity, the methods used both in the past and present to research it and the evolution of different theories that this research has contributed to. I have drawn on many examples that are used in everyday language to try and highlight the high occurrence of this phenomenon and I have described the contrast that is to be found when comparing ambiguity in spoken language as opposed to Sign Language. I have raised more questions that I could dare hazard answers to, but feel that by raising curiosity on the subject the reader is invited to reflect on the many issues that still have to be resolved in this area of linguistics and so, better understand the work that linguists still face. Although sentence parsing and language processing comes as a second nature to most of us, the complexity involved is staggering. A quote from (Cowart, 1997) describes this process perfectly:

“While forming a sentence judgement, a speaker draws on a variety of cognitive resources to perceive the auditory or visual signals through which the sentence is expressed, to parse or process the sentence as its elements are identified, to form an evaluation of the sentence, and to organise and execute a response. By hypothesis there is grammar involved in this executing this performance, in collaboration or competition with other components of the cognitive system.”

I think it is a perfect description, as the complexity of the quote seems to mirror what it is trying to describe. I have completed two studies, in order to try and grasp a part of the intricacy of language processing, one on word frequency analysis and another on the tools that people of different age groups rely on to resolve ambiguity and at what age they begin to do so. It has been an immensely rewarding experience, as I have learned to appreciate the effort and planning that goes into conducting a psycholinguistic experiment and I have a better sense of the determination and hard work that goes into writing a project of this proportion. I have also learnt that the benefits of undertaking an arduous task such as this, satisfaction and pride in your own work, are a valuable reward and fair justification for the hours spent sitting in front of the laptop.

7.2 Summary of main topics

It was important to begin by describing some of the basic characteristics of ambiguity and it’s different uses. Our knowledge on ambiguity is closely related to our knowledge on the human lexicon and it’s inner workings, so it is wise to delve into current theories on how words are stored and retrieved from the lexicon and contrast them to the theories on ambiguity resolution in an effort to have a more rounded view on the processes that take place in the understanding of language. Another aspect of ambiguity also needed to
be dealt with. A lot of information has been gathered over the years and now that we now know ambiguity resolution to be quite a complex process, it is important to study the often conflicting conclusions as a means of collecting evidence that can be considered when coming up with current hypotheses on the subject. Research into the past of a specific field of study is imperative, but we must also take a keen interest in the research that hasn’t yet been conducted. Sign Language is an exciting platform to carry out future research. It comprises two vital features that make it ideal; it is a structurally complex language that possess an unlimited level of expressivity, yet it’s structure remains different to those spoken languages. It would seem that the occurrence of ambiguity and the way it is dealt with, also differs from spoken language and this could provide vital pieces of the puzzle. The empirical study was probably the most interesting part of the project. It’s a great achievement to be able to analyse the answers collected and draw on the information and research that has already been carried out to form educated opinions and produce interesting results. The various considerations and the tailoring of the project to suit the demographic characteristics of the two age groups were a huge learning curve and the fact that ambiguity resolution studies aren’t often carried out on children made it all the more exciting. In conclusion, the project is a well rounded discussion on this extraordinary facet of language with insights that I myself found fascinating while researching this curious phenomenon.

7.3 Further study

There are numerous avenues of research that could be undertaken to shed more light on how ambiguity is resolved by the human brain. An aspect I would be interested to explore is the evolution of this interesting phenomenon. It has been shown by computer simulations of language evolution that synonymy and homonymy are always quite significantly present. It seems that homonymy would intuitively be higher at the beginning of language emergence, and as the population broadens it’s repertoire of phonemes, it seems that homonymy should decrease. So why then, do different languages have different numbers of phonemes available to them? Would it not have been in the interest of accuracy of an emerging language to develop as many phonemes as were needed to eradicate homonymy? What is the reason for synonymy? How did it come to have such a strong grip on spoken languages and yet be only a weak presence in Sign Language? This raises another interesting research topic. If more studies were carried out on emerging Sign Languages, for example Nicaraguan Sign Language\textsuperscript{1}, much information could be gathered on the phenomenon of synonymy, and thus ambiguity, at the first stages of language emergence. As regards to spoken language, I think it would be beneficial to conduct further studies on children of different ages. If the ‘onset’ of ambiguity resolution was measured, it might help linguists to understand what processes are first required and how they are further refined to evolve into a fully comprehensive

\textsuperscript{1}Nicaraguan Sign Language is a language that has emerged in as little as a decades among a group of deaf people in Nicaragua. As the language is passed on to younger children it seems to be becoming richer and more complex. For more information see (Senghas & Coppola, 2001)
model of language understanding. Using context containing different degrees of bias could indicate how word frequency affects the children’s responses to the ambiguous word. There is certainly no shortage of research topics in this area, as much has yet to be discovered.

