Cross-linguistic Research to Examine
the Principle of Linguistic Relativity:
Evidence from English, Mandarin and Russian

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Declaration

I hereby declare that this thesis, submitted in candidature for the degree of Master of Science at Trinity College Dublin, is entirely my own work and has not been previously submitted for a degree at this or any other university. I agree that the Library may lend or copy the thesis upon request.

Ronan Grace, October 30, 2007
The principle of linguistic relativity states that differences in language lead to differences in ways of thinking. The greater the diversity in language, the greater the differences in cognition. This thesis examines the bi-directional relationship between language and culture and the relationship between language and cognition. It studies data from a wide range of the world’s languages in order to provide a balanced account.

The thesis reviews research in linguistic relativity and establishes the areas of thought where language may have a greater influence. Research has shown that the effect of language is greater on the conceptualisation of abstract concepts, where there is less supporting sensory information.

The thesis focuses on two concepts that are of universal relevance, but are described differently in various languages. These are the areas of time and negation.

Empirical investigations are carried out to analyse the effect of native language upon the conceptualisation of time for English and Mandarin speakers. One experiment replicates earlier findings, which revealed a correlation between native language and the means of ordering events, while a second experiment produces new results that confirm the role played by language in the conceptualisation of time.

Empirical investigations are also conducted to examine the effect of the contrasting methods of forming negated propositions in English and Russian on the conceptualisation of alternative possibilities. Results of these experiments also reveal a relationship between native language and cognition.
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Die Grenzen meiner Sprache bedeuten die Grenzen meiner Welt.

The limits of my language mean the limits of my world.

Ludwig Wittgenstein (1889 – 1951)
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Chapter One

Introduction
La dernière chose qu’on trouve en faisant un ouvrage, est de savoir celle qu’il faut mettre la première. (The last thing one knows in constructing a work is what to put first) – Blaise Pascal (1632–1662)

1.1 Linguistic Diversity

There are several thousand languages spoken in the world today. The exact figure depends on the criteria that are used, as the boundary between language and dialect is often blurred. However, if we take mutual intelligibility (the ability of two speakers to communicate with and understand one another) to be the standard criterion, then the figure stands at somewhere in the region of six thousand (Wolff 2000; Deutscher 2005). This figure shifts constantly, since many languages face the threat of extinction, and to be replaced by a language with a greater number of speakers. Roughly half of the languages that exist today have less than three thousand native speakers, leaving them in a severely endangered state (Harrison 2007). Many languages have already grown extinct.

Political factors are involved in the definition of a language. While Low German (known locally in Northern Germany as ‘Plattdeutsch’) and Swiss German are mutually unintelligible, both are considered to be dialects of the one German language (to achieve mutual understanding these speakers would have to converse in High German, the standardised form of the language). In contrast, Low German and Dutch possess many more similar characteristics, yet these are politically distinct languages (Sanders 1982). Similarly, the distinction between the Croatian and Serbian languages and the Bulgarian and Macedonian languages is primarily a political one, as in each case the languages are mutually intelligible (Lockwood 1972). On the other hand, the main three Chinese languages, Mandarin, Cantonese and Wu, are vastly different to one another, and are not mutually intelligible, but the Chinese government (which uses Mandarin in an official capacity) considers each of them to be dialects of the one Chinese language (DeFrancis 1984; Ramsey 1987).

Figure 1 shows the distribution of the various language families around the world. The more closely related that two languages are, the more that they will have in common. Norwegian will have more in common with Danish, for example, than it will with Greek, while it will have more in common with Greek than with a Native American language.
Each family of languages contains a large number of sub-divisions. Some of the sub-groups of the Indo-European language family include the Germanic, Romance, Slavic and Celtic languages, among a number of others. The Germanic language group further contains West Germanic, consisting of German, English, Dutch, Afrikaans and Frisian, North Germanic, which consists of Swedish, Norwegian, Danish, Icelandic and Faroese, and an extinct East Germanic group. Many individual countries possess a vast linguistic wealth within their political borders. Nigeria has more than four hundred languages (Crozier & Blench 1992; Blench 1998), while India has several hundred spanning several language families (Mallikarjun 2002). Since there are several thousand languages actively spoken in the world, there are a vast number of different ways for people to describe the world around them.
Edward Sapir commented that “no two languages are ever sufficiently similar to be considered as representing the same social reality”. (Sapir 1958 [1929], p. 69). If each language describes a particular “social reality”, then the language that one speaks could have an impact on the way that one perceives certain aspects of the world. This is known as the principle of linguistic relativity.

1.2 Linguistic Relativity

The principle of linguistic relativity is the notion that the linguistic background of an individual can shape or influence the way that they think. The language that a person speaks may influence their conceptualisation of certain concepts or events. For this to be the case, language must be more than a simple means of communication.

While the faculty of language is universal to all human societies, there is a vast amount of diversity in the thousands of languages that are spoken throughout the world. A language has to serve the needs of its speakers, and to do this it requires labels for everything that its speakers wish to describe. Sapir commented that each human society is different, and is not merely the same world with alternative labels assigned to its elements (Sapir 1958 [1929]. Many of the languages of the world have evolved independently over the last thousands of years, so it is natural that there should be a lot of diversity today. The needs of a society differ not only to other societies, but also change over time, and thus the language of each society is necessarily unique in the way that it caters for its speakers at any point in time.

Diversity of language is observed in many areas. Firstly, a language is made up of a lexicon and a grammar. The lexicon of a language is a finite set of words, while its grammar is a system of rules that enables an infinite number of sentences to be created from this finite set of words. Languages are different not only in the assignment of labels to elements in the world (and in deciding which elements require labels), but also in the grammatical rules that are used to build sentences. Basic word order is different in many languages, for example. While English operates a subject-verb-object rule, Japanese employs a subject-object-verb rule (Kuno 1973), and Irish uses a verb-subject-object rule.

Languages can be different in terms of both their lexica and their grammars without there being unassailable differences in the ways that speakers build their thoughts. Lexical diversity is often a trivial matter. For example, the fact English speakers say ‘salt’, German speakers say ‘Salz’, and French speakers say ‘sel’ does not mean that any of the groups...
possess a different conceptualisation of the substance. Linguistic relativity means more than the differences that exist between alternative sets of vocabulary and different sounds.

The German philosopher and philologist Wilhelm von Humboldt remarked on the diversity of language that:

[…](Humboldt 1999 [1836] VII: 53)

When we talk of linguistic relativity we do not talk of languages merely having different vocabulary, but of having unique underlying structures that persuade their speakers to align their thoughts in a certain way. Different perceptions of the world are brought about when the speaker is not aware that they are being influenced by their language. Language must do more than act as a medium of expression, and must play a role in shaping the expression itself.

The principle of linguistic relativity states that linguistic diversity leads to differences in the ways that people of different linguistic backgrounds perceive and conceptualise the world. It is important to establish how great this diversity of thought might be. Since we know that people have the capacity to learn foreign languages and converse with native speakers of other languages, we know that the various world views are not so incommensurate that people cannot achieve mutual understanding. Moreover, it is possible to translate from one language to another, so we know that something that can be expressed in one language may be expressed in another. The conceptual differences implied by the theory of linguistic relativity do not preclude people from different linguistic backgrounds from conversing with one another, but they are no less important in spite of that.

Language enables the language user to describe concrete objects and events that they witness in the world as well as less tangible abstract concepts. Concrete things are supported by a lot more sensory information than abstract ones. An abstract concept, such as love or freedom, is more difficult to relay by pointing and gesturing, for example.

Language is particularly important in this respect, and for just this reason it is thought that language may play a larger role in the understanding of abstract concepts than concrete ones, due to the dearth of sensory information. The way that people understand concepts like justice, harmony and the passing of time may be influenced by the way that their language describes them.
1.3 Pre-Twentieth Century Account of Linguistic Relativity

In the late eighteenth and early nineteenth century research into linguistic relativity became more prominent in Germany. In particular Johann Georg Hamann (1730-1788), Johann Gottfried Herder (1744-1803) and Wilhelm von Humboldt (1767-1835) devoted a lot of time to the role of language in human thought (Hamann 1957; Herder 1966 [1772]; Humboldt 1999 [1836]).

1.3.1 Wilhelm von Humboldt

Humboldt was a philosopher, anthropologist and linguist, and spent a lot of time translating the Ancient Greek poets and playwrights Pindar and Aeschylus. He also studied the Basque language extensively and was one of the first to classify its origin and structure, attributing it to a much wider region of Spain and Southern France than it currently occupies (Stubb 2002). Only in recent decades has his work in linguistics received more careful analysis, although Boas and Sapir did draw somewhat from his works. He is a key figure in the theory of linguistic relativity. Humboldt gathered a vast amount of data from languages spanning all over the world, with which he formed his ideas. These included a number of Indo-European, Asian, South American and Austronesian languages.

Associated with Humboldt is the notion of various Weltansichten, or “world views”. This is the notion that speakers of different languages have opposing views of the world, depending on the language that they speak. Humboldt did not invent this idea, but he was the first person to describe it in close detail (Stubb 2002). For Humboldt the ‘Weltansicht’ of a language was located in both its grammar and its lexicon, and above all in its discourses and texts, which he considered to be the real ‘character’ of a language. He commented that the true nature of language manifested itself in the acts of living speech production in society (Humboldt 1999 [1836]).

Although Humboldt was a proponent of the idea that each language possessed its own character, he also held that there were a great number of linguistic universals. The prime universal element was that every language was able to fully describe a specific view of the world, according to the requirements of its speakers. No one language was inferior to any other, something which was believed by many European people at the time. The Indo-European languages received much more attention than languages from other
language families and it was thought that these languages could better describe the world and that one could express oneself better in these languages. Furthermore, it was believed that the speakers of Indo-European languages were thus more advanced with regard to cognitive capacity than speakers of other languages. It is now understood that all languages are equally complex and equally adept at fulfilling the needs of communication. Yet Humboldt was among the first people to devote a serious amount of time to a range of languages outside the Indo-European language family (Stubb 2002).

Above all, Humboldt considered the function of language to go beyond the mere communication of ideas and concepts. He described language as “das bildende Organ des Gedankens” (the formative organ of thought) (Humboldt 1999 [1836]).

1.3.2 Franz Boas

Franz Boas (1858 – 1942) was an American anthropologist, who made a series of descriptive studies of Native American languages. He discussed the problems that arise when speakers of one language try to classify another language. For example, he disputed the findings of the linguist Daniel Garrison Brinton, who claimed that in many Native American languages words varied in their vocalisation even within the scope of just one speaker. Brinton postulated that this was a sign of the “inferiority” of these languages, which were at an earlier stage of their evolutionary process (Brinton 1890). Boas rejected this idea and insisted that the discrepancy arose not among the speakers of those languages, but in the perception of the sounds by people from alternative linguistic backgrounds who studied them (Williams 1996). He argued that in every language people can pronounce a word in a number of different ways, while the word will still be recognised as the same word. A major part of Boas’ work was what he called “cultural relativism” (Darnell 1994). This meant that elements that are significant in the world of one culture may seem meaningless to another culture. This is related to the theory of linguistic relativity, as language and culture are closely intertwined. If two cultures value different concepts, then these cultural differences will be reflected in their respective languages.

Boas made three main points about the role of language in culture. Firstly, he remarked that language classifies experience:

Since the total range of personal experience which language serves to express is infinitely varied, and its whole scope must be expressed by a limited number of phonetic groups, it is obvious that an extended classification of experiences must underlie all articulate speech. (Boas, 1966 [1911]: 20)
Secondly, he made the point that different languages classify experience in different ways:

[…] the principles of classification which are found in different languages do not by any means agree.  
(Boas, 1916 [1911]: 198)

Thirdly, Boas claimed that linguistic constructions are unconscious by nature, since they are produced automatically and without much preparation.

[…] the use of language is so automatic that the opportunity never arises for the fundamental notions to emerge into consciousness.  
(Boas, 1966 [1911]: 64)

Taking Boas’ three points together, the central view of his writings is that language reflects differences in thought, but it does not determine thought. Boas also believed in the “psychic unity of man” which was encapsulated in the linguistic universals that he recognised (Boas 1966).

1.4 The Sapir-Whorf Hypothesis

The Sapir-Whorf hypothesis, often known simply as the Whorfian hypothesis, is the idea that there is a systematic relationship between a language and those who speak it. The more diverse languages are, the greater the differences between the speakers of different languages. The hypothesis is named after the linguists Edward Sapir (1884-1939) and Benjamin Lee Whorf (1897-1941), who have made a large impact on the study of language and on the science of linguistics. It is predominantly through the work of Sapir and Whorf that linguistic relativity came to prominence in the twentieth century.

The debate around linguistic relativity has always been a hotly disputed one, and Ellis remarked that “the Whorf hypothesis seems to bring out the worst in those who discuss it” (Ellis 1993: 57). He also observed that “the nature of [Whorf’s] original contribution does not really lie in what is commonly attacked in his work” (Ellis 1993: 63). Many of the aspects of Whorf’s work that are attacked are ideas attributed to him rather than ones that were postulated in his work. This refers to the stronger view of linguistic determinism, namely that language determines thought. While this is widely regarded to be false, it should not be assumed that language thus does not influence thought at all.
The term ‘linguistic relativity’ is a better one than the ‘Sapir-Whorf Hypothesis’, since Whorf himself did not apply this label to his work. The titular hypothesis has been posthumously built from a collection of Whorf’s personal letters and articles. Although many of Whorf’s ideas have been attacked by other linguists, including the celebrated example of Eskimo words for ‘snow’, Whorf’s core ideas are as relevant today as they were at the time he formulated them.

Edward Sapir was a student of Franz Boas and held stronger views of the effects of language on thought than his predecessor. He remarked that:

The worlds in which different societies live are distinct worlds, not merely the same world with different labels attached... Even comparatively simple acts of perception are very much more at the mercy of the social patterns called words than we might suppose... We see and hear and otherwise experience very largely as we do because the language habits of our community predispose certain choices of interpretation.

(Sapir 1958 [1929]: 209)

Sapir also claimed that language is a “guide to social reality”. He believed that the link between language and culture is so strong that they cannot be separated. One can only come to fully understand one by learning the other. Sapir believed that there is a “bi-directional relationship” between language and culture.

Unlike Humboldt, Sapir did not believe language and thought to mean the same thing. However, he maintained that it was through language that people have access to fully conceptual thought. He rejected the notion of being able to think without language as a “confusion of imagery with thought” (Lucy 1992: 20). While Boas believed that language reflected thought, Sapir went a step further and held that language had an important shaping influence on its speakers’ interpretations of experience. He said of the speakers of a language:

[... they are very much at the mercy of the particular language which has become the medium of expression for their society... the ‘real world’ is to a large extent unconsciously built up on the language habits of the group.]

(Sapir, 1958 [1929]: 69)

Benjamin Lee Whorf, often labelled as an amateur linguist, trained as a chemical engineer and was initially self-taught in linguistics. However, he later came into contact with Edward Sapir and worked under him. He made important descriptive studies of Hopi, a Native American language, as well as other Aztecan and Mayan languages. He wrote an important account of the conceptualisation of time in the Hopi language.
Whorf believed that language had a very strong influence on thought, and in one of his well-known writings he remarked that:

[…] all observers are not led by the same physical evidence to the same picture of the universe, unless their linguistic backgrounds are similar, or can in some way be calibrated. (Whorf 1940: 231)

Whorf believed that the world that we observe is not an objective vision of reality, but rather it depends on the way that our language describes it. Another of Whorf’s seminal quotes that contributes to this hypothesis is the following:

We dissect nature along lines laid down by our native languages. The categories and types that we isolate from the world of phenomena we do not find there because they stare every observer in the face; on the contrary, the world is presented in a kaleidoscopic flux of impressions which has to be organized by our minds—and this means largely by the linguistic systems in our minds. We cut nature up, organize it into concepts, and ascribe significances as we do, largely because we are parties to an agreement to organize it in this way - an agreement that holds throughout our speech community and is codified in the patterns of our language. The agreement is, of course, an implicit and unstated one, but its terms are absolutely obligatory; we cannot talk at all except by subscribing to the organization and classification of data which the agreement decrees. (Whorf 1956 [1940]: 213–214)

Although people often make the assumption that the categories determined by their language are natural ones that are decided by an external and objective reality, no one language presents an objective view of the world. According to the theory of linguistic relativity people may be led to believe that objects and concepts that their language categorises in a similar way have more in common than objects and concepts from opposing categories. For example, many animals that are members of the class of ‘dogs’ have little in common with one another in terms of physical appearance (an Irish Wolfhound and a Shih Tzu, for instance). Similarly, German uses a single word, ‘Taube’, where English uses two, to refer to a ‘pigeon’ and a ‘dove’. This makes it more likely that German speakers will create an association between these birds, while an English speaker might not. People may make associations between things that are classed within one linguistic category and grow aware of similarities of which they might otherwise not be aware.