7.4 Concluding remarks

Although ambiguity has provided us with countless unanswered questions and doubts, it is an essential part of spoken language. It is hard to imagine the English language without it. It is the playfullness and versatility of language that allows creativity of expression. A perfect example lies within the contrast in the use of image and language to tell a story. It is a known fact that film remakes of great novels are never as satisfying as the original book. The appeal of a book is the personal quality that it retains, allowing the reader to interpret the story as they wish, without imposing any limits. A book will transmit a concept, an idea, but allow the reader to use their imagination to realise it. This is the real beauty of ambiguity and the vagueness of spoken language, and I can’t help but feel that there would be a void without it.
Bibliography


Appendix A

Children’s sample questionnaire

It must be noted that these questionnaire were answered by hand and transcribed here for increased legibility. Any spelling errors are part of the original transcript and were kept to maintain the originality of the questionnaires.
SCRIPT 2:
PERSONAL INFORMATION:

Gender: Female

Age: 12

Are you left-handed or right-handed?
Right handed

Do you have an idea of what this experiment is about?
No

Do you have a background in linguistics, and if so, to what extent?
No

Thank you for participating in this experiment!

EXERCISE

Example: Tommy smiled happily when he saw all the presents under the tree.

1) Read this sentence and describe the picture that comes into your head in your own words.
The little boy called Tommy walked into the room and was happy, because he saw loads of presents under the tree

2) Write 3 or more words that come to your mind when you read this sentence.

Christmas morning
Christmas tree
Toys
1. The river sparkled in the sunlight and the grass on its bank swung in the gentle breeze.

1) Read this sentence and describe the picture that comes into your head in your own words.

*A warm, sunny day, flowers everywhere, birds in the trees singing, a light cool breeze.*

2) Write 3 or more words that come to your mind when you read this sentence.

*River, Grass, Clouds, Blue sky.*

2. The organ was being transported by two tall men.

1) Read this sentence and describe the picture that comes into your head in your own words.

*A golden organ was transported by two tall men wearing a blue jumper matching.*

2) Write 3 or more words that come to your mind when you read this sentence.

*Truck, Heavy, Lifting*
3. The Irish Times is my father’s favourite paper

1) Read this sentence and describe the picture that comes into your head in your own words.

*My dad runs down the stairs shouting where the Irish Times its my favourite paper.*

2) Write 3 or more words that come to your mind when you read this sentence.

*Sitting*  
*Reading*  
*News*

4. The teacher chose two children to help her collect all the copies to be corrected.

1) Read this sentence and describe the picture that comes into your head in your own words.

*Mark and Jo collect the copies for me please. All the children put up there copies in the air so they could collect them.*

2) Write 3 or more words that come to your mind when you read this sentence.

*Work*  
*Homework*  
*Books*
5. There is a grey mouse sitting on the desk in my room.

1) Read this sentence and describe the picture that comes into your head in your own words.

A mouse on my desk eating my cheese sandwich. Jumping up and down.

2) Write 3 or more words that come to your mind when you read this sentence.

Rats
Mouse hole
Cheese

6. The food I ate was revolting, I felt sick for the rest of the evening.

1) Read this sentence and describe the picture that comes into your head in your own words.

I hate some chips. I felt a bit sore in the stomace. I thought I was going to get sick.

2) Write 3 or more words that come to your mind when you read this sentence.

Doctor
Bed
Medecin
7. Striking workers is illegal; in fact hitting anyone is illegal.

1) Read this sentence and describe the picture that comes into your head in your own words.

* A man hitting another man in the face. The cops charge him with assault.

2) Write 3 or more words that come to your mind when you read this sentence.

* Jail
* Fine
* Police cars

8. The weeping willow is a beautiful tree that gets its name from the shape of its branches.

1) Read this sentence and describe the picture that comes into your head in your own words.

* A beautiful willow tree moving in a light breeze. The beautiful scent goes through the air.

2) Write 3 or more words that come to your mind when you read this sentence.

* Garden
* Growing
* Flowers
9. The tiring athlete realised she should have worked a little harder when she was training for the race.

1) Read this sentence and describe the picture that comes into your head in your own words.

*Athlete came 2nd in the race she could not breath when she got to the finish line she realised she should have worked harder.*

2) Write 3 or more words that come to your mind when you read this sentence.

*Medal*  
*Win*  
*Lose*

10. Belting children is very serious, you can go to prison for it!

1) Read this sentence and describe the picture that comes into your head in your own words.

*A man hitting a child with a belt and a child screaming to the top of her lungs.*

2) Write 3 or more words that come to your mind when you read this sentence.

*Care*  
*Crying*  
*Report*
11. Closing doors can be tricky.

1) Read this sentence and describe the picture that comes into your head in your own words.

A child pushes the door when it says pull.

2) Write 3 or more words that come to your mind when you read this sentence.

Handels
Doorbells
Knock

12. The running machines in the gym were broken, so I used the rowing machine instead.

1) Read this sentence and describe the picture that comes into your head in your own words.

The running machines was broken when the man steped on it so he used the rowing machine

2) Write 3 or more words that come to your mind when you read this sentence.

Weights
Boxing
Pool
13. We had a lot of visiting relatives over last week, because it was my birthday.

1) Read this sentence and describe the picture that comes into your head in your own words.

*My Aunts, uncle and cousins and I sat at the table sing happy birthday to me.*

2) Write 3 or more words that come to your mind when you read this sentence.

*Cake*
*Party*
*Cards*

14. Training staff can be hard work.

1) Read this sentence and describe the picture that comes into your head in your own words.

*The manager showed the women how to use the till.*

2) Write 3 or more words that come to your mind when you read this sentence.

*Shop*
*Money*
15. Flying planes requires a lot of training from experienced pilots.

1) Read this sentence and describe the picture that comes into your head in your own words.

A person learning how to drive a plane from an experienced pilot

2) Write 3 or more words that come to your mind when you read this sentence.

Flying
Airplanes
Training pilots
SCRIPT 2:
PERSONAL INFORMATION:

Gender: Female

Age: 10

Are you left-handed or right-handed?
Right handed

Do you have an idea of what this experiment is about?
No

Do you have a background in linguistics, and if so, to what extent?
No

Thank you for participating in this experiment!

EXERCISE

Example: Tommy smiled happily when he saw all the presents under the tree.

1) Read this sentence and describe the picture that comes into your head in your own words.
The little boy called Tommy walked into the room and was happy, because he saw loads of presents under the tree

2) Write 3 or more words that come to your mind when you read this sentence.
Christmas morning
Christmas tree
Toys
1. I set up a savings account in the bank to keep my money safe.

1) Read this sentence and describe the picture that comes into your head in your own words.

This guy walks into the bank and saves money in the bank. He puts the money in the safe. He walks back out and goes home again.

2) Write 3 or more words that come to your mind when you read this sentence.

Protect
Safe
Right

2. The organ played a familiar tune, as the bride walked up the aisle.

1) Read this sentence and describe the picture that comes into your head in your own words.

The organ was playing a familiar tune as the bride in the white dress. And she walks down the aisle slowly.

2) Write 3 or more words that come to your mind when you read this sentence.

Buityfull
Happy
Sad
Injoying
3. Origami is the Chinese art of folding paper.

1) Read this sentence and describe the picture that comes into your head in your own words.

I see the chinese in Origami folding paper. I see the Folding its very quick It looks like hard work to do. But they look good in my mind.

2) Write 3 or more words that come to your mind when you read this sentence.

Hard work
Language

4. That’s Karen’s handwriting, so it must be an old copy; she left over 3 weeks ago.

1) Read this sentence and describe the picture that comes into your head in your own words.

I see Karen’s handwriting on the paper copy. I see how its dated 3 weeks ago I see Karen writing it. 3 weeks ago.

2) Write 3 or more words that come to your mind when you read this sentence.

Long time ago
Writing
Persons name
5. John clicked on the mouse and a picture appeared on the screen.

1) Read this sentence and describe the picture that comes into your head in your own words.

*I see him clicking the mouse I see a high speed raceing up on the screen. I see it as a logo. I see him as he goes to click the mouse.*

2) Write 3 or more words that come to your mind when you read this sentence.

*Reading*
*Thinking*
*Mouse*
*Looking*

6. The revolting of the French people came to be known as the French revolution.

1) Read this sentence and describe the picture that comes into your head in your own words.

*I see the french people changing the word from revolting to revolution. I’m not sure what else.*

2) Write 3 or more words that come to your mind when you read this sentence.

*Sick*
*Changing / cant think /
7. I only agree with striking workers when it is necessary.