A central point of Whorf’s argument is that linguistic categories are used in habitual thought. In trying to understand an experience people use the categories available in their language to attribute properties to that experience. Whorf remarked that:
We say “see that wave”—the same pattern as “see that house”. But without the projection of language no one ever saw a single wave. We see a surface in ever-changing undulating motion. Some languages cannot say “a wave”; they are closer to reality in this respect. Hopi say walalata, “plural waving occurs,” and can call attention to one place in the waving just as we can. But, since actually a wave cannot exist by itself, the form that corresponds to our singular, wala, is not the equivalent of English “a wave”, but means “a slosh occurs”, as when a vessel of liquid is suddenly jarred. (Whorf 1956 [1945]: 262)

Whorf believed that the notion of a ‘wave’ is created only by our language, and that it is reasonable to imagine a language describing this event in an alternative way, where there would exist no word for what we know as a ‘wave’ (Whorf 1945). In this example, the speaker may pay less attention to the ‘waves’ if a different part of the event were lexicalised. Consequently, if two languages categorise the world in different ways, their speakers may view members of those different categories in correspondingly different ways.

In this sense, language does not so much prevent its speakers from seeing something that exists in their world, but rather makes suggestions which would not be arrived at through experience alone. Such effects of language can have deep and far-reaching consequences on the thought processes of a speaker. People are generally unlikely to recognise the means by which their language causes them to think in certain ways.

Any discussion of linguistic relativity is necessarily a cyclical one, as one must use some particular language in order to conduct a study of the effects of language. Penn noted that:

In short, if one believes in linguistic relativity, one finds oneself in the egocentric quandary, unable to make assertions about reality because of doubting one’s own ability to correctly describe reality (Penn 1972: 33)

This is the paradox of any discussion of language. There is no escape or exit from language. In order to support the theory of linguistic relativity, one must acknowledge, using some particular language, that there exist things in the world that are not objective, but rather are shaped by our language.

1.5 Aims and Objectives

The broad aim of this thesis is to examine the relation between language and cognition. To achieve this I will study the bi-directional relationship that exists between
culture and language and examine the ways that each one refines and sharpens the other. I will show the ways that a language identifies itself with the cultural background of its speakers and through my own empirical research I will investigate whether language plays a role in the shaping of habitual thought. My empirical research is conducted in the areas of time and negation, since both are universal concepts and neither is restricted to the field of linguistics.

1.6 Chapter Overview

Chapter 2 develops the points introduced in Chapter 1 and examines the relation between language and culture more closely. It discusses the problems that the theory of linguistic relativity causes for translation. It considers Chomsky’s notion of Universal Grammar and presents a study of the Pirahã language, spoken in an Amazonian region of central Brazil. This language is important to the debate around linguistic relativity as it defies several features of Universal Grammar. Chapter 2 also provides accounts of a range of earlier empirical research done to test the theory of linguistic relativity. It is important to consider the implications of earlier findings before embarking on new research. By examining earlier research it is clear the influence of language on cognition is greater on the conceptualisation of abstract concepts than on concrete ones.

Chapter 3 focuses on the abstract concept of time and discusses how it is conceptualised differently in different languages. It draws upon data from a number of languages, including Aymara, English and Mandarin. While Indo-European languages project the future as being in front of the ego and the past as behind, Aymara projects the future and past the opposite way around. This chapter discusses the ways that languages use vocabulary from a concrete domain to talk about an abstract domain, with spatial vocabulary being employed to talk about time. It examines how the use of ‘horizontal’ and ‘vertical’ spatial metaphors affects the conceptualisations of the order of events for English and Mandarin speakers respectively. Two sets of experiments undertaken by Boroditsky and Chen are important in this debate (Boroditsky 2001; Chen 2006).

Chapter 4 presents a replication of Boroditsky’s initial experiment in addition to a subsequent experiment that uses an alternative method of priming. The two experiments investigate whether the spatial metaphors of one’s native language play a role in English and Mandarin speakers’ conceptualisations of the ordering of events. Results support a correlation between native language and the conceptualisation of time.
Chapter 5 studies the area of negation, which, like time, is universal to all human languages. The ways in which people process negative information differently to affirmative information are discussed. Negative information requires more time to process and is initially decoded in terms of affirmative information. Furthermore, the diversity in the ways that negation is formed in different languages is considered. Languages employ either negative concord (several negative constituents may be used together to form a single semantic instance of negation) or double negation (the use of more than one negative constituent results in a cancelling effect and the creation of an affirmative meaning). Most Germanic languages follow a principle of double negation, while the Slavic languages and some Romance languages employ negative concord. Chapter 5 studies the differences between the two types of negation and discusses whether the use of opposing types leads to an alternative interpretation of negative information.

Chapter 6 presents details of two experiments that investigate the effects of double negation and negative concord on the processing of negative information in English and Russian respectively. Results support the idea that the negative pronouns used in negative concord languages are more easily processed and lead to a stronger interpretation than the negative polarity items used by double negation languages.

Chapter 7 offers the conclusions of the thesis and makes suggestions for further research. The primary result of the thesis is support for the theory of linguistic relativity, namely that differences in language lead to differences in ways of thinking.
Chapter Two

Linguistic Relativity
[...] I believe that those who envision a future world speaking only one tongue, whether English, German, Russian, or any other, hold a misguided ideal and would do the evolution of the human mind the greatest disservice. – Whorf, Languages and Logic, April 1941.

2.1 Introduction

As introduced in Chapter 1, the principle of linguistic relativity states that differences in language lead to differences in ways of thinking, since language does not describe an objective reality. This chapter describes the ways that these differences in thinking are manifested and shows how a language identifies itself with the cultural background of its speakers. It discusses the problems that the theory of linguistic relativity causes for translation and how the abilities to translate and to learn new languages do not preclude the theory. Also discussed is Chomsky’s idea of Universal Grammar, and how this fits in with the theory of linguistic relativity. The Pirahã language, spoken in a part of central Brazil, is important to any discussion of Universal Grammar. The chapter then proceeds to review earlier empirical research done in various areas to test the theory of linguistic relativity. There is a considerable amount of data that support the theory.

2.2 Language and Culture

Boas, Sapir and Whorf have all shown that there is a close relation between language and culture (Boas 1966; Sapir 1958 [1929]; Whorf 1956).

2.2.1 Cultural Elaboration

Wierzbicka labels the most frequently used words and phrases of a language as the key words of a culture (Wierzbicka 1997). Wierzbicka defines cultural elaboration as the process by which “each language will expand upon areas that are of particular importance to the speakers of that language” (Wierzbicka 1997: 10).
The example of the number of Eskimo words for ‘snow’ is both old and controversial. Franz Boas first cited the number of words for snow in the Eskimo languages as an example of linguistic or cultural relativism in 1911.

Another example of the same kind, the words for SNOW in Eskimo, may be given. Here we find one word, *aput*, meaning SNOW ON THE GROUND; another one, *qana*, FALLING SNOW; a third one, *piqsirpoq*, DRIFTING SNOW; and a fourth one, *qimuqsuq*, A SNOWDRIFT.

(Boas, 1966 [1911]: 21-22)

Boas’ point was that diversity exists between languages, and is necessary, so that a language can adequately describe the essential elements of its speakers’ daily lives. This example has been discredited by a number of linguists, notably by Geoffrey Pullum and Stephen Pinker (Pullum 1991; Pinker 1994). Pinker remarked that “contrary to popular belief, the Eskimos do not have more words for snow than do speakers of English” (Pinker 1994: 64). Pullum declared it as a “hoax” in an article about how rumours become accepted as truth if they are repeated frequently enough (Pullum 1991). Pullum argues that there are no more words for snow in the Eskimo languages than there are in English. He is almost certainly correct in this, but this fact is not necessarily surprising. Since English is spoken in parts of the world where snow is a part of everyday life, English has as great a need for words for snow as the Eskimo languages. Moreover, the technical jargon of the sublanguage of skiers would contain a large lexicon of words for different varieties of ‘snow’, whereas a distinction is less important for people outside the skiing community. This is the point that Boas made. Each group of language users should have access to a language that accommodates their needs.

Cultural elaboration is observed in every language, dialect and culture. Wierzbicka notes that the Warlpiri language, an Aborigine language spoken in Australia, has a large number of words for ‘sand’, while the Hanunóo language of the Philippines has many words for ‘rice’ (Wierzbicka 1993; Conklin 1957). Furthermore, Italian has a number of words for different varieties of ‘pasta’, each depending on the shape of the pasta.

These are not examples of linguistic relativity, but rather cultural elaboration, as they are examples of the ways that language adapts to the needs of its speakers, rather than language shaping the outlook of its speakers. However, they serve to highlight that language and culture are closely linked, and that there are often cases where a word in one language does not correspond directly with a single word in another language. Boas’ idea of cultural relativism was that things that are important to one culture may be meaningless to another (Boas 1966 [1911]).
2.2.2 Cultural Salience

Cultural elaboration is observed in language not only in concrete, external things like snow, sand and rice, but also in abstract, internal concepts. Boas’ point about cultural relativism is realised by the presence and absence of words for certain concepts in different languages. For example, there is no word in English for the concept described by the Japanese word ‘enryo’. Some of the meanings of ‘enryo’ are listed as ‘reserve’, ‘restraint’, ‘discretion’, ‘hesitation’ and ‘shyness’ (Wierzbicka 1997). However, none of these English words leads back to ‘enryo’ when looked up in an English-Japanese dictionary. Yet ‘enryo’ is a common word in Japanese texts and is rooted in Japanese culture (Smith 1983). The word is not easily translated from Japanese to any other language, since the concept belongs solely to Japanese culture. According to sources, the concepts of politeness and restraint are valued more highly in the Japanese culture than in Western cultures, and it is regarded as impolite to express one’s opinions or desires in a frank manner in Japanese culture (Smith 1983; Reischauer 1988; Kataoka & Kusumoto 1991; Hendry 1993). In this respect, ‘enryo’ means a sort of courtesy or self-restraint, a concept that cannot be described by a single word in other languages.

There are many examples of abstract concepts that are important in one culture and not important in other cultures. This leads to languages possessing words, whose meanings cannot be easily explained to speakers of other languages. The novelist Vladimir Nabokov wrote about the Russian concept of ‘пошлость’, or ‘poshlust’.

The Russian language is able to express by means of one pitiless word the idea of a certain widespread defect for which the other three European languages I happen to know possess no special term. […] English words expressing several, although by no means all, aspects of poshlust [sic] are for instance: “cheap, sham, common, smutty, pink-and-blue, high falutin’, in bad taste.” […] but what Russians call poshlust is beautifully timeless and so cleverly painted all over with protective tints that its presence (in a book, in a soul, in an institution, in a thousand other places) often escapes detection.

(Nabokov 1961: 64)

One of the reasons why the artificially created language, Esperanto, failed to take off and become a worldwide lingua franca may be its lack of a cultural background. Without a group of native speakers the language may have lacked the sense of identity found in natural languages.
2.2.3 Languages and Attitudes

The use of language can tell us about the attitudes of speakers. Through the study of the frequency that a word or phrase occurs in speech or texts it is possible to gauge the importance of a particular word to the speakers of a language.

Wierzbicka wrote about the differences in attitudes among Russian and English speakers (Wierzbicka 1997). According to her research, Russian favours the use of more direct words than English. Wierzbicka remarked that “Russian culture encourages “direct,” sharp, undiluted value judgments, whereas Anglo culture does not” (Wierzbicka 1997: 12).

Wierzbicka provides substantial data to support this claim. Using frequency dictionaries for Russian (Zasorina 1977) and English (Kučera & Francis 1967; Carroll et al. 1971), she extracted the results for the Russian words “дурак (durak), глупый (glupyj), глупо (glupo) and идиот (idiot)” and their English counterparts “fool, stupid, stupidly and idiot”. In each case the Russian word appeared far more frequently in Russian texts than the corresponding English word did in English texts. The complete findings are provided in the following table (the number of occurrences of each word per one million words).

<table>
<thead>
<tr>
<th>English</th>
<th>Russian</th>
</tr>
</thead>
<tbody>
<tr>
<td>fool 43/21</td>
<td>дурак 122</td>
</tr>
<tr>
<td>stupid 25/9</td>
<td>глупый 99</td>
</tr>
<tr>
<td>stupidly 2/0.4</td>
<td>глупо 34</td>
</tr>
<tr>
<td>idiot 4/1</td>
<td>идиот 29</td>
</tr>
<tr>
<td>utterly 27/4</td>
<td>совершенно 365</td>
</tr>
<tr>
<td>absolutely 0/12</td>
<td>абсолютно 166</td>
</tr>
<tr>
<td>perfectly 31/27</td>
<td></td>
</tr>
<tr>
<td>terribly 18/9</td>
<td>ужасно 170</td>
</tr>
<tr>
<td>awfully 10/7</td>
<td>страшно 159</td>
</tr>
<tr>
<td>horribly 2/1</td>
<td></td>
</tr>
</tbody>
</table>

Table 1. Frequency of English and Russian words (Wierzbicka 1997: 12-13)

From looking at these figures it is clear that there is a significant difference between the two languages. In English, for instance, the use of the word ‘fool’ is more...
limited than it is in Russian, since English ‘fool’ is regarded as a more pejorative term in English-speaking cultures than Russian ‘дурак’ is in Russian-speaking cultures. Russian’s use of stronger, more direct words like ‘совершенно’ and ‘ужасно’ highlights the tendency in Russian-speaking cultures to make definitive statements (Hollander 1973; Walicki 1980; Kerblay 1983; Wierzbicka 1997). On the other hand, statements in English-speaking cultures can be less frank, with words like ‘probably’, ‘possibly’ and ‘perhaps’ portraying an element of doubt (Hollander 1973; Wierzbicka 1997). This cultural difference may result in misunderstandings when a speaker of one of these languages learns to speak the other.

Language, Edward Sapir said, is “a symbolic guide to culture” (Sapir 1949: 162). In these examples the use of language highlights the alternative cultural outlooks in Russian and Anglo cultures.

This section and the previous one highlight the close relationship that exists between language and culture, but they do not address the issue of which influences which. Sometimes the influence of language is exaggerated. Muir and Muir claimed that “one could deduce Hitler’s Reich from the ruthless shape of the German sentence” (Muir & Muir 1966: 96). This question is addressed later in this chapter and in the subsequent chapters.

2.3 Problems for the Principle of Linguistic Relativity

The ability to translate between languages and to learn new languages poses a potential problem for the principle of linguistic relativity, as it claims that each language has an effect on cognition for its speakers.

2.3.1 Translation and Translatability

The ability to translate is taken to be evidence against the view that thought is determined by language. If a sentence can be translated from one language to another, then its contents are not dependent on either language, and the same thoughts can be formulated in more than one language.

However, the art of translation is a complex process. As discussed in the previous section, language and culture are closely related, and a text is often meaningless without reference to the source culture. In order to achieve an accurate translation that loses as little
of the original meaning as possible it is important to pay close attention to the cultural background of the source text. Malinowski observed that:

Translation becomes rather the placing of linguistic symbols against the cultural background of a society than the rendering of words by their equivalents in another language.  (Malinowski 1935: 18)

That each language identifies closely with the cultural background of its speakers necessarily leads to difficulties in translation. Language only makes sense when it is viewed against the source culture. A translator must always be careful not to impose the laws and restrictions of their own language onto the language that they are translating to.

The difficulties of translation are not confined to the lexical manifestations of cultural salience. Grammatical differences between languages also have an impact on translation. A significant problem is that different languages require differing levels of information in propositions. For example, while the inclusion of tense is obligatory in some languages, it is not in others, such as Mandarin and Indonesian, where the addition of a special temporal word designates a particular timeframe (Boroditsky 2003: 917). Similarly, the designation of gender must be made in some languages, but not in others. The structure of the following example sentence illustrates some of the differences between languages.

(1) The teacher moved the rocks  (English)

In English tense is included, in order to provide the time of the event. However, in Russian it is necessary to include not only the tense (through the verb like in English), but also the gender of the teacher. It is also necessary to state whether the teacher moved all of the rocks or only a certain proportion of them. In Turkish the speaker is additionally required to specify whether the event was witnessed first hand or was hearsay.

Nothing is ever straightforward when languages are compared with one another. A sentence that began as quite a basic one in English requires more detailed information in some languages and less detailed information in other languages. If the initial sentence were in German and were translated into English, then some information would be “lost in translation”, unless further words were added.