1) Read this sentence and describe the picture that comes into your head in your own words.

I see me agreeing with striking workers when it is necessary. I see them on their knees begging. Strikers at work but a speech bubble when its necessary.

2) Write 3 or more words that come to your mind when you read this sentence.

Good workers
Job
Need them
Sometimes
Despite.

8. The weeping willow stood tall and lonely in the centre of the field.

1) Read this sentence and describe the picture that comes into your head in your own words.

I see the weeping willow standing tall in the middle of a feild. I see him from the road. It looks weird its so quite. All I hear is him weeping.

2) Write 3 or more words that come to your mind when you read this sentence.

Loud
Disturbing
Alone
Quite
Wild
Feild
Weird to me
Ghostly, Darkish.
9. The tiring athlete talked non-stop about all her medals, until Tom just couldn’t take anymore and he let out a sleepy yawn.

1) Read this sentence and describe the picture that comes into your head in your own words.

I see the athlete going on yaping about his/her medals. I see the tierd in Tom’s eyes. I can see him just not listning to a word he says. Then he make a big huge tiger mouth sleepy yawn.

2) Write 3 or more words that come to your mind when you read this sentence.

1) sleepy
2) mad
3) bord
4) big
5) animal
6) anoying.

10. Belting someone can have life or death consequences.

1) Read this sentence and describe the picture that comes into your head in your own words.

I can just see my freind beling me across the cheek and nose. He/she knows the they coulde cause life or death. I see them dealing with consequences.

2) Write 3 or more words that come to your mind when you read this sentence.

1) Guity
2) Blood
3) Noise of beting
4) Sore
5) Red
6) Cross
11. The man’s jacket ripped when it got caught in the closing door.

1) Read this sentence and describe the picture that comes into your head in your own words.

I just see him walking and closing the door I hear the crak when his jacket rippes He tries to curse but he just can’t. Speech mark / last time I wear this jacket.

2) Write 3 or more words that come to your mind when you read this sentence.

Angry
Good jacket
Tear
Craket.

12. Running machines is a job that requires careful attention.

1) Read this sentence and describe the picture that comes into your head in your own words.

I see a man up on a running manchin in the bedroom. Hes not been carefull He falls of it he should of looket at the speed metre.

2) Write 3 or more words that come to your mind when you read this sentence.

Speed
Non attention / not carefull
Hurt / never again.
13. Visiting relatives can be a nuisance.

1) Read this sentence and describe the picture that comes into your head in your own words.

* A friend of mine was visiting relatives, he came home after he was so bored of the because they were a nuisans.

2) Write 3 or more words that come to your mind when you read this sentence.

* Annoyed
* Boaring / sad

14. Training staff is the manager’s job, even though she sometimes wishes it wasn’t.

1) Read this sentence and describe the picture that comes into your head in your own words.

* She sometimes think its boaring because the dont listen sometimes and annoying

2) Write 3 or more words that come to your mind when you read this sentence.

* Pasions
* Anger
* Wishing
15. Flying planes are more interesting to look at than parked planes.

1) Read this sentence and describe the picture that comes into your head in your own words.

*They are because planes are boaring when their on the ground they make know noise atall or the dont do circles on the ground.*

2) Write 3 or more words that come to your mind when you read this sentence.

*Boaring
Unnoisy
On the ground doin notin.*
Appendix B

Adult’s sample questionnaire
SCRIPT 2:
PERSONAL INFORMATION:

**Gender:** Female

**Age:** 16

**Are you left-handed or right-handed?**
*Left handed*

**Do you have an idea of what this experiment is about?**
*No*

**Do you have a background in linguistics, and if so, to what extent?**
*No*

Thank you for participating in this experiment!

**EXERCISE**

Example: Tommy smiled happily when he saw all the presents under the tree.

1) Read this sentence and describe the picture that comes into your head in your own words.
*The little boy called Tommy walked into the room and was happy, because he saw loads of presents under the tree*

2) Write 3 or more words that come to your mind when you read this sentence.
*Christmas morning*
*Christmas tree*
*Toys*
Please answer the questions following each sentence:

1. I set up a savings account in the bank to keep my money safe.

1) What does this sentence mean? Paraphrase it in your own words.

*I put money in a bank to save it and not spend it.*

2) Write 3 or more words that come to your mind when you read this sentence.

*Banks, bank books, loads of money!*

3) Does the sentence seem natural to you? If a foreign friend uttered that sentence in English, would you correct him/her?

*It sounds natural enough in one way, depends on how you look at it.*

2. The organ played a familiar tune, as the bride walked up the aisle.

1) What does this sentence mean? Paraphrase it in your own words.

*The organ played a tune I knew, as the bride to be walked up the aisle.*

2) Write 3 or more words that come to your mind when you read this sentence.

*White, music, flowers*

3) Does the sentence seem natural to you? If a foreign friend uttered that sentence in English, would you correct him/her?

*Yes, it seems natural.*
3. The birds’ singing sounded cheerful and carefree.

1) What does this sentence mean? Paraphrase it in your own words.

The birds that were singing sounded carefree and cheerful

2) Write 3 or more words that come to your mind when you read this sentence.

Trees
music
sunny days

3) Does the sentence seem natural to you? If a foreign friend uttered that sentence in English, would you correct him/her?

No, the bit at the start seems wrong.

4. Origami is the Chinese art of folding paper.

1) What does this sentence mean? Paraphrase it in your own words.

In China, origami is the art of folding paper.

2) Write 3 or more words that come to your mind when you read this sentence.

School
paper
art

3) Does the sentence seem natural to you? If a foreign friend uttered that sentence in English, would you correct him/her?

Yes, it seems natural.
5. The plant was outgrowing its pot, so I found a corner for it in the garden.

1) What does this sentence mean? Paraphrase it in your own words.

The plant was getting too big for the pot it was in so I planted it in the corner of the garden.

2) Write 3 or more words that come to your mind when you read this sentence.

Grass
pots
trees

3) Does the sentence seem natural to you? If a foreign friend uttered that sentence in English, would you correct him/her?

It sounds natural

6. The sleeping cat lay on the mat.

1) What does this sentence mean? Paraphrase it in your own words.

A cat is lying on a red carpet in front of the fire sleeping.

2) Write 3 or more words that come to your mind when you read this sentence.

Furry
breathing
purring

3) Does the sentence seem natural to you? If a foreign friend uttered that sentence in English, would you correct him/her?

It sounds natural
7. That’s Karen’s handwriting, so it must be an old copy; she left over 3 weeks ago.

1) What does this sentence mean? Paraphrase it in your own words.

That has to be an old copy of Karen’s handwriting because she left over 3 weeks ago.

2) Write 3 or more words that come to your mind when you read this sentence.

Paper
pen
copy

3) Does the sentence seem natural to you? If a foreign friend uttered that sentence in English, would you correct him/her?

Natural

8. John clicked on the mouse and a picture appeared on the screen.

1) What does this sentence mean? Paraphrase it in your own words.

John clicked on the mouse and a picture appeared on the computer screen.

2) Write 3 or more words that come to your mind when you read this sentence.

Mouse pad
computer screen
chair

3) Does the sentence seem natural to you? If a foreign friend uttered that sentence in English, would you correct him/her?

Natural
9. The revolting of the French people came to be known as the French revolution.

1) What does this sentence mean? Paraphrase it in your own words.

_The revolution that the French people were involved in became to be known as the French revolution_

2) Write 3 or more words that come to your mind when you read this sentence.

_School_
_history_
_teacher_

3) Does the sentence seem natural to you? If a foreign friend uttered that sentence in English, would you correct him/her?

_Unusual_

10. Ringing telephones can be annoying.

1) What does this sentence mean? Paraphrase it in your own words.

_When telephones ring it can be annoying_

2) Write 3 or more words that come to your mind when you read this sentence.

_Phone_
_kitchen_
_ringtone_

3) Does the sentence seem natural to you? If a foreign friend uttered that sentence in English, would you correct him/her?

_Unusual_
11. I only agree with striking workers when it is necessary.

1) What does this sentence mean? Paraphrase it in your own words.

_I only agree with workers who strike when its necessary._

2) Write 3 or more words that come to your mind when you read this sentence.

_Picket_  
_strikes_  
_lots of people_

3) Does the sentence seem natural to you? If a foreign friend uttered that sentence in English, would you correct him/her?

_Unusual_

12. The weeping willow stood tall and lonely in the centre of the field.

1) What does this sentence mean? Paraphrase it in your own words.

_The tall and lonely weeping willow tree stood in the centre of the field_

2) Write 3 or more words that come to your mind when you read this sentence.

_Field grass majestic_

3) Does the sentence seem natural to you? If a foreign friend uttered that sentence in English, would you correct him/her?

_Natural_
13. The tiring athlete talked non-stop about all her medals and her victories, until Tom just couldn’t take anymore and let out a sleepy yawn.

1) What does this sentence mean? Paraphrase it in your own words.