(2) a. Die Lehrerin hat die Steine bewegt  (German)
   b. The (female) teacher moved the rocks  (English)
Still more information would be lost if the sentence were translated into English from Russian or Turkish, namely how many of the rocks were moved and if the speaker witnessed or heard about the event. Only by omitting a substantial amount of information would the sentence translated into English be the same as the one originally constructed in English in (1). On the other hand, if a sentence is translated from a language that requires less information into one that requires more, then the translator must add information to the event. For example, if the initial sentence were in Mandarin, where tense is not obligatory, then tense would have to be added to an English translation of the sentence.

Translation is not a trivial process and often it is not the same information that is portrayed in different languages. While it is possible to create a translation of any sentence from any one language into any other language, the process often involves a considerable reshaping of the sentence to suit the needs of the speakers of the target language and ends up being a different sentence from the original one in the source language.

The above example sentence highlights another important point. Even though a sentence can be translated from one language to another languages lead their speakers to attend to aspects of an event that they otherwise may not have attended to. Sentence (2) leads a German speaker to attend to the gender of the agent of the sentence, while (1) does not lead an English speaker to pay attention to this. Similarly, Russian speakers must attend to whether the event is a complete or a partitive one. Speakers are led by their language to attend to experiences in wholly different ways. They may categorise and remember experiences differently as a result of the way that their language describes them.

Wallace Chafe commented that, such are the complexities of translation, especially with regard to context and culture, that machine translation will never be able to take the place of human translators. He remarked that:

[…] the skeletal ideas of referents, events and states, as opposed to their categorisations, orientations and combinations are transferable. Referents, events and states constitute the skeleton of thought. In verbalising these ideas each language fleshes them out in its own way. (Chafe 2000: 106)

According to Chafe there is both linguistic universality and relativity. He believes that while the core ideas are the same, each language expresses them in a variety of different ways.
2.3.2 Globalisation: A Threat to Linguistic and Cognitive Wealth

House makes the claim that increasing globalisation will lead to a loss of linguistic diversity and that translation might one day be unnecessary:

Through the fast growing globalisation and internationalisation processes, cultural and linguistic convergence processes are set into motion, which may eventually make the practice of translation redundant, giving way to the more efficient practice of producing simultaneously parallel texts that will have to be as culturally-neutral as possible, which amounts in reality to a global adaptation to North-American-North West European norm. (House 2000: 84)

Whorf also had strong views on the loss of linguistic diversity. A world with only one language is “a misguided ideal and would do the evolution of the human mind the greatest disservice” (Whorf 1956: 244). Whorf equated linguistic wealth with cognitive wealth, with the loss of one resulting in the loss of the other.

While all languages are subject to change, these changes are often regarded as a worsening of the language, or as an example of increasing stupidity. George Orwell was critical of the changes taking place in the English language in the twentieth century.

MOST people who bother with the matter at all would admit that the English language is in a bad way, but it is generally assumed that we cannot by conscious action do anything about it. Our civilization is decadent, and our language—so the argument runs—must inevitably share in the general collapse. (Orwell 1946: 1)

Language change has always occurred and will always continue to occur. The English language of Orwell’s time was a different one to the English language of the seventeenth century and was different to the English language of today. Orwell was concerned about the changes in the English language, because he believed that they would have cognitive effects on the speakers of the language. “But if thought corrupts language, language can also corrupt thought” (Orwell 1946: 8).

2.3.3 Learning New Languages

In addition to the ability to translate between languages, the ability to learn new languages serves as evidence against the view that thought is determined by language. If one can successfully learn another language, then one cannot be trapped within the confines of one’s own language. However, this does not refute the theory of linguistic
relativity, that thought is influenced by language. On the capacity to learn new languages Bickel observed:

[…] linguistic relativity does not preclude the possibility of learning other languages. One of the reasons for this is precisely the embeddedness of language in the overall cultural habitus. This way, learning a new language means re-habituating oneself in other modes of attending to the world […]

(Bickel 2000: pp. 185-186)

Bickel maintained that although each human language possesses a unique outlook on the world, it is possible for people to learn languages other than their native language, and by doing so they learn to perceive the world in ways that are not encouraged by their native language.

2.3.4 Newspeak

George Orwell, in the novel ‘Nineteen Eighty-Four’, created the fictional language, Newspeak. In the world of Orwell’s novel Newspeak was used to force a particular world view upon the language user and to deny them the capacity of dissenting thought.

The purpose of Newspeak was not only to provide a medium of expression for the world-view and mental habits proper to the devotees of Ingsoc, but to make all other modes of thought impossible. It was intended that when Newspeak had been adopted once and for all and Oldspeak forgotten, a heretical thought — that is, a thought diverging from the principles of Ingsoc — should be literally unthinkable, at least so far as thought is dependent on words.

(Orwell, 1949: 309)

Newspeak had a very small lexicon and did not have words for concepts like ‘freedom’ and ‘morality’. Furthermore, the simple, monosyllabic nature of its words, the regularity of its grammar, the lack of synonyms and antonyms, and the abundance of acronyms and euphemisms were important in the language. They enabled the speaker to speak without the need for thought. While ‘good’ covered the meanings of all of the English words ‘great’, ‘excellent’ and ‘wonderful’, ‘ungood’ covered all of the corresponding negative meanings. This reduced the capacity for creativity found in natural languages.

2 In Esperanto the word ‘malbona’, which means English ‘bad’, is constructed like this. Similarly, in Swedish military jargon the word ‘ofred’ (literally unpeace) is often used instead of ‘war’ (Holmberg & Platzacl 2002).
There are many similarities to be seen between Newspeak and natural languages. For instance, euphemisms and dysphemisms, commonplace in natural language (job titles, political jargon, military jargon), were abundant in Newspeak, such as ‘joycamp’ (a forced labour camp), ‘Minitrue’ (Ministry of Truth) and ‘thoughtcrime’ (unorthodox thoughts). Furthermore, acronyms were an important part of Newspeak. They were easier to say, they reduced the need for thought, and they hid some layers of the original meaning. Orwell remarked that by abbreviating a name one “narrowed and subtly altered its meaning, by cutting out most of the associations that would otherwise cling to it” (Orwell 1949: 313). This is also a common feature of natural language. ‘Gestapo’ (Geheimstaatspolizei), ‘radar’ (radio detecting and ranging), ‘laser’ (light amplification by stimulated emission of radiation), and the ‘USA Patriot Act’ (Uniting and Strengthening America by Providing Appropriate Tools Required to Intercept and Obstruct Terrorism Act) are a few examples. Through repeated usage the fully expanded version is forgotten, and the abbreviation is taken to be the entire name. This results in parts of the original meaning being lost.

While Newspeak was forced upon the characters of Orwell’s novel, the situation is different to that of a natural language. Newspeak was created by a small group of people, an oligarchic language rather than a democratic one. For natural languages, dictionaries expand to incorporate words that reflect the constantly changing daily lives of language users. The vocabulary of Newspeak, on the other hand, grew continually smaller and depended solely on the people who created it. Although Newspeak is a work of fiction, it remains an interesting language to study, since many of its features are also a part of natural languages. It shows how language can be used to encourage and discourage certain thoughts.

2.4 Universal Grammar

The theory of Universal Grammar (UG) proposes that aspects of grammar are shared by all languages, and that grammar is innate in humans (Chomsky 1965; 1988; Hornstein 1990). Darwin remarked that language was a human instinct, similar to standing upright (Darwin 1871).

UG postulates a set of rules that are intended to cover the grammars of all human languages and assumes that every language is built upon the same structural basis. Much of the grammar of a language is similar to the grammar of any other language. Unrelated

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3 Some of the newest words added to the Oxford English Dictionary in June 2007 were ‘fattoush’, ‘chill pill’ and ‘probiotic’.
languages like Mandarin and English, for example, have many similar grammatical rules and decide if a sentence is grammatical in similar ways. According to the theory of UG, the knowledge of any language must include the knowledge of UG. Chomsky believed that UG is not learned through mimicry, but rather it is innate in every human being (Chomsky 1965).

Critics of the theory of UG argue that UG is not falsifiable. Sampson commented that the rules proposed by UG are rather observations about languages that are already known and described than predictions about the possibilities of language (Sampson 2004). The grammar of the Pirahã language, spoken in Brazil, contradicts several aspects of UG (Everett 2005).

2.5 Pirahã

The Pirahã language is an important case study in the debate about linguistic relativity. Pirahã is spoken in an Amazonian region of Brazil, and has about 200 remaining native speakers, almost all of whom are monolingual (Everett 2005; Oliviera 1977). Figure 2 shows the location of the Pirahã community.

![Figure 2. Location of the Pirahã language](image)

Daniel Everett, a professor of phonetics and phonology at the University of Manchester, spent twenty-seven years living among the Pirahã tribes in Brazil and made an extensive descriptive study of their language, learning to speak the language fluently (Everett 1979; 1986; 1993; 2005).
Pirahã has a number of unusual features that set it apart from most other languages. Due to these features, Pirahã contradicts Chomsky’s concept of Universal Grammar. Below are some of the unusual aspects of the Pirahã language (Everett 2005).

- No words for numbers or numerals and no concept of counting
- They were unable to learn to count
- Unusual formation of terms for colours (no morphologically simple colour terms)
- No form of embedding
- No terms of quantification
- Very small phoneme inventory (tone is used extensively)
- Very simple pronoun inventory; may have been entirely borrowed
- Very simple kinship system
- No perfect tense
- No creation myths, fictional stories or fables
- Immediacy of experience is always favoured; no collective memory beyond 1 or 2 generations
- Unable to draw
- Monolingual despite closeness to Portuguese and other languages

Table 2. Features of the Pirahã language

Pirahã has just three number-related terms (Everett 2005). These are ‘hói’ (small size or amount), ‘hoí’ (somewhat larger size or amount) and ‘báagiso’ (many; lit. “cause to come together”). Hence, in Pirahã the sentences “I want one (or some other small number of) fish” and “I want a small fish” would be the same. Similarly, the sentences “I want many fish” and “I want a large fish” are the same in Pirahã. This necessarily leads to ambiguity and appears to rule out the possibility of saying, using these terms of quantification, either of the sentences, “I want one large fish” and “I want many small fish”, since there is just one Pirahã word for ‘one’ and ‘small’ and just one word for ‘many’ and ‘large’. Everett writes that “Given the lack of number distinctions, any nominal is ambiguous between singular, plural and generic interpretation” (Everett 2005: 13).

Pirahã has a very small inventory of phonemes and uses tone extensively to distinguish between sounds (Everett 2005). The Pirahã people use whistling, humming, singing and whispering as well as normal tone of voice. Pirahã also has a very simple system of kinship terminology. There is just one word for both mother and father (parent), and the language does not keep track of relations further removed than biological siblings. There are no words for ‘cousin’, ‘aunt’, ‘uncle’, or ‘grandparent’.

Pirahã does not have any form of embedding in its grammar. In English it is common to have a sentence like “I said that [Stephanie will cook fish for dinner]”, with the second part of this sentence embedded within the first part. However, in Pirahã this
sentence would have to be constructed like “My saying Stephanie will cook fish for dinner”, where the initial verb is nominalised. Additionally, Pirahã has only one verb for ‘to say’ and ‘to think’ (gai).

Pirahã is also unusual for having no perfect tense. Everett (1993) claims that not only does Pirahã lack a formal marker for a perfect tense, but it lacks a perfect tense meaning. Pirahã has just two tense-like morphemes, -i for ‘proximate’ and -a for ‘remote’. These two morphemes are used to mark whether an event is either past or present, i.e. if it is in the “immediate control or experience of the speaker” (proximate) or not (remote).

Table 2 also shows that Pirahã lacks terminology for numerals and that the speakers have no concept of counting. The language has just three general terms of quantification, and these are insufficient for measuring specific quantities. The inability to count could be seen to support the theory of linguistic relativity, although Everett distances himself from this claim. The native people were given lessons in counting by Everett, but after eight months not one of them could count as high as ten, or was able to add three and one together (Everett 2005). Since the Pirahã people trade regularly with outsiders, one might expect that counting would be a cultural necessity for them, in order to receive a fair deal. One might expect that the necessity to count would have developed through their experience in trading, which is more than two hundred years, but yet it did not. During this time, other Amazonian tribes borrowed numerological terminology from other languages as they grew to require them (Oliviera 1978; Gordon 2003). The reason why Pirahã did not borrow numerals might explain why the people were unable to learn to count. It might not necessarily be due to the restrictions of their language, but rather due to a deeper, cultural feeling that being able to count is not necessary.

One aspect of Pirahã culture is central to all of the peculiarities of the language. Pirahã favours what Everett labels as “immediacy of experience” (Everett 2005). This means that the Pirahã people strongly focus their attention on what is happening in the present rather than what has happened in the past. This is reflected in numerous aspects of the language, including the lack of a perfect tense. In addition to this, the Pirahã also have no fictional stories, fables or myths, art or any kind of literature from a previous generation. There is little collective memory among the Pirahã beyond one or two generations. Everett claims that many of the Pirahã cannot identify their grandparents. They have little interest in keeping track of relations beyond direct siblings. Everett states that the Pirahã rarely talk about generic or abstract ideas, since they fall outside the realm of that which is visible and immediate.
Another point about the Pirahã people is that they are almost all monolingual, despite the fact they live in close proximity to a number of other languages, including Portuguese. For the Pirahã people, their culture is of prime importance (Everett 2005). Everett claims that they take little interest in other cultures and are naturally “wary of outsiders”. Due to the cultural preference for immediacy of experience, those things that cannot be supported by immediate sensory information are of less importance.

Everett states that Pirahã highlights the “bi-directional causal relationship between language and culture”. Pirahã is an example of a culture untouched by globalisation, where the language reflects the culture’s most important beliefs. The strong cultural preference for immediacy of experience and the close relation between each speaker and the cultural habitus help to shape the outlook of each speaker.

Pirahã lacks kinship terms like ‘cousin’ and ‘uncle’, since they are not culturally salient. While the lexicon of a language is initially determined by cultural salience, the lexicon can in turn affect the speakers of the language. Due to the exclusion of certain words the speakers of a language are further discouraged to think of these missing concepts. This shows how language in turn can have an impact on cognition.

2.6 Empirical Research to Test the Theory of Linguistic Relativity

The principle of linguistic relativity has been tested across a wide variety of areas. Research has achieved contrasting results. Some research has produced evidence for linguistic relativity, while other research has found none. However, no empirical research can definitively assert that the principle of linguistic relativity, as it is described, does not exist. At the very most it can show that there is no evidence to support that it does.

2.6.1 Colour Discrimination

A lot of the early empirical research into linguistic relativity was conducted in the area of cross-linguistic colour discrimination. The results from tests on colour discrimination have been mixed. In one of the earliest studies, Berlin and Kay found no support for linguistic relativity (Berlin & Kay 1969). They concluded that basic colour terms were transferable between languages.
Berlin & Kay made a study of ninety-eight languages, and from their findings they proposed that there are eleven basic colour terms which act as focal points for the colour terminology of all languages. In English these eleven terms are “black, white, red, orange, yellow, green, blue, purple, pink, brown and grey”. Berlin & Kay claimed that languages began with just two colour terms (black and white) and progressively added more until they filled the basic pool of eleven. They argued that every language that possessed just two colour terms had terms for ‘black’ and ‘white’, every language that possessed three colour terms had terms for ‘black’, ‘white’ and ‘red’, every language that possessed four colour terms had terms for ‘black’, ‘white’, ‘red’ and either ‘yellow’ or ‘green’, and so on. In this way they viewed colour terminology as an expression of language evolution, and thus any language that possessed less than the full complement of eleven basic colour terms was a more primitive language.

However, the conclusions made by Berlin & Kay have been contested, firstly on the grounds that some of their cultural assumptions were questionable, namely that colour categories should exist a priori rather than being acquired through repeated linguistic usage (Lucy 1997; Saunders & van Brakel 1997), and secondly due to the bias of languages from industrialised societies used to gather data. Saunders & van Brakel argued that Berlin & Kay’s results could not be generalised to other languages. One such language is Pirahã (cf. section 2.5). In contrast to Berlin & Kay’s claims, Pirahã has no morphologically simple colour terms.