*The athlete kept talking about all her medals and victories, until Tom, who couldn’t take anymore let out a sleepy yawn*

2) Write 3 or more words that come to your mind when you read this sentence.

*Medals*  
*running*  
*boring.*

3) Does the sentence seem natural to you? If a foreign friend uttered that sentence in English, would you correct him/her?

*Yes, natural*  

14. Belting someone can have life or death consequences.

1) What does this sentence mean? Paraphrase it in your own words.

*If you belt someone it can have life or death consequences*

2) Write 3 or more words that come to your mind when you read this sentence.

*Scary*  
*life*  
*death*

3) Does the sentence seem natural to you? If a foreign friend uttered that sentence in English, would you correct him/her?

*Natural*
15. The black bird took one look at the cat and flew away.

1) What does this sentence mean? Paraphrase it in your own words.

*The black bird saw a cat, got scared and flew away.*

2) Write 3 or more words that come to your mind when you read this sentence.

*Trees, birds, scared*

3) Does the sentence seem natural to you? If a foreign friend uttered that sentence in English, would you correct him/her?

*Natural*

16. The man's jacket ripped when it got caught in the closing door.

1) What does this sentence mean? Paraphrase it in your own words.

*The man's jacket ripped in the door when it was closing.*

2) Write 3 or more words that come to your mind when you read this sentence.

*Rip, door, man*

3) Does the sentence seem natural to you? If a foreign friend uttered that sentence in English, would you correct him/her?

*Natural*
17. Running machines is a job that requires careful attention.

1) What does this sentence mean? Paraphrase it in your own words.

Running machines require careful attention

2) Write 3 or more words that come to your mind when you read this sentence.

Work
  treadmill
gym

3) Does the sentence seem natural to you? If a foreign friend uttered that sentence in English, would you correct him/her?

Unusual

18. Sarah blew out the candles as all her friends sang her happy birthday.

1) What does this sentence mean? Paraphrase it in your own words.

As Sarah blew out the candles on her birthday cake, all her friends sang her happy birthday

2) Write 3 or more words that come to your mind when you read this sentence.

Cake
  presents
  birthday

3) Does the sentence seem natural to you? If a foreign friend uttered that sentence in English, would you correct him/her?

It sounds natural
19. Visiting relatives can be a nuisance.

1) What does this sentence mean? Paraphrase it in your own words.

*When you have to visit your relatives it can be a nuisance*

2) Write 3 or more words that come to your mind when you read this sentence.

- Aunties
- Uncles
- Family gathering

3) Does the sentence seem natural to you? If a foreign friend uttered that sentence in English, would you correct him/her?

*Natural*

20. Training personnel is a job reserved for the assistant manager, even though she sometimes wishes it wasn’t.

1) What does this sentence mean? Paraphrase it in your own words.

*The assistant manager has a training personnel job reserved for her, even though she wishes it wasn’t her job*

2) Write 3 or more words that come to your mind when you read this sentence.

- Work
- Training
- Reserved

3) Does the sentence seem natural to you? If a foreign friend uttered that sentence in English, would you correct him/her?

*Unusual*
21. Flying planes are more interesting to look at than stationery/parked planes.

1) What does this sentence mean? Paraphrase it in your own words.

*To watch flying planes is more interesting than watching parked planes.*

2) Write 3 or more words that come to your mind when you read this sentence.

*Airports, plane watchers, planes*

3) Does the sentence seem natural to you? If a foreign friend uttered that sentence in English, would you correct him/her?

*Unusual*
SCRIPT 3:
PERSONAL INFORMATION:

Gender: Female
Age: 16
Are you left-handed or right-handed?
Left handed
Do you have an idea of what this experiment is about?
No
Do you have a background in linguistics, and if so, to what extent?
No
Thank you for participating in this experiment!

EXERCISE

Example: Tommy smiled happily when he saw all the presents under the tree.

1) Read this sentence and describe the picture that comes into your head in your own words.
The little boy called Tommy walked into the room and was happy, because he saw loads of presents under the tree

2) Write 3 or more words that come to your mind when you read this sentence.
Christmas morning
Christmas tree
Toys
APPENDIX B. ADULT’S SAMPLE QUESTIONNAIRE

Please answer the questions following each sentence:

1. As I walked by the bank, I remembered it was mother’s day

1) What does this sentence mean? Paraphrase it in your own words.

_The writer remembers it is mother’s day as he is passing by the bank in town_

2) Write 3 or more words that come to your mind when you read this sentence.