However, there have recently been some findings related to colour discrimination that supports the principle of linguistic relativity. Winawer et al. found effects of language on colour discrimination among Russian speakers (Winawer et al. 2007). While English uses the word ‘blue’, Russian uses two distinct words, ‘голубой’ (goluboj) for lighter blues and ‘синий’ (sinij) for darker blues. Winawer et al. found that Russian speakers discriminated two colours more quickly if the colours were described by opposing terms in Russian (one голубой and one синий) than if they were described by the one linguistic term. English speakers took longer to discriminate between shades of blue than Russian speakers, since in English the colours are described by the same word. Winawer et al. acknowledged that English speakers are able to distinguish between different shades of blue (using the labels ‘light’ and ‘dark’), but the difference lies in that “Russian speakers cannot avoid distinguishing them: they must do so to speak Russian in a conventional manner” (Winawer et al. 2007: 7783). Consequently, “Russian speakers habitually make use of this distinction even when performing a perceptual task that does not require language” (Winawer et al. 2007: 7784).
2.6.2 Objects and Substances

Data to support the theory of linguistic relativity have been found in other areas of investigation. Imai and Gentner found that there was a “boundary shift” in the range of things considered to be objects or substances between speakers of English and Japanese (Imai & Gentner 1997). They found that while speakers of English treated both complex and simple solids as objects and non-solids as substances, Japanese speakers treated only complex solids as objects, with simple solids and non-solids being classified as substances. In contrast to English speakers, speakers of Japanese attended more to the substance of an object than to its shape. Yoshidi and Smith observed that the count-mass distinction of the respective languages may have shifted the boundary between object and substance in English relative to Japanese (Yoshidi & Smith 2001; 2003).

Furthermore, Japanese also differs from English in the way that plurals are formed. Whilst in English one says ‘one pencil’, ‘two pencils’, etc., in Japanese one must add a unit of measurement such as ‘one long thin piece of pencil’, ‘two long thin pieces of pencil’, etc. This is similar to English ‘mass’ nouns, such as furniture, food, water, and abstract nouns such as fun and sadness. These cannot be divided into individual pieces, so an alternative means of measurement must be found. In Japanese, unlike in English, this is the case for every noun. Subsequently, Japanese is known as a classifier language. Yucatec, a member of the Mayan language family, is another classifier language.

In classifier languages the distinction between objects and substances is less definite than it is in English. Lucy & Gaskins found that Yucatec Mayans attend more to what an object is comprised of than English speakers do, due to the fact that their language blurs the boundary between objects and substances (Lucy & Gaskins 2001). They showed Yucatec and English speakers an image of an object, and then two further images, asking them which of the latter pair resembled the original image more. In one example, the original image was a plastic comb with a handle, while the two subsequent images were a plastic comb without a handle (a variation in shape) and a wooden comb with a handle (a variation in material). English speakers considered the wooden comb with a handle to be more similar to the original image, while Yucatec Mayans considered the plastic comb without a handle to be a closer match. Lucy & Gaskins conclude that while English speakers attended more to the shape of an object, Yucatec speakers attended more closely to the material that comprised the object.
2.6.3 Spatial Relations

A number of tests have been carried out to ascertain the effect of language on the conceptualisation of spatial relations.

2.6.3.1 Korean and English

Bowerman described some of the differences in the ways that speakers of different languages describe spatial relations (Bowerman 1996). He discussed one such difference between speakers of English and Korean. English distinguishes between putting things “into containers” and “onto surfaces”. Examples of the former include “the ball is in the net” and “the letter is in the envelope”, while examples of the latter are “the painting is on the wall” and “the aerial is on the roof”. Korean makes a different distinction, one between “tight fit” and “loose fit” (Bowerman 1996). For example, putting a letter in an envelope and putting a painting on a wall are described by the one preposition, *kitta*, as both cases are examples of “tight fit”. On the other hand, putting a ball in a net and putting an aerial on a roof require a different preposition, namely *nehta*, since these scenarios belong to “loose fit”.

McDonough et al. tested whether the linguistic difference in the descriptions of spatial relations in English and Korean would lead to conceptual differences. They found that this was the case. In an experiment participants were shown a sequence of pictures depicting either “tight fit” or “loose fit” scenes (McDonough et al. 2000). The participants were then shown two images, a tight fit scene and a loose fit scene. Korean speakers were found to look at the image that corresponded to the type of scene (either “tight fit” or “loose fit”) that they had been previously shown. However, English speakers looked equally long at both images and made no distinction between them. In a second experiment participants were shown a series of images of either tight or loose fit with one image of the contrasting type randomly inserted. Korean speakers were able to select the image that did not belong to the series, while English speakers could not. In a final experiment it was found that pre-linguistic infants from both English and Korean speaking families could distinguish between the tight fit and loose fit scenes, unlike adult English speakers. McDonough et al. concluded that infants have the ability to attend to any range of spatial distinctions, but when they learn a language the spatial distinctions that are emphasised by
that language become more salient, with the result that alternative spatial distinctions are
discouraged.

2.6.3.2 Tzeltal and Dutch

Levinson found differences in the conceptualisation of spatial relations between
speakers of Tzeltal (a Mayan language) and Dutch (Levinson 1996a). While European
languages favour relative spatial terms, such as left/right, over/under and front/back (“the
cup is to the right of the plate”), Tzeltal favours absolute terms of reference, similar to the
terms north/south/east/west in English (“the cup is west of the plate”) (Levinson 1996a).
Guugu Yimithirr, an Australian Aboriginal language, uses a similar absolute reference
system (Haviland 1979; Nisbett & Norenzayan 2002).

Levinson tested if linguistic variation in the description of spatial scenarios would
lead to conceptual differences (Levinson 1996a). He presented Tzeltal and Dutch-speaking
participants with an arrow on a table in front of them. The arrow pointed either to the right
(north) or to the left (south). The participants were then relocated to a second table facing
in the opposite direction. Here there were two arrows, one pointing left (north) and one
pointing right (south). The participants were required to specify which arrow was “like the
one they saw before”. The Dutch speakers decided that the arrow that pointed in the same
relative direction as the first arrow (either both pointing left or both pointing right) was
most like the first one. In contrast, the Tzeltal speakers chose the arrow that pointed in the
same absolute direction (either both pointing north or both pointing south), despite the fact
that the arrow pointed in the opposite relative direction. Levinson concluded that the
spatial descriptions of a person’s language have an effect on their conceptualisation of
spatial relations (Levinson 1996a).

2.6.4 Effects of Grammatical Gender

Some research on the effects of grammatical gender on a speaker’s
conceptualisation of nouns has provided support for the principle of linguistic relativity.
Boroditsky et al. investigated whether the grammatical gender of nouns in German and
Spanish influenced the speakers’ conceptualisations of those nouns (Boroditsky et al.
2003).
Boroditsky et al. commented that since a lot of grammatical distinctions reflect differences that exist in the external world, such as plural inflection, it might be natural for a child to infer that the gender of a noun signified a meaningful distinction between different types of non-biological objects.

Grammatical gender is a means of assigning nouns to different linguistic categories. French, Italian and Spanish have two grammatical genders (masculine and feminine), while German and Russian have three (masculine, feminine and neuter). The neutral gender is explained as a remnant from when there was no indication of gender in language (Müller 1943). Müller claimed that ‘Pferd’ (neutral gender), the German word for ‘horse’, refers generally to the type of species, while there is also a masculine (Hengst) and a feminine (Stute) word to refer to the specific male and female of the species. In modern German, the neutral ‘Pferd’ is used to refer to both sexes of the animal. Modern English does not have any grammatical gender, except for the use of pronouns (he, she, his, her) and rare examples like a ‘ship’ (designated as feminine). Many languages do not possess any grammatical gender, including Chinese, Japanese, Persian, Bengali, Tagalog, Turkish, Basque, Finnish and Magyar (Lockwood 1972; Kuno 1973; Crystal 1997).

English does not categorise non-biological objects by gender, although nouns like ‘man’ and ‘woman’ have an inherent natural gender. Non-biological nouns are not usually assigned a gender in language out of any logical reason. The process is sometimes referred to as a “fluke of grammar” (Boroditsky et al. 2003). Mark Twain remarked that in German, while ‘Mädchen’ (girl) is neuter, ‘Rübe’ (turnip) is feminine (Twain 1880).

Gretchen: Wilhelm, where is the turnip?
Wilhelm: She has gone to the kitchen.
Gretchen: Where is the accomplished and beautiful English maiden?
Wilhelm: It has gone to the opera. (Twain, 1880)

Nouns are assigned to different categories in different languages. Many nouns that are masculine in one language may be feminine in another. For example, the Italian word ‘luna’ (moon) is feminine, while the German word ‘Mond’ is masculine. In contrast, German ‘Sonne’ (sun) is feminine, while Italian ‘sole’ is masculine.

Jakobsen showed that people attribute properties to inanimate objects based on their grammatical gender (Jakobsen 1966). Russian speakers, when asked to personify the days of the week, were shown to personify the days that are grammatically masculine (Monday, Tuesday and Thursday) as men and the days that are grammatically feminine
(Wednesday, Friday and Saturday) as women (Jakobsen 1966). None of the participants could explicitly explain their reasoning.

Further evidence for the cognitive effects of grammatical gender was provided by Konishi and by Sera, Berge & del Castillo. Konishi asked German and Spanish speakers to rate the “potency” of a series of nouns that had opposite genders in the two languages (Konishi 1993). Each group of speakers rated the grammatically masculine nouns in their language as being more potent than the grammatically feminine nouns, despite the fact this referred to the opposite group of nouns for the two sets of participants. Both sets of participants rated the word for ‘man’ as being more potent than the word for ‘woman’ and applied similar distinctions between inanimate objects of opposite grammatical genders (Konishi 1993). Sera et al. obtained concurrent data in another test involving Spanish speakers (Sera et al. 1994). The participants were required to decide whether pictures of inanimate objects were masculine or feminine. Their decisions were consistent with the grammatical gender of the objects. When the Spanish word for the object was presented with the picture in a further study, the result was even more pronounced. The participants were not able to explain why they made the decisions that they did.

Boroditsky et al. found similar evidence (Boroditsky et al. 2003). They instructed German and Spanish speakers to learn proper names for twenty-four inanimate objects, e.g. an apple was called ‘Patrick’. Then they tested the participants’ ability to remember the proper name labels. Each object had the opposite grammatical gender in Spanish and German. For half of the objects the proper name chosen was consistent with its grammatical gender, e.g. ‘Patrick’ is consistent with the gender of ‘apple’ in German. For the other half it was inconsistent, e.g. Patrick is inconsistent with the gender of ‘apple’ in Spanish. The entire test was undertaken in English, in which all of the participants were proficient. The results showed that the Spanish and German speakers displayed opposite memory biases. Both sets of speakers were more likely to remember the proper name given to an object if it was consistent with that object’s grammatical gender, e.g. German speakers found it easier to remember a male name for ‘apple’ and ‘star’ and a female name for ‘fork’ and ‘mouse’, while it was the exact opposite for Spanish speakers. Native English speakers performing the same test displayed no bias for either set of nouns and remembered all of the names equally well. The results showed that the native language of both the Spanish and the German speakers interfered with their ability to remember the names that were inconsistent with the grammatical gender of the noun.

Boroditsky et al. also asked German and Spanish speakers to name three adjectives that they thought of when they were given some noun (Boroditsky et al. 2003). Again the
set of nouns chosen had opposite grammatical genders in the two languages, and again the test was undertaken entirely in English. For a noun such as ‘key’ (‘Schlüssel’ is masculine in German, and ‘llave’ is feminine in Spanish) the German speakers named adjectives such as ‘hard’, ‘heavy’, ‘metal’, ‘jagged’ and ‘useful’, while the native Spanish speakers gave adjectives such as ‘intricate’, ‘lovely’, ‘golden’, ‘shiny’ and ‘little’. For the word ‘bridge’, on the other hand, (‘Brücke’ is feminine in German, and ‘puente’ is masculine in Spanish) the German speakers gave adjectives like ‘beautiful’, ‘elegant’, ‘slender’ and ‘pretty’, while the Spanish speakers named ‘big’, ‘strong’, ‘sturdy’ and ‘dangerous’ among the list of adjectives. While all of these adjectives may apply to the object in question, the two sets of speakers attended to different aspects of the object in each case. The grammatical gender of the noun caused speakers to look at certain properties of the object more than other properties, without raising their awareness of this (Boroditsky et al. 2003). None of the speakers were conscious of the reasons for their answers. Boroditsky et al. remarked that “linguistic categories can influence people’s thinking by encouraging them to carry out comparisons that they would not have otherwise carried out.” (Boroditsky et al. 2003: 74)

2.6.4.1 The Function of Linguistic Categories

The original function of linguistic categories may have been to enable speakers to more quickly make associations between members of one category and to reduce the amount of effort needed in communication (Müller 1943; Boroditsky et al. 2003). However, since there are a small number of categories for a large number of objects, this no longer applies. However, the use of linguistic categories has cognitive effects on the speakers of a language, as the experiments described in the previous section have shown.

The original function of linguistic categories is still evident in Dyirbal, an Australian Aboriginal language. Dyirbal is known for its distinctive system of noun classes (Dixon 2003). Dyirbal has one noun class for animate objects and men, one for women, water, fire and violence, one for edible fruit and vegetables, and a fourth noun class for anything not classified by the other three. Such a design of categories of nouns imposes a particular view of the world upon its speakers and leads them to make associations between nouns that belong to one category that they might otherwise not have made.

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4 This noun class inspired the title of George Lakoff’s book, ‘Women, Fire and Dangerous Things’ (Boroditsky et al. 2003).
2.6.5 Abstract versus Concrete Concepts: The Effect of Language

In a comment made by Humboldt and recreated by Trabant, Humboldt expressed that the “designation of material objects is more or less the same in all languages” (Trabant: 2000: 35), while the designation of “unsinnliche Gegenstände” (abstract concepts, lacking sensory information) should be more diverse than the designation of the external world. Similarly, Boroditsky claimed that evidence for linguistic relativity is more likely to be obtained in an abstract domain than in a concrete one (Boroditsky 2003).

Despite the variety of evidence described earlier in this section, the effects of language should be stronger on the conceptualisation of an abstract concept, where there is less supporting sensory information. In the conceptualisation of abstract domains speakers have no physical background to support the concept, so language should have more scope to exert an influence on the construction of the abstract concept. Gillette et al. observed that adult participants, when watching a film without access to the sound, found it easier to guess nouns that were used in a mother-child conversation than verbs, and in turn they found it easier to guess verbs of “concrete activity” than abstract verbs (Gillette et al. 1999). Gillette et al. concluded that the reason for this result is that the referents of abstract terms are difficult to deduce purely from observing a scenario. Understanding abstract concepts demands experience with language, and the conceptualisation of these concepts is influenced by the way that language describes them.

Chapter 3 takes up the study of such an abstract concept, time, and investigates if a person’s conceptualisation of time is influenced by their language.

2.6.6 The Problems Involved in Testing the Principle of Linguistic Relativity

The difficulty with performing any research to test the principle of linguistic relativity lies in establishing the terms of comparison. Research must take more than one language into account, in order to show whether there is some effect of language on thought, and must not take any particular language or its construal of reality as a privileged frame of reference, since each language might impose its own restrictions on the reality experienced by its speakers.
2.7 Conclusion

Chapter 2 provided a detailed account of the principle of linguistic relativity. It discussed the bi-directional relationship between language and culture and examined the ways that a language matches the cultural background of a society. It discussed how prevailing cultural attitudes are expressed through language and studied how the capacity to translate between languages and to learn new languages does not preclude the principle of linguistic relativity.

It discussed the problems that the Pirahã language causes for the principle of Universal Grammar (Everett 2005). The Pirahã language and culture are observed to have a continual refining effect on one another.

Chapter 2 also provided an account of wide variety of empirical research, which examined the effects of language on cognition. Evidence for the principle of linguistic relativity was found in areas such as colour discrimination (Winawer et al. 2007), the discrimination between objects and substances (Imai & Gentner 1997; Lucy & Gaskins 2001), and spatial relations (Bowerman 1996; Levinson 1996a; McDonough 2000). Further effects were observed with regard to grammatical gender, which was seen to affect the conceptualisation of inanimate objects (Konishi 1993; Sera et al. 1994; Boroditsky et al. 2003).
Chapter Three

Time
3.1 Introduction

The concept of time is universal. Boroditsky commented that time is universally conceived as “a one-dimensional, unidirectional entity” (Boroditsky 2000: 4). Every culture is aware that experiences are transient. Time is unidirectional, since one can never return to an earlier event. Time is an abstract concept, since there is little sensory information available for people to describe it.

Chapter 3 examines the relation between space and time in language, since it appears that it is a universal facet of language to use spatial vocabulary to talk about time. However, different languages have different means of talking about time, in spite of the fact that the concept of time is universal. This chapter discusses the treatment of time in Aymara, English and Mandarin, and describes experiments carried out by Boroditsky and Chen to compare the conceptualisations of time among English and Mandarin speakers (Boroditsky 2001; Chen 2006). Boroditsky’s experiments found support for the principle of linguistic relativity, specifically that language influences a speaker’s conceptualisation of the ordering of events. In contrast, Chen’s experiments found no support for this.

3.2 The Division of Time

Every culture has ways of extracting chunks of time from experiences in the world and grouping them together. It is important to find ways of breaking time down into pieces of manageable duration. There are a number of linguistic universals in the description of time. For instance, the concept of a ‘day’ is a universal one, since the relationship between the earth and the sun affects every culture and language.

The concept of a month is also common to most languages. The significance of the moon was greater in the old Indo-European cultures than in the majority of modern cultures, which resulted in time being measured around the lunar cycle (Mallory & Adams 1997). The word for ‘month’ is thus derived from ‘moon’ in many Indo-European languages, as the lunar cycle takes approximately thirty days (Hoad 1986). Furthermore, greater weight was given to night time than day time in the measurement of time in Indo-European culture. This can be observed in the English word ‘fortnight’ (lit. fourteen
nights) (Hoad 1986). This example shows that the division of time can also differ between languages, since most languages do not have a corresponding word for the concept of a ‘fortnight’. Even in English the usage of the word has deceased to a large extent. It is not difficult to imagine that some language might have no word for ‘fortnight’. Similarly, English does not have a special word for a duration of ten days or sixteen days. One might imagine a hypothetical world where the earth would not have a moon. In this world, the division of time would necessarily take on a different form. Some of the concepts that are taken for granted in language can be quite arbitrary, as other languages may choose different boundaries for the duration of events.

A feature that is universal is that every language takes its vocabulary for time from that of space (Boroditsky 2000), using aspects of spatial relations to describe an abstract concept that lacks sensory information.

### 3.3 Metaphor

Lakoff and Johnson claimed that “Metaphor is not just a matter of language, that is, of mere words. On the contrary, human thought processes are largely metaphorical.” (Lakoff and Johnson, 1980).

Metaphor is an inherent and important part of language. To illustrate the pervasive nature of metaphor Lakoff & Johnson discuss the metaphors “up is good” and “down is bad” (Lakoff & Johnson 1980). This metaphor appears to be applied linguistically and derives from a physical basis. If a person is sick, then they are likely to be lying down, while a healthy person will stand upright. Similarly, the majority of healthy plants stand tall and face the sun, while dying plants droop and fall down. This metaphor is reflected in language, often going unnoticed by speakers. The positive attribute is ‘up’ and the negative attribute is ‘down’ in terms of being happy or sad (“in high spirits, raise one’s spirits, over the moon, feeling down, depressed, down in the dumps”), healthy or sick (“in top shape, rise from the dead, in declining health, under the weather, come down with the flu”), conscious or unconscious (“wake up, rise from the dead, fall asleep, under a spell”), big or small (“rising stock, rising income, turn the volume up, drop in temperature”), virtue and depravity (“upstanding, underhanded”) and good or bad (“things are looking up, to be over

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5 Crawling plants can be an exception to this rule. However, these are in the minority.

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the worst of it, to get over something, going downhill, at an all-time low”)⁶. This metaphor appears to be a universal one, since no language has yet been documented where a phrase like “I feel down” has a more positive meaning than “I feel up” (Lakoff & Johnson 1980).

Lakoff & Johnson commented that metaphor enables the language user to understand and experience one thing in terms of another thing. Metaphor enables the language user to come to terms with concepts that are difficult to grasp. Subsequently, it should be the case that metaphor plays a greater role in the comprehension of abstract concepts, where there is less sensory information to form a mental picture. More layers of metaphor should be required to express greater levels of abstraction. Moreover, lesser abstraction should contain less metaphoric and more descriptive content. This has been found to be the case (Gelman & Heyman 1999). Time is an abstract concept, and therefore one might expect that metaphor would play an active role in aiding the language user to form a conception of time. Furthermore, Boroditsky claimed that “[…] abstract conceptual domains are structured through metaphorical mappings from domains grounded directly in experience.” (Boroditsky 2000: 1).

Since time is an abstract concept, then the layers of metaphor used to describe it should be based on a more concrete domain. Lakoff & Johnson argued that in western societies there is an extended metaphor that relates time to money (Lakoff & Johnson 1980). Similar to the “up is good” metaphor, “time is money” is reflected in many aspects of language. If time is understood like money, then it is subject to the same types of behaviour. For example, in English time can be “spent, wasted, squandered, saved, borrowed, budgeted and invested”. Lakoff and Johnson claimed that because of the fact that English and other European languages describe time as though it were a valuable commodity, the speakers of these languages perceive time in that way (Lakoff & Johnson 1980).

Lakoff and Johnson proposed that the entire human conceptual system is based on a small set of fundamental concepts that come directly from our sensory experience with the concrete world (Lakoff & Johnson 1980). These basic concepts include a set of spatial relations such as up/down and front/back, a set of physical ontological concepts, such as

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⁶ An “uphill struggle” appears on first glance to be an exception to the rule, since it describes a negative scenario. However, the focus of this metaphor is upon the journey (travelling uphill) rather than the eventual position. In contrast, “to get over something” implies that the situation will be better when one is “over” the thing in question, i.e. the focus is on the eventual position. Similarly, the metaphor “going downhill” implies that the eventual position is worse than the current one. An “uphill struggle” is the opposite, however. The metaphor relates to the difficulty of the situation, but the desirable position is the “top of the hill”, which is further proof that “up is good” and “down is bad”. Similarly, the negative words ‘upend’ and ‘upset’ refer to states that are no longer ‘up’. A stack of books might be upended, with the results that the books fall down.
entity and container, and a set of basic actions, such as sleeping and talking (Lakoff & Johnson 1980). Any concept that is not grounded in physical experience is understood in terms of metaphor. An abstract concept like time is understood by means of metaphorical mappings from a set of fundamental concrete concepts. This is called the Metaphorical Structuring Hypothesis (Lakoff & Johnson 1980). Common extended metaphors in language, such as “ideas are food” and “argument is war” support this. The abstract concepts are fleshed out by relating them to concrete things that are more easily understood.

Boroditsky remarked that the abstract concept is not treated the same as the concrete one in every respect, but receives its fundamental relational structure from it. “Metaphors import the relational structure and not the surface features of the base domain to the target domain. (Boroditsky 2000: 3). Boroditsky means by this that for an extended metaphor like “time is money”, while phrases such as “spend time” and “borrow time” are used, time cannot be put into our wallets and cannot be stored in an account. The relational structure that abstract concepts receive from concrete ones is enough for people to form a complex perception of the concept.

Since the abstract concepts of a natural language are supported by less sensory information than concrete ones, there is more scope for diversity in the ways that languages describe abstract concepts than concrete concepts. Abstract concepts are described in terms of more directly understood concrete concepts.

3.4 English: Time and Space

English uses a metaphor that equates time with money. Subsequently, time is seen to have similar attributes to money and English treats them in a similar manner, as noted above. Further to the relation of time to money, the concept of time is built upon a system of further metaphors. The understanding of time is based initially on experiences in the physical world. People from all cultures can observe that experiences are transient and that time consists of constant unidirectional change.

As noted earlier, spatial vocabulary is employed by all languages to talk about time. In English, time is conceptualised using a number of spatial metaphors. The spatial metaphors that are used are one-dimensional, directional metaphors like “ahead/behind,

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7 “Food for thought, half-baked ideas, an appetite for knowledge.”
8 “He attacked the points of my argument, I won the argument, His claims were indefensible, He tried to shoot down my ideas, I destroyed his claims.”
before/after and up/down”, rather than multi-dimensional, symmetric ones like “shallow/deep, high/low and left/right” (Clark 1973; Traugott 1978). The spatial words that are used correspond with the “one-dimensional, unidirectional” view of time that Boroditsky commented upon (Boroditsky 2000).

Despite the fact that languages universally use one-dimensional, directional spatial metaphors to talk about time, there is much scope for linguistic diversity. While time may be unidirectional, it is unclear whether it is moving backwards or forwards, left or right, and up or down. On the other hand, time may not move at all, but rather each person might move through time. This cannot be answered by simply observing experiences from the real world, and consequently language can play an important role in shaping the understanding of time.

In English, the phrases “looking ahead to a bright future”, “looking forward to tomorrow”, “running behind schedule” and “looking back at the past” are common. The spatial metaphors that are used in these phrases impose a particular understanding of time on the language user, namely that the future is “in front” and that the past is “behind” (Boroditsky 2000).

### 3.4.1 Moving-Ego and Moving-Time Metaphors

There are two dominant spatial metaphors used to position the order of events in English, namely the “moving-ego” and the “moving-time” metaphors (McTaggart 1908; Clark 1973; Lakoff & Johnson 1980; Boroditsky 2000). In the first of these metaphors, the ‘ego’, or the language user, moves through time, toward the future. This is illustrated by the following sentence.

(1) We are drawing ever closer to the end of the summer.

In the second metaphor, on the other hand, time is seen to move from the future to the past, relative to a static observer.

(2) The onset of winter is drawing near.

The two metaphors are further illustrated in the following diagrams.
In Figure 3 the observer is moving forward towards the future and away from the past. In contrast, the observer is static in Figure 4, while time is moving. In this picture the future moves toward the observer with the past moving away from him/her. The following sentence highlights the difference between the two scenarios.

(3) Wednesday’s meeting is moved forward by two days

Under the moving-ego metaphor the observer is moving through time, so the word ‘forward’ means two days ‘later than’ Wednesday, hence Friday. However, under the moving-time metaphor, time moves toward the observer from future to past, so ‘forward’ means “nearer to the observer”, hence two days ‘earlier than’ Wednesday, which is Monday. Sentence (4) depicts a similar situation.

(4) The 2008 Beijing Olympic Games are moved forward by a year

According to the moving-ego metaphor the Olympic Games would take place in 2009, while according to the moving-time metaphor the Olympic Games would take place in 2007.

### 3.4.2 Stored Meanings after Frequent Usage

Boroditsky remarked that while spatial metaphors play a role in shaping a person’s conceptualisation of time, after frequent usage, people form an independent representation of the concept, with the result that the spatial schemas no longer need to be accessed on every occasion in order to think about time (Boroditsky 2000). Frequently used metaphors develop “stored meanings” to save the cost of carrying out the same calculation again and again. The influence of language may not be easily recognised by the language user if they
are not aware of the spatial schemas that their language uses to talk about time. The stored meanings of the spatial metaphors can aid their understanding of time without raising their awareness of this.

It is possible that when people use metaphoric phrases to talk about time that they are using them simply out of habit and are not aware of the ‘literal’ spatial relations of their words. This literal meaning is similar to the dual meaning that is available in idiomatic phrases.

Chafe described the notion of shadow meanings and explains their relation to the study of language and cognition (Chafe 2000). For example, the word for ‘horse’ in Seneca (a Native American language) ‘geodanéhgwh’, which literally means “it pulls logs”. The term was derived from a description of the animal’s function among the Seneca society. Its primary raison d’être was to pull equipment that was necessary for work. Over time the required meaning was extended when it became necessary to make reference to the animal outside of its original scope (Chafe 2000). However, the term ‘geodanéhgwh’ was still used. At this point the term had a double meaning: a literal meaning (the function of pulling logs) and an idiomatic meaning (the animal). When the idiomatic meaning is intended, the literal meaning can also be called a “shadow meaning” (Chafe 2000).

Some studies have shown that people are aware of the literal or shadow meanings of idiomatic phrases (Chafe 2000; Gibbs 1994). However, the extent to which these meanings influence a person’s outlook on the world is unclear. It is likely that it varies for different people and for different phrases. Seneca speakers are able to think of a horse as more than just something that pulls logs (Chafe 2000), so shadow meanings do not prevent people from accepting an idiomatic meaning.

A substantial amount of the lexicon of a language may be comprised of idiomatic and literal meanings. The English word ‘butterfly’, for example, derived its name from a folk belief that the insect was a witch in disguise, which wanted to steal cream, milk and butter that lay uncovered over night (Hoad 1986). The German word for the insect is ‘Schmetterling’ (lit. “cream fly”) and derived its name in the same way, via an Upper Saxon loan word from the Czech word ‘smetana’ (cream) (Kluge 1995). In modern English and German speaking societies, only the idiomatic meaning is still relevant, since the word has acquired its own history. It is unlikely that many people are aware of the etymology of the name and would make a connection between the idiomatic and literal meanings. Similar to the example from Seneca, it is questionable whether ‘butterfly’ should still be described as an idiomatic meaning, since the word has been in place for so long. It does not
appear that the literal or shadow meanings of idiomatic phrases have a large impact on a person’s conceptualisation of that phrase.

Even if people are aware of the literal meaning of an idiomatic phrase or of a spatial metaphor when talking about time, it might not play a significant part in their understanding of an idiomatic phrase or a temporal expression, since many parts of language are generated unconsciously and automatically. If this were the case, it may be possible for a person to utter a temporal phrase like “Christmas is coming up” without surrendering to the view that time must move past a stationary observer. However, Boroditsky showed by experiment that spatial metaphors do influence a person’s understanding of time (Boroditsky 2000).

Spatial metaphors can provide relational structure to the concept of time, where that structure is not found directly from world experience (Boroditsky 2000; Matlock et al. 2005). Where sensory information is lacking, language helps to shape abstract thought. Boroditsky argued that people use spatial information not just to talk about time, but also to think about time. She conducted an experiment involving ninety-eight undergraduates at Stanford University. The participants were presented with a set of graphic primes and then required to answer a temporal question. The primes consisted of two particular types of frames of reference. One frame of reference was moving-ego and the other was moving-object. An example of the primes that were used is shown in the following diagram (Boroditsky 2000).

![Spatial prime used by Boroditsky](Boroditsky 2000: 12)

Each prime consisted of a picture with an accompanying sentence and depicted a perspective either from the left or from the right. The sentences required participants to imagine the view from the vantage point of the depicted agent. Following the primes, participants were presented with an ambiguous temporal sentence. This sentence was in the form of “Next Wednesday’s meeting has been moved forward two days”. The participants were then asked to answer on what day the meeting would now take place and rate how
certain they were in their response. A control group answered the same set of temporal questions without viewing any of the primes.

The findings of the experiment provided support for Boroditsky’s claim that spatial information impacts on the way that people think about time. 73.3% of the participants primed with the moving-ego frame of reference concluded that the meeting would take place on Friday, with the remaining 26.7% opting for Monday. For participants primed with the moving-object frame of reference 69.2% answered Monday, with just 30.8% saying Friday. Participants’ confidence in their answers followed the same consistency bias. This was in line with the prediction about the two frames of reference. If the moving-ego metaphor is prevalent people view themselves as moving through time, and two days ‘forward’ from Wednesday will imply Friday. On the other hand, under the moving-object or moving-time metaphor two days ‘forward’ will bring the meeting closer to the static speaker, i.e. Monday (Boroditsky 2000). The answers of the control group that was not subjected to either set of primes were more evenly divided, with 54.3% choosing Friday and 45.7% Monday. Boroditsky concluded that spatial schemas are imported from the domain of space into the domain of time to help with the understanding of time, since time is less rich in sensory information.

While spatial primes impact on how people think about time, temporal primes do not impact on how people think about space. This is due to the fact that space has three dimensions, while time is treated universally in language as one-dimensional (Boroditsky 2000). Subsequently, the concept of time should be simpler than the concept of space, and primed temporal schemas will not aid in the creation of spatial schemas in the opposite direction.

3.4.3 Horizontal Spatial Metaphors

In addition to the moving-ego and moving-time metaphors, spatial metaphors play a further part in the English speaker’s understanding of time. Consider the following sentence.

(5) Before Oliver met Betty at the train station he had lunch with Vanessa

This sentence gives information about two distinct events. Oliver met Betty at the train station. Oliver had lunch with Vanessa. The word ‘before’ informs the reader that Oliver earlier had lunch with Vanessa, and later met Betty at the train station.
‘Before’ has a temporal meaning in (5) and a purely spatial meaning in (6).

(6) A man dressed as a clown stands before the entrance to the circus

In addition to ‘before’, other spatial morphemes like ‘after’, ‘forward’ and ‘behind’ are commonly used to talk about time in English.

English uses a system of front/back terms to talk about time. These include “before/after, forward/back and ahead/behind”. When used spatially these words describe horizontal spatial relations. The use of the same terms to talk about time helps to create the view that time passes in a horizontal direction relative to the observer.

(7) a. Oliver is looking forward to spending Christmas with his friends and family
    b. Vanessa looks back at her life with sadness and regret
    c. Hugo is ten minutes ahead of Raoul in the race

The prevalent view in all English-speaking societies is that time moves on a horizontal plane (Boroditsky 2000). Hiberno-English provides further support for this. A common construction in Hiberno-English is the ‘after + gerund’ construction, as seen in the following examples.