_Money, green, flowers, reminder_

3) Does the sentence seem natural to you? If a foreign friend uttered that sentence in English, would you correct him/her?

_Sounds natural_

2. An organ that is vital to our survival is the heart.

1) What does this sentence mean? Paraphrase it in your own words.

_This sentence means that without the heart, the body could not function and life would cease_

2) Write 3 or more words that come to your mind when you read this sentence.

_Beating, breathing, life_

3) Does the sentence seem natural to you? If a foreign friend uttered that sentence in English, would you correct him/her?

_I think it is reversed. It would make more sense to me, grammatically, if it read ‘The heart is an organ that is vital to our survival’_
3. The birds’ singing sounded cheerful and carefree.

1) What does this sentence mean? Paraphrase it in your own words.

The singing of the birds signalled their happiness

2) Write 3 or more words that come to your mind when you read this sentence.

Tree
nest
happiness

3) Does the sentence seem natural to you? If a foreign friend uttered that sentence in English, would you correct him/her?

Sounds natural. Usual grammar.

4. John held the paper up for everyone to see and the others gasped in amazement.

1) What does this sentence mean? Paraphrase it in your own words.

The sentence means that when John held the paper up to his audience to see, they were shocked or surprised.

2) Write 3 or more words that come to your mind when you read this sentence.

Shock
display
newspaper

3) Does the sentence seem natural to you? If a foreign friend uttered that sentence in English, would you correct him/her?

It does seem grammatically correct.
5. The plant has caused so much pollution that a protest is being organised to close it down.

1) What does this sentence mean? Paraphrase it in your own words.

*A factory emitting dangerous toxins or pollutants has caused so much pollution that people are protesting against it and want it closed*

2) Write 3 or more words that come to your mind when you read this sentence.

*Smoke*  
*cough*  
*picket*

3) Does the sentence seem natural to you? If a foreign friend uttered that sentence in English, would you correct him/her?

*Seems grammatically correct*

6. The sleeping cat lay on the mat.

1) What does this sentence mean? Paraphrase it in your own words.

*A cat is lying on a red carpet in front of the fire sleeping.*

2) Write 3 or more words that come to your mind when you read this sentence.

*Furry*  
*breathing*  
*purring*

3) Does the sentence seem natural to you? If a foreign friend uttered that sentence in English, would you correct him/her?

*It sounds natural*
7. The new intern is going to make a copy of the document and file it away, assuming she knows how to use a photocopier.

1) What does this sentence mean? Paraphrase it in your own words.

*It isn’t known if the new intern can use the photocopier, but if she can, she will photocopy the document and file it*

2) Write 3 or more words that come to your mind when you read this sentence.

*Folder, assumption, condescending*

3) Does the sentence seem natural to you? If a foreign friend uttered that sentence in English, would you correct him/her?

*It should be the other way i.e. ‘Assuming she knows how to use a photocopier the new intern is going to make a copy of the document and file it away*

8. As soon as Sally saw the mouse she jumped up onto the nearest chair and screamed.

1) What does this sentence mean? Paraphrase it in your own words.

*Sally was scared when she saw the mouse and tried to get out of its way*

2) Write 3 or more words that come to your mind when you read this sentence.

*Fright
grey
girl*

3) Does the sentence seem natural to you? If a foreign friend uttered that sentence in English, would you correct him/her?

*Seems natural*
9. The peasants are revolting

1) What does this sentence mean? Paraphrase it in your own words.

_The peasants are having an uprising or rebelling against something i.e. society / boss_

2) Write 3 or more words that come to your mind when you read this sentence.

_Pitchfork_
_field_
_anger_

3) Does the sentence seem natural to you? If a foreign friend uttered that sentence in English, would you correct him/her?

_Grammatically natural, but ambiguous_

10. Ringing telephones can be annoying.

1) What does this sentence mean? Paraphrase it in your own words.

_Telephones that are constantly ringing i.e. people ringing your phone, can be annoying_

2) Write 3 or more words that come to your mind when you read this sentence.

_Stress_
_palpitation_
_noise_

3) Does the sentence seem natural to you? If a foreign friend uttered that sentence in English, would you correct him/her?

_Seems natural_
11. Striking workers have greatly improved working conditions over the years.

1) What does this sentence mean? Paraphrase it in your own words.

*Workers who have gone on strike to improve their working condition have achieved their goal*

2) Write 3 or more words that come to your mind when you read this sentence.

*Standards*  
*equality*  
*justice*

3) Does the sentence seem natural to you? If a foreign friend uttered that sentence in English, would you correct him/her?

*Seems natural*

12. The weeping willow sobbed and moaned until the fairies made him a daisy chain to hang from his branches.

1) What does this sentence mean? Paraphrase it in your own words.

*The tree was crying and upset but was made to feel better when the fairies gave him a present of a daisy chain to cheer him up.*

2) Write 3 or more words that come to your mind when you read this sentence.

*Kindness*  
*sympathy*  
*creaky*

3) Does the sentence seem natural to you? If a foreign friend uttered that sentence in English, would you correct him/her?

*Seems natural*
13. The tiring athlete finally gave up

1) What does this sentence mean? Paraphrase it in your own words.

*The athlete only gave in after pushing themselves as much as they could*

2) Write 3 or more words that come to your mind when you read this sentence.

*Fatigue, endurance, cramp*

3) Does the sentence seem natural to you? If a foreign friend uttered that sentence in English, would you correct him/her?

*Seems natural*

14. Belting children as soon as you get into the car is a good idea unless you want to receive points on your drivers licence.

1) What does this sentence mean? Paraphrase it in your own words.

*Putting a seat belt on children as soon as they get in the car is advised*

2) Write 3 or more words that come to your mind when you read this sentence.

*Smack, parent, windscreen*

3) Does the sentence seem natural to you? If a foreign friend uttered that sentence in English, would you correct him/her?

*Grammatically correct*
15. The black bird took one look at the cat and flew away.

1) What does this sentence mean? Paraphrase it in your own words.

*The blackbird recognised the danger of the cat and escaped immediately*

2) Write 3 or more words that come to your mind when you read this sentence.

*Feathers*
*Wings*
*Whiskers*

3) Does the sentence seem natural to you? If a foreign friend uttered that sentence in English, would you correct him/her?

*Seems natural*

16. The supervisor instructed the doorman that when closing doors he must be careful not to bang them.

1) What does this sentence mean? Paraphrase it in your own words.

*The supervisor was telling the doorman how he wanted him to do his job*

2) Write 3 or more words that come to your mind when you read this sentence.

*Boss*
*Bouncer*
*Quiet*

3) Does the sentence seem natural to you? If a foreign friend uttered that sentence in English, would you correct him/her?

*Seems natural*
17. Running machines can be daunting.

1) What does this sentence mean? Paraphrase it in your own words.

_Treadmills can be scary, people may be apprehensive using them._

2) Write 3 or more words that come to your mind when you read this sentence.

_Gym_
_exercise_
_anxiety_

3) Does the sentence seem natural to you? If a foreign friend uttered that sentence in English, would you correct him/her?

_Seems grammatically correct, but could be understood as working or using machinery can be scary_

18. Sarah blew out the candles as all her friends sang her happy birthday.

1) What does this sentence mean? Paraphrase it in your own words.

_Sarah’s friends were singing happy birthday to her while she was blowing out the candles on her birthday cake_

2) Write 3 or more words that come to your mind when you read this sentence.

_Party_
_balloons_
_cake_

3) Does the sentence seem natural to you? If a foreign friend uttered that sentence in English, would you correct him/her?

_Seems natural_
19. Visiting relatives used to be fun, but since we’ve moved home the journey to go and see them just takes too long.

1) What does this sentence mean? Paraphrase it in your own words.

Due to moving house to somewhere further away, the journey to visit relatives is now too long and it is not enjoyed.

2) Write 3 or more words that come to your mind when you read this sentence.

Aunt
uncle
children
car

3) Does the sentence seem natural to you? If a foreign friend uttered that sentence in English, would you correct him/her?

Seems grammatically correct

20. The training personnel in the hotel weren’t too happy with their wages, but didn’t feel they could complain, as they had no previous experience.

1) What does this sentence mean? Paraphrase it in your own words.

Some staff in the hotel felt their wages weren’t enough, but were apprehensive about complaining as they had no previous experience to give them confidence.

2) Write 3 or more words that come to your mind when you read this sentence.

Confidence
work
desk

3) Does the sentence seem natural to you? If a foreign friend uttered that sentence in English, would you correct him/her?

Natural
21. Flying planes can be dangerous.

1) What does this sentence mean? Paraphrase it in your own words.

*It can be unsafe to fly planes*

2) Write 3 or more words that come to your mind when you read this sentence.

*Speed
blades
pilot
safety*

3) Does the sentence seem natural to you? If a foreign friend uttered that sentence in English, would you correct him/her?

*Natural*