(8) a. Oliver is after making tea
    b. Vanessa is after seeing a ghost

This type of construction is unique to the Hiberno-English dialect and is used to show that an event has just recently occurred. (8a) might be rephrased as “Oliver has just made tea”. Like other English temporal phrases this construction uses the spatial metaphor ‘after’ to portray the order of events on a horizontal plane.

It is also possible in English to discuss the order of events using absolute terms of reference, like ‘earlier’ and later’. Depending on whether the moving-ego or the moving-time metaphor is used, spatial terms can refer either to an event that is closer to the past (Hallowe’en comes before Christmas) or one that is closer to the future (Exciting times lie before us). However, ‘earlier’ and ‘later’ place events unambiguously in a particular sequence. Chapter 4 discusses the use of absolute terms in more detail and investigates the effects of the prevalence of horizontal spatial metaphors in English on the understanding of temporal phrases that contain ‘earlier’ and ‘later’.

(9) a. Hallowe’en comes earlier than Christmas
b. Christmas comes later than Hallowe’en

Although horizontal spatial terms dominate the English treatment of time, there are a few vertical spatial terms that are used to talk about time, such as in phrases like “to hand down advice from generation to generation” and “the deadline was coming up soon”. However, the use of vertical spatial terms in temporal descriptions is far less common in English than the use of horizontal spatial terms. For this reason, Boroditsky made the claim that English supports a view that time passes with horizontal motion (Boroditsky 2000). Section 3.6 describes Boroditsky’s efforts to test this hypothesis and to contrast the conceptualisation of time in English to that in Mandarin Chinese. Chapter 4 describes my own empirical investigations, including a replication of Boroditsky’s experiment.

3.5 Aymara: language and gesture

Aymara is a Native American language spoken in the Andes in South America. It has over one and a half million speakers and is an official language of Bolivia and Peru, with a smaller number of native speakers in Chile and Argentina (Miracle & Yapita 1981; Gifford 1986; Núñez & Sweetser 2006).

3.5.1 Time in Aymara

Núñez and Sweetser studied the Aymara language and made the claim that it has a very different conceptualisation of time to that of almost every other language (Núñez & Sweetser 2006). Along with Quechua, another Native American language from South America, Aymara is rare in that the past appears to be perceived as being located in front of the speaker, while the future is located as behind the speaker (Gifford 1986; Harrison 1989; Núñez & Sweetser 2006). Núñez & Sweetser found data from both Aymara speech and gesture that confirmed this. Consider the following temporal uses of the word ‘nayra’ in Aymara, which means ‘eye’, ‘sight’ or ‘front’.

(10) a. Nayra mara
   Eye/sight/front year
   ‘Last year’

b. Ancha nayra pachana
   A lot eye/sight/front time in/on/at
‘A long time ago’
c. Nayra pacha/timpu
    Eye/sight/front time
    ‘Past time’

In each case the word ‘nayra’, although spatially referring to the field in front of the speaker, refers to the past when it is used temporally.

Núñez & Sweetser claimed that “nayra mara” in (10 a) cannot mean “the year before”, but rather means “last year” or “the year before now” (Núñez & Sweetser 2006). Similarly, “Ancha nayra pachana” in (10 b) means “a long time before now”, and cannot mean “at a far earlier time”, while “Nayra pacha/timpu” in (10 c) means “the past”, rather than merely a time earlier than some reference point. The temporal use of ‘nayra’ expresses only an absolute term of reference. There is no overt reference to the ego in the temporal phrases, but this is not necessary. Similarly, the English phrase “the weeks ahead” means “the weeks ahead (of us)”, despite the lack of an explicit noun phrase.

Consider also the following phrases illustrating the temporal uses of the word ‘qhipa’, which means ‘back’.

(11) a. Qhipùru
    Back/behind day
    ‘A future day’
b. Akata qhiparu
    This from back/behind day
    ‘From now on’
c. Qhipa marana
    Back/behind year in/on/at
    ‘In the next (immediately future) year’
d. Qhipa pacha/timpu
    Back/behind time
    ‘Future time’

In each phrase in (11) ‘qhipa’ refers to future events, although the spatial meaning of ‘qhipa’ refers to the field behind the speaker.

One interpretation of the sentences in (10) is that the past is conceptualised as being in front of the Aymara speakers because it is known to them, and the speaker can see what is in front of him/her (Miracle & Yapita 1981). It is also noteworthy that the word ‘nayra’ means both ‘eye’ and ‘front’, which adds support to this hypothesis. The sentences in (11) show that in talking about the future, Aymara uses spatial words that place the future as
behind the speaker. While the past is known, the future remains unknown and unseen, so it is perceived as being behind the speaker, where it cannot be observed (Miracle & Yapita 1981). Núñez & Sweetser rephrase this by saying that in Aymara “realis is in front” and “irrealis is behind” (Núñez & Sweetser 2006). Furthermore, the moving-ego metaphor of time is prevalent for speakers of Aymara.

In addition to studying patterns of speech, Núñez & Sweetser also analysed Aymara gesture and obtained converging evidence (Núñez & Sweetser 2006). The study of gesture can enrich the study of a language. Indeed, Núñez & Sweetser make the claim that speech and gesture are “two facets of the same cognitive linguistic reality” (Núñez & Sweetser 2006: 19). There are a number of features of gesture that support its importance in the study of a language. For instance, gesture is observed universally together with speech. There is a synchronicity between gesture and speech, which is not interrupted by either delayed auditory feedback or by clinical stuttering (McNeill & Duncan 2000). Furthermore, gesture is produced without a visible interlocutor, which shows that its function is greater than simply to ease the comprehension process in discourse (Iverson & Goldin-Meadow 1998). On the side of the interlocutor, research has shown that after a spell of time the interlocutor cannot recall whether the information that was imparted in the discourse was conveyed in gesture or in speech (McNeill et al. 1994; McNeill & Duncan 2000; Kendon 2000; Núñez & Sweetser 2006). It appears that speech and gesture are closely linked for both speakers and listeners. Furthermore, a large amount of gesture that is co-produced with speech is believed to be produced unconsciously (McNeill & Duncan 2000; Núñez & Sweetser 2006). McNeill & Duncan remarked that “the confluence of speech and gesture suggests that the speaker was thinking in terms of a combination of imagery and linguistic categorical content” (McNeill & Duncan 2000: 142). Gesture portrays the way that a person has visualised the concept they are talking about.

If speakers of Aymara were found to gesture the past as in front of them and the future as behind them, then the spatial terms that are used to talk about time in Aymara have more than just a linguistic effect. This would show that the Aymara speaker had a deeper conceptualisation of time as being arranged in this manner, and that he/she visualised it as such.

Núñez & Sweetser found that this was the case. They observed the Aymara speakers using forward gestures co-produced with speech when talking about the past and backward gestures co-produced with speech when talking about the future. This is the reverse to what occurs in English and other European languages. Also significant is that members of the Aymara community that speak only Spanish, and not Aymara, gesture in a
way comparable to speakers of other European languages (Núñez & Sweetser 2006). Furthermore, bilingual members of the Aymara community were found to gesture in the same manner as monolingual Aymara speakers, when speaking both Aymara and Spanish. When talking about time in Spanish bilingual Aymara people gestured according to the Aymara conceptualisation of time, even though this type of gesture did not correspond with the Spanish conceptualisation of time (Núñez & Sweetser 2006).

Due to the shape of the human body, forward gestures tend to be more elaborated than backward gestures in all cultures (people cannot gesture as far behind their bodies as they can in front). Núñez & Sweetser remarked that in European languages this results in gestures about the future being more elaborated than gestures about the past, while in Aymara gestures about the past are more elaborated (Núñez & Sweetser 2006: 32). The gestural results from Aymara support the speech results.

Núñez & Sweetser’s findings in both Aymara speech and gesture strongly suggest that the Aymara people conceptualise the past as “in front” and the future as “behind”. Since gesture is produced in the unconscious mind (McNeill et al. 1994), Núñez & Sweetser’s findings suggest that the Aymara view of time reflects a deep aspect of their cognitive structure.

### 3.5.2 Explaining the Differences between Aymara and English

The Aymara conceptualisation of time contrasts with the one of English and other European languages, but both are easily explained.

All sighted humans relate vision to knowledge (Lakoff & Johnson 1980; Miracle & Yapita 1981; Núñez & Sweetser 2006). For human beings vision is the primary means of analysing their environment. Some animals rely more heavily on other senses, e.g. bats use sound waves to gauge their environment, while dogs have a keen sense of smell. Subsequently, Lakoff & Johnson discuss a “vision is knowledge” metaphor, which they claim is prevalent in all languages (Lakoff & Johnson 1980). The basis of this conceptual metaphor is responsible for both the front to back view of the flow of time in Aymara and the back to front flow of time in English.

Núñez & Sweetser explained the view of time in Aymara as follows:

Now imagine a static viewer with a visual field. He or she can only see what is in the “front” half of the space he or she is in—the direction he or she is facing. One might be able to creep up on this person from behind, unseen; but this would be impossible from the opposite direction. Under such circumstances, what is seen
correlates with what is known—and with what is in front of the viewer.

(Núñez & Sweetser 2006: 38-39)

By this view, what is known is located in front of the speaker and what is unknown is located behind the speaker. This correlates with the fact that the past is known and the future is unknown. This view ignores more distant parts of the environment in front of the speaker that cannot be seen. Alternatively the view of time in European languages is explained in the following way.

Imagine a moving person, walking along a path. Of course, like the static viewer, he or she has a visual field and can only see in front of him or her. However, another crucial correlation in his or her experience is that he or she does not know what he or she will find around the next turn in the path. An important division of the world for this person, besides “what I can see in front of me” and “what I can’t see behind me” is the division between “places I haven’t yet been to—and thus haven’t seen and don’t know about” and “places I’ve been to already—and have thus seen and gained some knowledge about.”

(Núñez & Sweetser 2006: 39)

According to this perspective what is unknown is in front of the speaker and what is known is behind the speaker. This is the opposite of the former scenario. While the perspectives of the European languages depend on a moving-ego scenario, the Aymara perspective depends on a static ego scenario. Núñez & Sweetser explain the dominance of the moving-ego scenario in European languages by claiming that the cultural experience of time is more dynamic, where the speaker claims influence over their future (Núñez & Sweetser 2006).

Núñez & Sweetser speculated about the reasons for the static ego scenario to prevail in the Aymara culture. They claimed that it may be due to an overemphasis placed on the realm of visual perception. Although every culture appears to hold that vision equates to knowledge, in the Aymara culture this conceptual metaphor may be more pronounced (Núñez & Sweetser 2006). Evidence from the Aymara language supports this.

Aymara, like Turkish (cf. section 2.3), makes a grammatical distinction between personal knowledge and hearsay by means of verbal inflection. Núñez & Sweetser offered the sample sentence, “Yesterday my mother cooked potatoes”. For this sentence it is obligatory that the Aymara speaker indicate whether they witnessed the event or merely heard about its occurrence. This information is provided by an appropriate ending on the verb for ‘to cook’ in this case. Núñez & Sweetser remarked that in Aymara it is “almost impossible to utter a sentence without marking the appropriate source” (Núñez & Sweetser 2006: 40). In contrast, the Indo-European languages do not make this distinction. The role
of personal knowledge in Aymara supports the significance of visual information. If a speaker can verify in the reporting of an event that they witnessed it, then their utterance carries more authority and is more likely to be taken as the truth (Miracle & Yapita 1981; Núñez & Sweetser 2006). Furthermore, Aymara speakers have no choice but to attend to the notion of personal knowledge, as it is necessarily encoded in their language, which further strengthens its cultural importance. This is a further example of the fact that speakers of different languages are forced to attend to different aspects of experiences (cf. section 2.3).

Miracle & Yapita claimed that Aymara divides time into the future and everything else (Miracle & Yapita 1981). The division is made according to the past and present, which are visible, and the future, which is not visible. This claim is supported by the fact that Aymara speakers talk more frequently, in more detail, and with more enthusiasm about the past than about the future (Núñez & Sweetser 2006).

The study of both Aymara speech and gesture provides evidence that the speakers of the language conceptualise time in a way that is different to all Indo-European languages. The Aymara culture favours visual information and personal experience, while the language contains grammatical distinctions that support this. This is further evidence of the bi-directional relationship between language and culture, as each one continues to influence the other in a sort of self-fulfilling prophecy. However, data obtained from Aymara speech and gesture show that the language has an impact not only on culture, but also on cognition.

3.5.3 Comparison of Pirahã and Aymara

As discussed in Chapter 2 (cf. section 2.5) Pirahã has a unique way of dealing with time. In Pirahã there is a strong cultural preference for the notion of “immediacy of experience” (Everett 2005). This results in a certain disregard for past events. According to Everett, Pirahã lacks both a past tense and a past tense meaning. In this sense, Pirahã is a direct contrast to Aymara, which places a strong emphasis on the past. However, both languages share a common source for their respective understandings of time, namely the significance of the visual field. For the Pirahã people, things and events that are immediately visible are much more important than what is not visible (Oliveira & Rodrigues 1977; Everett 2005). Pirahã uses this as a reason to disregard the more distant
past and to favour talking about the present. Aymara, on the other hand, conceptualises the past as in front of the speaker, since the past is known and the future is unknown.

3.6 Mandarin

Mandarin Chinese is the most spoken language in the world with almost nine hundred million native speakers (Gordon 2005).

As discussed earlier, the abstract concept of time is described using vocabulary from the concrete domain of space. This is a universal facet of language and is a part of the Metaphorical Structuring Hypothesis (cf. section 3.3).

3.6.1 Vertical Spatial Metaphors

While the spatial terms that English uses to talk about time are predominantly terms that describe horizontal spatial relations, Mandarin uses a number of terms that describe vertical spatial relations. In English the horizontal outlook is dominant, despite a limited use of vertical spatial terms like “The holidays are coming up soon” (cf. 3.4.3). However, Mandarin makes use of both horizontal and vertical spatial terms to talk about time.

The horizontal spatial morphemes ‘qián’ (front) and ‘hòu’ (back) are frequently used in Mandarin (Scott 1989). However, unlike English, Mandarin also commonly uses the vertical spatial morphemes ‘shàng’ (up) and ‘xià’ (down) to describe the ordering of events. Like the horizontal terms, these terms are used to talk about both space and time. The following diagram provides examples of how the terms are used in both the areas of space and time (Boroditsky 2001: 6).

(1) SPACE

mǎo shàng shù
cats climb trees

TIME

shàng gè yuè
last (or previous) month

(2) SPACE

tā xià le shān méi yǒu
has she descended the mountain or not?

TIME

xià gè yuè
next (or following) month

Figure 6. Vertical spatial metaphors in Mandarin
Figure 6 shows how ‘shàng’ (up) is used both in spatial and temporal descriptions. In the temporal phrase “shàng ge yuè” (上个月), it means “last month” or “previous month”, although its literal meaning is “the month above”. ‘Xià’ (down) is also used both spatially and temporally and means “next month” or “following month” in the phrase “xià ge yuè” (下个月), although its literal meaning is “the month below”. The earlier month is described by the word for ‘up’ and the later month is described by the word for ‘down’. The use of spatial metaphors to talk about time in this way helps to create the view that time travels in a vertical (downward) direction (Boroditsky 2001).

Another point that Figure 5 highlights is that Mandarin, unlike Aymara (cf. section 3.5.1), does not involve the moving-ego metaphor of time. The phrase “shàng ge yuè” can mean both “last month” and “previous month” and is not an absolute term of reference.

These examples illustrate the use of vertical spatial metaphors to talk about time in Mandarin, but it is important to remark that Mandarin uses both vertical and horizontal spatial metaphors in temporal phrases, and there is less of a bias for either system than there is in English (Chen 2007).

### 3.6.2 Mandarin and English Speakers’ Conceptualisation of Time

Lera Boroditsky made the claim that Mandarin exhibits a preference for vertical spatial metaphors in its treatment of time, and that as a result of this speakers of Mandarin might be found to conceptualise time as moving in a vertical direction (Boroditsky 2001). For English speakers it should be the opposite, as English contains a strong preference for horizontal spatial metaphors to talk about time. Boroditsky found support for this claim through the research described in the next section. In contrast, a counter-study by Chen found no support for linguistic relativity and observed no significant differences between English and Mandarin speakers (Chen 2007).

#### 3.6.2.1 Boroditsky’s Research

Boroditsky asked the question whether English and Mandarin speakers conceptualise time differently as a consequence of the different sets of spatial metaphors that their respective languages use to talk about time (Boroditsky 2001). She addressed this
question with a spatial priming experiment, similar to the prior one that examined the role of spatial metaphors in the conceptualisation of time (cf. section 3.4.2).

Twenty-six native English speakers and twenty native Mandarin speakers undertook the experiment. Each of the Mandarin speakers was proficient in English, but each of them acquired it only as a second language after the age of six. The experiment was conducted entirely in English. The participants were presented with spatial priming pictures, followed by a temporal statement, to which they were required to respond. Each of the spatial primes depicted two objects in either vertical or horizontal motion and each of them was accompanied by a descriptive statement about the spatial relationship of the objects. The participants were required to determine whether the temporal statement was true or false and were timed in their responses. They were tested on thirty-two temporal statements. Sixteen of them were true and sixteen were false. The false statements were used as fillers in the experiment, so the participants were being measured on the time they took to validate correct statements about the order of the months of the year. Sample of the primes that were used in the experiment are provided below (Boroditsky 2001: 7-8).

![Figure 7. Horizontal spatial prime used by Boroditsky](image)

The black worm is ahead of the white worm.

![Figure 8. Vertical spatial prime used by Boroditsky](image)

The black ball is above the white ball.

The temporal statements that the participants had to evaluate were either in the form of “June comes before July” or “June comes earlier than July”. The first type was meant to serve as a check on the effectiveness of the priming process, as it contained the horizontal spatial word, ‘before’. Both Mandarin and English speakers responded more quickly to this type of statement after observing a horizontal prime, since ‘before’ is a horizontal spatial word. More significant were the participants’ responses to the statements
that contained the words ‘earlier’ and ‘later’, since these words are absolute terms of reference and display bias in neither direction. Boroditsky found that English speakers responded to ‘earlier’ and ‘later’ statements more quickly after seeing a horizontal prime than after seeing a vertical prime. In contrast, the Mandarin speakers were quicker after vertical primes. Boroditsky concluded that Mandarin speakers conceptualised time as moving on a vertical plane, while English speakers conceptualised time on a horizontal plane.

Moreover, all of the Mandarin speakers could speak English proficiently, and the experiment was carried out in English. Therefore, even when the Mandarin speakers were thinking about time in a non-native language, they thought about it as moving vertically. Boroditsky claimed that since the Mandarin speakers talked about time using vertical spatial metaphors, they also thought about time as moving vertically. Boroditsky concluded that spatial metaphors affect how people think about time, even when they think about it in another language. Therefore, “habits in language encourage habits in thought” (Boroditsky 2001: 12).

Boroditsky also wanted to measure the effect of learning English on the Mandarin speakers. The question was whether those who learned English earlier or who were able to speak English for a long time would be less inclined to exhibit a “vertical bias” in their response to the temporal statements. The experiment was repeated in the same format with three different groups of Mandarin speakers, depending on the age that they began to learn English (between the ages of 3 and 13). Each of the participants had at least ten years exposure to English.

The results showed that the age at which the Mandarin speakers had begun to learn English did influence their responses (Boroditsky 2001: 14-15). The tendency to think about time vertically was stronger for those who began to learn English later. The vertical bias was not affected by the length of exposure to English. In short, the length of time that a child spoke only Mandarin was the main factor in the way that they thought about time. Cognitive habits encouraged by a language depend more on how early one begins to learn that language than on the length of exposure of it (Boroditsky 2001: 16).

In a third experiment Boroditsky answered another question. She wanted to see if there were non-linguistic factors at play in the Mandarin speakers’ conceptualisation of time. One potential factor was writing direction, which is often vertical in Chinese.9

Boroditsky wanted to examine whether habitually writing in a vertical direction in one’s

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9 Although writing in Traditional Chinese was arranged in vertical columns that moved from right to left, writing direction varies in modern Chinese and can be arranged either vertically or horizontally (DeFrancis 1984).
native language could be an element of influence. To determine whether such non-linguistic, cultural differences could be excluded, in which case the differences in the results of the two sets of speakers must have been brought about by linguistic factors, Boroditsky trained seventy English speakers to think about time vertically (Boroditsky 2001: 17-18). They learned to use the following vertical spatial terms to talk about time, “above, below, higher than, and lower than”, half of them learning the first pair and the other half the latter pair. Examples of the use of these terms would include the sentences “Cars were invented above fax machines”, “Dessert usually comes below dinner”, “Saturday is higher than Friday” and “Wednesday is lower than Thursday”. The idea of this experiment was to disable the English speakers’ bias for thinking about time horizontally by making vertical schemas immediately available. If the results of the earlier experiments were brought about purely by linguistic factors, then the English speakers undertaking this experiment should display a vertical bias similar to the Mandarin speakers in the earlier experiments.

For temporal statements containing the horizontal spatial words ‘before’ and ‘after’, Boroditsky found that the response times were still quicker after horizontal primes. However, for temporal phrases containing the absolute terms ‘earlier than’ and ‘later than’, the results were reversed. The “trained” English speakers responded more quickly after vertical primes than after horizontal primes, thus differing from the “untrained” English speakers and more resembling the Mandarin speakers from the first two experiments in their results. The results of Boroditsky’s experiments are presented together in the following chart (Boroditsky 2001: 11).

![Figure 9. Results of Boroditsky’s experiments for English and Mandarin speakers](image)

There was no sign of any demand characteristics in any of Boroditsky’s experiments that might have affected the participants’ responses. The results of Boroditsky’s experiments make a strong case for the idea that language influences habitual
thought. Strong support for the principle of linguistic relativity was found when Mandarin
speakers showed effects of their language in performing a task in a non-native language
and when English speakers who were trained to talk about time differently were shown to
think about time differently.

Chapter 4 describes a replication of Boroditsky’s findings and a second experiment
that uses animated spatial primes instead of the static spatial primes used by Boroditsky.
Both experiments support Boroditsky’s results.

3.6.2.2 Chen’s Research

Chen disputes some of the claims made by Boroditsky (Chen 2007). According to
Chen, Mandarin speakers do not have a preference for vertical spatial terms over horizontal
ones when talking about time (Chen 2007: 2). Chen claimed that while Mandarin uses both
horizontal and vertical spatial terminology to talk about time, it uses horizontal spatial
terms more frequently than vertical spatial terms. If this were the case, then there should be
no reason for there to be a vertical bias in a Mandarin speaker’s conceptualisation of time.

Chen provided support for the claim that horizontal spatial terms are more common
than vertical ones in Mandarin temporal phrases by compiling a list of internet news
sources in Mandarin and extracting phrases involving expressions of time. The following
are the results that Chen obtained from a search of Yahoo News Taiwan (Chen 2007: 3).

<table>
<thead>
<tr>
<th>Before</th>
<th>After</th>
<th>Sum of horizontal</th>
<th>Above</th>
<th>Below</th>
<th>Sum of vertical</th>
</tr>
</thead>
<tbody>
<tr>
<td>123</td>
<td>127</td>
<td>250</td>
<td>70</td>
<td>52</td>
<td>122</td>
</tr>
</tbody>
</table>

Table 3. Chen’s internet search results

From 100 news items in Mandarin Chen found 250 horizontal temporal phrases and
122 vertical ones. 57 of the news sources exhibited more horizontal temporal phrases than
vertical ones, while 29 had more vertical temporal phrases. The remaining 14 were equal.

In a second test Chen searched for a combination of the Mandarin words for the
temporal terms “day, week, month, season, year” and the spatial terms “above, below,
before, after” through Google News Taiwan. The results were similar to the first test (Chen
2007: 4).
<table>
<thead>
<tr>
<th></th>
<th>Before</th>
<th>After</th>
<th>Sum of horizontal</th>
<th>Above</th>
<th>Below</th>
<th>Sum of vertical</th>
</tr>
</thead>
<tbody>
<tr>
<td>Day</td>
<td>38</td>
<td>22</td>
<td>60</td>
<td>3</td>
<td>1</td>
<td>4</td>
</tr>
<tr>
<td>Week</td>
<td>38</td>
<td>44</td>
<td>82</td>
<td>63</td>
<td>40</td>
<td>103</td>
</tr>
<tr>
<td>Month</td>
<td>25</td>
<td>30</td>
<td>55</td>
<td>21</td>
<td>23</td>
<td>44</td>
</tr>
<tr>
<td>Year</td>
<td>11</td>
<td>7</td>
<td>18</td>
<td>7</td>
<td>10</td>
<td>17</td>
</tr>
<tr>
<td>Season</td>
<td>19</td>
<td>19</td>
<td>38</td>
<td>6</td>
<td>9</td>
<td>15</td>
</tr>
<tr>
<td>Event</td>
<td>54</td>
<td>53</td>
<td>107</td>
<td>25</td>
<td>13</td>
<td>38</td>
</tr>
<tr>
<td>Total</td>
<td>185</td>
<td>175</td>
<td>360</td>
<td>125</td>
<td>96</td>
<td>221</td>
</tr>
</tbody>
</table>

Table 4. Results of Chen’s second internet search

Each of the results involved one of the six temporal nouns in the leftmost column in conjunction with either a horizontal or a vertical spatiotemporal term. Three of the six nouns were found significantly more with horizontal terms than with vertical terms. Only for one term, ‘week’, did the number of vertical terms used exceed the number of horizontal terms.

Chen’s results appeared to contradict Boroditsky’s conclusions, for if there is not any preference for vertical spatial terms in discussing time in Mandarin, there would be not be any linguistic reason for Mandarin speakers to exhibit a vertical bias in their conceptualisation of time.

Chen also attempted to carry out a replication of Boroditsky’s experiments (Chen 2007: 4-8). The materials that Chen used were in exactly the same form as the ones that Boroditsky used and the experiment was again conducted entirely in English. For the temporal statements to which the participants had to respond, Chen used examples that contained days of the week and seasons, as well as months, which Boroditsky used exclusively.

In contrast to Boroditsky’s findings, Chen did not observe any tendency among Mandarin speakers to conceptualise time in a vertical manner. Chen found no meaningful difference in the response times of the English and the Mandarin speakers.

Further to the replication of Boroditsky’s experiments, Chen additionally conducted the same experiment entirely in Mandarin (Chen 2007: 8-9). This had a dual purpose. Firstly, this experiment would ensure that it was not due to some aspect of the procedure of the experiment that the results were different to Boroditsky’s. Secondly, if Mandarin speakers did conceptualise time vertically even when performing a task in a non-native
language, then the effects of this should be even stronger when they are performing the
same task in their native language.

Chen again failed to replicate Boroditsky’s results and observed no significant
differences in Mandarin speakers’ response times following either horizontal or vertical
primes (Chen 2007: 9).

3.6.2.3 Comparison of Boroditsky’s and Chen’s Findings

There are stark differences in the results produced by Boroditsky and by Chen. On
the one hand, Boroditsky concluded that Mandarin speakers think about time vertically
since their response times to the temporal statements are significantly shorter after vertical
primes than after horizontal primes (Boroditsky 2001). On the other hand, Chen found no
significant difference between the Mandarin speakers’ response times after either type of
prime (Chen 2007). There must be an explanation for these differences.

Closer scrutiny of Chen’s results shows that they differed to Boroditsky’s in more
ways than failing to produce a vertical bias among Mandarin speakers. Chen’s results for
English speakers were also significantly different for the absolute ‘earlier than’ and ‘later
than’ constructions. Furthermore, Chen’s results differed among both Mandarin and
English speakers for the ‘before’ and ‘after’ constructions.

Boroditsky found that both English and Mandarin speakers responded more quickly
to ‘before’ and ‘after’ temporal statements after observing a horizontal prime. The reason
for this was that the words ‘before’ and ‘after’ described a horizontal spatial relation.
However, Chen did not replicate these results.

Table 5 contrasts Chen’s and Boroditsky’s complete results (Boroditsky 2001: 10-
11; Chen 2007: 5-6). Blue font shows that response times were faster after vertical primes,
and red font shows that response times were faster after horizontal primes.

For the ‘before’ and ‘after’ constructions Boroditsky found that both English and
Mandarin speakers were quicker after horizontal primes. English speakers responded on
average 130ms quicker after horizontal primes, while Mandarin speakers responded 120ms
quicker. For the same task involving months of the year Chen found English speakers to be
248ms quicker after horizontal primes, while Mandarin speakers, on the other hand, were
223ms quicker after vertical primes. Chen’s Mandarin speakers were quicker after vertical
primes for all of the ‘before’ and ‘after’ temporal statements, including statements
involving days and seasons, although the effect was greater for statements containing
months. However, Chen’s results for English speakers on the ‘before’ and ‘after’
statements were inconsistent. They were significantly faster (248ms) after horizontal primes for tasks involving months (“June comes later than April”), and for seasons (248ms), but they were significantly faster after horizontal primes for tasks involving days (299ms). Both among Mandarin and English speakers Chen’s results were very different to Boroditsky’s and ranged significantly, depending on whether the temporal task involved months, days or seasons.

For the ‘earlier’ and ‘later’ absolute temporal tasks Chen’s results were also inconsistent. Mandarin speakers were marginally faster after vertical primes for tasks involving months, although the effect was less strong than in Boroditsky’s findings (91ms versus 200ms). However, for tasks involving days and seasons the Mandarin’s response times were more similar after either type of prime.

Chen’s English speakers produced similar results to Boroditsky’s for ‘earlier’ and ‘later’ tasks involving months, with the participants being 190ms quicker after horizontal primes. However, for tasks involving days and seasons the trend was reversed, and the English speakers were faster after vertical primes (by 572ms in the case of seasons).

Taking Chen’s overall average results, English speakers responded more quickly to temporal tasks after horizontal primes for ‘before’ and ‘after’ constructions, but they responded more quickly after vertical primes for the absolute ‘earlier’ and ‘later’ constructions.

Chen’s findings fail to refute Boroditsky’s conclusions about Mandarin speakers’ conceptualisation of time, since they present an inconsistent set of results for both English and Mandarin speakers. Taking only temporal statements involving months as an example, which was the sole task examined by Boroditsky, Chen’s results do, in fact, exhibit a horizontal bias among English speakers and a small vertical bias among Mandarin speakers. However, when statements containing days and seasons are introduced, Chen’s results are greatly varied for both sets of speakers. There should not be any significant difference in the way that people conceptualise the ordering of months to the ordering of days or seasons. Moreover, Chen’s results did not suggest that this was the case, since the results for tasks involving days and seasons did not appear to follow a particular pattern.

Not only do Chen’s results fail to support the idea that Mandarin speakers conceptualise time vertically, they also fail to produce evidence for any effects of spatial metaphors on the conceptualisation of time among either Mandarin or English speakers.
## Table 5. Comparison of results from (Chen 2007) and (Boroditsky 2001)

<table>
<thead>
<tr>
<th></th>
<th>Chen's Mean RT (SD)</th>
<th>Chen's Difference of V-H</th>
<th>Boroditsky's Mean RT (SD)</th>
<th>Boroditsky's Difference of V-H</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Chinese participants</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Before/after Day</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3053 (799)</td>
<td>2939 (711)</td>
<td>−114</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3219 (827)</td>
<td>2996 (727)</td>
<td>−223</td>
<td>2380 (2500)</td>
<td>120</td>
</tr>
<tr>
<td>2780 (980)</td>
<td>2677 (964)</td>
<td>−103</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3017 (879)</td>
<td>2870 (810)</td>
<td>−147</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Earlier/later Day</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3353 (822)</td>
<td>3368 (820)</td>
<td>15</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3194 (818)</td>
<td>3103 (802)</td>
<td>−91</td>
<td>2550 (2350)</td>
<td>−200</td>
</tr>
<tr>
<td>3017 (782)</td>
<td>2987 (826)</td>
<td>−30</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3188 (808)</td>
<td>3152 (821)</td>
<td>−36</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>English participants</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Before/after Day</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2461 (905)</td>
<td>2162 (544)</td>
<td>−299</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2326 (652)</td>
<td>2574 (517)</td>
<td>248</td>
<td>2070 (2200)</td>
<td>130</td>
</tr>
<tr>
<td>2196 (381)</td>
<td>2444 (498)</td>
<td>248</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2328 (672)</td>
<td>2393 (536)</td>
<td>65</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Earlier/later Day</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2461 (886)</td>
<td>2369 (830)</td>
<td>−92</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2464 (789)</td>
<td>2654 (664)</td>
<td>190</td>
<td>2190 (2400)</td>
<td>210</td>
</tr>
<tr>
<td>2937 (768)</td>
<td>2365 (583)</td>
<td>−572</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2621 (828)</td>
<td>2462 (696)</td>
<td>−159</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Chen made the following conclusion from her research:
In sum, the two parts of the study led us to conclude that Chinese speakers do not conceptualize time differently than English speakers. This conclusion, however, must be limited to the way time is expressed spatially. Whether Chinese and English speakers might differ in other ways of conceptualizing time remains an open question; so does the linguistic relativity claim. (Chen 2007: 11)

Chen left open the possibility that speakers of different languages could conceptualise time differently due to other reasons, but ruled out any effect of spatial metaphors. However, closer analysis of Chen’s findings shows that her research cannot be regarded as effectively refuting Boroditsky’s claims about the effect of spatial metaphors on the conceptualisation of time.

3.6.2.4 Horizontal and Vertical Spatial Metaphors in Mandarin

The first point that Chen made was that vertical spatial metaphors are not more common than horizontal ones in talking about time in Mandarin (Chen 2007: 2). Chen claimed, in fact, that vertical spatial metaphors were less common than horizontal ones, and supported this by extracting a selection of temporal phrases from internet news sources.

In the second of her tests, Chen performed a search of Google News Taiwan for the Mandarin temporal words for “day, week, month, season and year” and the Mandarin spatial words for “above, below, before and after” (cf. Table 4). Chen found the temporal words more frequently in combination with the horizontal spatial words ‘qiàn’ (front, before) and ‘hòu’ (back, after) than with the vertical spatial words ‘shàng’ (up, above) and ‘xià’ (down, below).

There are, however, weaknesses involved in this test. Firstly, the range of temporal terms that Chen examined was rather narrow. An equivalent English sample would not have found results containing phrases like “Oliver is looking forward to spending Christmas with his friends and family”.

Secondly, the viability of the internet as a corpus is uncertain. Kilgarriff & Grefenstette commented that web searches do not provide enough context for the results they produce and that “the statistics are unreliable, with frequencies given for “pages containing x” varying according to search engine load and many other factors” (Kilgarriff & Grefenstette 2003: 12). Furthermore, due to the evanescent nature of internet news sources, the results of a web search can vary from day to day and from search engine to search engine.

Chen did not give a detailed account of how she used the Yahoo and Google search tools to research the terms in question, so it is unclear how she searched for combinations
of the temporal and spatial words. A short application of the Google search engine for the English terms ‘before’ and ‘yesterday’ brings up more than seventy thousand results, but for many of these results the two words do not even appear in the same sentence and bear no relation to one another. Moreover, ‘before’ might not always carry a temporal meaning. Chen may have used quotation marks around the terms to search for terms in direct succession, but this would also not be entirely accurate, as the words may sometimes appear in a different arrangement. Indeed, a phrase like the ones used by Boroditsky in her experiment (“June comes before August”) would not be retrieved by a search of this type. Therefore, the results of any internet search depend to a large extent on the particular search criteria that were used.

### 3.6.2.5 Internet Search for Spatiotemporal Terms in Mandarin

Table 6 shows the results of a Google News China and Google News Taiwan search for the same terms that Chen used. Quotation marks were not included around the terms. Each search looked for one of the temporal terms (day, week, month, season, year) in conjunction with one of the spatial terms (above, below, before, after). Twenty searches were carried out in total. The test was carried out on the eighteenth of September, 2007. The figures for each result are given as a percentage of the overall number of results obtained. The figures from Google News China are given in red, while the figures from Google News Taiwan are given in green.

<table>
<thead>
<tr>
<th></th>
<th>qiàn 前</th>
<th>hòu 後</th>
<th>Sum of H</th>
<th>shàng 上</th>
<th>xià 下</th>
<th>Sum of V</th>
</tr>
</thead>
<tbody>
<tr>
<td>rì 日</td>
<td>42 44</td>
<td>0 4.89</td>
<td>42 48.89</td>
<td>1.18 0.63</td>
<td>0.52 0.47</td>
<td>1.7 1.1</td>
</tr>
<tr>
<td>zhou 邱</td>
<td>0 0.03</td>
<td>0 0.13</td>
<td>0 0.16</td>
<td>0 0.04</td>
<td>0 0.03</td>
<td>0 0.07</td>
</tr>
<tr>
<td>yuè 月</td>
<td>2.85 3.97</td>
<td>0 2.08</td>
<td>2.85 6.05</td>
<td>0.43 0.37</td>
<td>0.24 0.27</td>
<td>0.67 0.64</td>
</tr>
<tr>
<td>shì 季</td>
<td>0.33 0.36</td>
<td>0 1.13</td>
<td>0.33 1.49</td>
<td>0 0.02</td>
<td>0 0.04</td>
<td>0 0.06</td>
</tr>
<tr>
<td>nián 年</td>
<td>41 25.2</td>
<td>0 9.9</td>
<td>41 35.1</td>
<td>7.26 4.87</td>
<td>2.77 1.44</td>
<td>10.03 6.31</td>
</tr>
</tbody>
</table>

Table 6. Results of internet search for Mandarin spatiotemporal terms
One might expect that the two news sources would provide similar results, but this was not the case. Chen used Google News Taiwan in her study, but Google News China offered a different set of results. The divergence is not related completely to the size of the sources. There is a larger pool of Chinese resources than Taiwanese resources, but the results of both sources illustrate the inconsistency of a test like this.

The overall results show that these temporal terms were found more in conjunction with the horizontal spatial terms than with the vertical terms, which was what Chen proposed (Chen 2007). However, deeper analysis of the results weakens this claim. This claim is based entirely on the figures for ‘qiàn’ (front) in the results, while the figures for ‘hòu’ (back) were minimal and lower than the figures for the vertical spatial terms. According to the partial results of Google News China for the spatial terms ‘xià’ (down) and ‘hòu’ (back), ‘xià’ was found more frequently in conjunction with the temporal words than ‘hòu’. In contrast, the result from Google News Taiwan was the reverse. Both sources found ‘qiàn’ (front/before) more frequently than ‘shàng’ (up) in conjunction with the temporal terms, except for the case of the word ‘zhòu’ (week).

The difficulty with these results is that they can be analysed in a number of ways and offer little in definitive information. According to the results of Google News China, one might surmise that a Mandarin speaker thinks about the past horizontally, but thinks about the future vertically. One might also deduce from these results that Mandarin speakers talk about days and years far more frequently than they talk about weeks, months and seasons, although this cannot be the case. As Kilgarriff & Grefenstette suggested, the results of a test like this are not definitive (Kilgarriff & Grefenstette 2003).

The results of this test neither prove nor disprove Chen’s argument that horizontal spatial terms are used more frequently than vertical spatial terms in talking about time in Mandarin. Chen argued that Boroditsky carried out her research on the basis of an assumption that she did not verify.

She [Boroditsky] assumed implicitly that Chinese speakers used the vertical metaphors far more frequently than the horizontal metaphors when expressing time. The assumption was evident in the way she analyzed and described the data. […] Unfortunately, she never tested that assumption. (Chen 2006: 2).

However, even if Boroditsky made a premature assumption about the frequency of vertical spatiotemporal terms in Mandarin, it would not explain how she arrived at the results of her experiments and found evidence that Mandarin speakers responded to temporal tasks more quickly after vertical primes, while English speakers responded more quickly after
horizontal primes. If vertical spatial terms are not used more commonly than horizontal spatial terms to talk about time in Mandarin, it is not clear why Mandarin speakers should exhibit a vertical bias in their conceptualisation of time. However, through her subsequent experiments involving training English speakers to use alternative spatiotemporal terms, Boroditsky showed that the effects observed in the experiment were caused by linguistic factors (Boroditsky 2001: 17-18).

Chapter 4 describes a replication of Boroditsky’s findings and a subsequent experiment involving animated spatial primes. Both experiments provide support for Boroditsky’s findings and conclude that English speakers exhibit a horizontal bias and Mandarin speakers exhibit a vertical bias in thinking about time.

### 3.7 Conclusion

The aim of Chapter 3 was to give a thorough account of the ways that different languages describe the concept of time. The concept of time was selected as a focal point for the thesis as it varies across different languages, despite the fact that it is a concept of universal relevance.

Chapter 3 described how languages import vocabulary from concrete domains into abstract domains. Since there is less sensory information to support the understanding of abstract concepts, people talk about abstract things in terms of concrete things. The role of metaphor in enabling people to understand one thing in terms of another thing was examined. Time is universally described in terms of space (Boroditsky 2000).

The ways that time is treated in Aymara, English and Mandarin were described. It has been shown from an analysis of data from Aymara speech and gesture that speakers of the language visualise the future as in front of them and the past as behind them (Núñez & Sweetser 2006).

English and Mandarin exhibit further differences in the description of time. English uses a system of horizontal spatial metaphors, such as ‘before’ and ‘after’, to talk about time, while Mandarin uses both horizontal and vertical spatial metaphors (Boroditsky 2001). Research analysing the effects of spatial metaphors on groups of English and Mandarin speakers’ conceptualisations of time has provided contradictory evidence (Boroditsky 2001; Chen 2006). Boroditsky found that English speakers perceived time as moving in a horizontal direction and that Mandarin speakers perceive time as moving in a vertical direction as a consequence of the spatial metaphors used by their respective native
languages to talk about time. In contrast, Chen tried and failed to replicate Boroditsky’s findings. Chapter 3 described both sets of research and assessed their importance to the principle of linguistic relativity. Chapter 4 describes an experiment that attempts to replicate the findings of Boroditsky and a second experiment that uses an alternative method of priming the participants.
Chapter Four

Empirical Investigation into the Association between Native Language and the Conceptualisation of Time
4.1 Introduction

Chen (2007) failed to replicate the findings of Boroditsky (2001). This chapter describes, firstly, a replication of Boroditsky’s experiment, and secondly, an altered experiment involving a set of animated spatial primes. Both of the experiments find support for Boroditsky’s findings, with the conclusion that English speakers portray a horizontal bias and Mandarin speakers a vertical bias in performing temporal tasks.

The experiments serve a dual purpose. On the one hand, they examine whether spatial primes have an influence on a language user’s conceptualisation of time, since the abstract concept of time is described in terms of the concrete concept of space. Furthermore, the experiments analyse whether speakers of languages that use different means of spatial descriptions have a different conceptualisation of the abstract concept of time.

4.2 EXPERIMENT 1

4.2.1 Aims

Experiment 1 sets out to test the results obtained by Boroditsky (2001) and by Chen (2007). It uses exactly the same method as those two experiments, with the goal of analysing the effects of horizontal and vertical spatial metaphors on people’s conceptualisation of time.

4.2.2 Method

Participants

12 native English speakers and 10 native Mandarin speakers participated in the experiment. The participants ranged in age from 19 to 65 and came from a variety of backgrounds. Some of them were postgraduate students with respective backgrounds in computer science and in the humanities, while others were in full-time employment in a
variety of areas. Mandarin was the sole language of the Mandarin speakers until at least the age of 10 years, with the onset of English acquisition coming at a mean age of 11.2 years. Participants were not informed about the purpose of the experiment and were aware only that it was part of a study for a Masters degree in linguistics.

Design

Participants observed spatial prime pictures which were accompanied by a descriptive statement, and then answered a question about time. The primes depicted either a horizontal (see Figure 10) or a vertical scenario (see Figure 11). The targets were statements about time, in the form of ‘earlier than’ and ‘later than’ statements (e.g., “December comes later than November”).

The entire experiment was conducted online. Each participant was able to undertake it at their own computer. Each participant completed twenty experimental trials. An experimental trial consisted of two spatial primes (both were horizontal or both were vertical) followed by one target question about time. Of the descriptive statements that accompanied the two spatial primes in each experimental trial one was true (see Figure 10) and one was false (see Figure 11). The order in which the two spatial primes appeared was randomised. Participants moved on to the target question by selecting the option with their mouse when they were ready. The target question was either true or false. There were twelve true temporal statements among the target questions and eight false ones. All of them involved the order of the months of the calendar year. Participants selected either true or false as their response to a temporal statement and were timed in doing so. A time limit of ten seconds was in place for each response. Participants answered each target question twice – once after a horizontal prime and once after a vertical prime.

Materials

A set of 40 primes and 20 targets, all true/false questions, was prepared.

Primes: Forty spatial scenarios were used as primes. Each scenario consisted of a picture and an accompanying descriptive sentence. Half of these primes gave accounts of horizontal spatial relations (see Figure 10), while the other half gave accounts of vertical spatial relations (see Figure 11). Each experimental trial contained one prime with a true descriptive statement and one prime with a false descriptive statement. The order of the
two primes before each target question was randomised. The left/right and up/down orientations of the horizontal and the vertical primes were balanced equally.

Targets: Ten statements regarding the order of the months of the year were prepared. Each of them used the purely temporal terms ‘earlier than’ and ‘later than’ (e.g. “December comes later than November”). Earlier and later statements were used equally often. Six of the temporal statements were true and four were false. Each of them was used twice – once after either type of prime. The full sets of primes and targets that were used are provided in Appendix 1.

Procedure

Participants performed the experiment individually on a computer. The experiment was conducted entirely in English. Participants viewed the spatial primes and then moved on to the next page in their own time by selecting the option on the screen. After two spatial primes participants were presented with a temporal statement, which demanded a true or false answer. They responded true or false as quickly as possible (and within an x second deadline) by selecting one of the options by use of a mouse. The positions of the true and false options were randomised for each experimental trial. Response times were measured to an accuracy of milliseconds and recorded by the experiment system. Participants did not receive any feedback for their performance in the experiment.

The blue car is going to win the race.

Figure 10. Sample horizontal spatial prime with a true descriptive statement
The red balloon is below the blue balloon.

Figure 11. Sample vertical spatial prime with a false descriptive statement

4.2.3 Results

English speakers responded faster to temporal questions after horizontal spatial primes than after vertical spatial primes. This confirms the hypothesis that people make use of spatial knowledge to process spatiotemporal metaphors used to talk about time. Mandarin speakers were faster in their responses after vertical spatial primes.

The results for English speakers were the ones predicted. Due to the dominance of horizontal spatial metaphors, such as ‘before’ and ‘after’, to talk about time in English, it was expected that the English speakers would respond to temporal questions more quickly after horizontal spatial primes than after vertical spatial primes.

Only correct responses and responses given within the ten second time limit were included in the analysis. In total, 15% of the responses were discarded. The overall error rate was 5.3%, while 10% of the responses exceeded the time limit. The responses that were discarded differed by both native language and by the type of prime. 11.43% of English speakers’ responses were omitted and 21% of Mandarin speakers’ responses were omitted, while 10.53% of responses after a horizontal prime were omitted and 19.47% of responses after a vertical prime were omitted. Table 7 below shows the quantity of responses that were discarded for having incorrect answers and for exceeding the time limit.
Table 7. Exclusion rates in Experiment 1

Table: Exclusion rates in Experiment 1

<table>
<thead>
<tr>
<th></th>
<th>Excl Horiz %</th>
<th>Excl Vert %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total</td>
<td>10.53</td>
<td>19.47</td>
</tr>
<tr>
<td>ENG</td>
<td>11.43</td>
<td>12.7</td>
</tr>
<tr>
<td>MAND</td>
<td>21</td>
<td>27</td>
</tr>
</tbody>
</table>

Figure 12. Response times for English and Mandarin speakers in Experiment 1

**English Speakers**

English speakers responded to temporal tasks more quickly after horizontal spatial primes than after vertical spatial primes. They took on average 4.356 seconds to respond to a temporal question after a horizontal prime and 4.822 seconds after a vertical prime. This means that their responses were 466 milliseconds faster after horizontal primes.

**Mandarin Speakers**

The response times of the Mandarin speakers were more even after either type of prime than the English speakers’ responses. However, they were slightly faster after vertical spatial primes. The Mandarin speakers took on average 5.572 seconds to respond
to a temporal task after a horizontal spatial prime and 5.449 seconds after a vertical spatial prime. On average, they were 123 milliseconds faster after vertical spatial primes.

Comparison of English and Mandarin Speakers’ Response Times

Figure 12 shows the comparison of the response times for both English and Mandarin speakers. Overall, taking both types of primes into account, English speakers responded significantly more quickly than Mandarin speakers (4531 and 5663ms respectively). Mandarin speakers had higher error rates and exceeded the allotted time more frequently than English speakers. English speakers responded more quickly after horizontal spatial primes, while Mandarin speakers responded more quickly after vertical spatial primes.

4.2.4 Discussion of Experiment 1

Due to the prevalence of horizontal spatial metaphors to talk about time in English, participants were able to respond more quickly to a temporal question following a horizontal prime, since the prime matched the direction in which they made temporal evaluations. The findings support the notion that spatial knowledge plays a role in the processing of spatiotemporal information. According to these results, English speakers are inclined to think about time horizontally.

In contrast to the English speakers, the Mandarin speakers responded to temporal tasks more quickly following a vertical spatial prime. The difference between the Mandarin speakers’ responses after either set of spatial primes was less than the difference observed for the English speakers. The reason for this could be that the spatial metaphors that Mandarin uses to talk about time are not dominated by either system of directional metaphors in the way that horizontal spatial metaphors are dominant in English. Mandarin has a wide range of both horizontal and vertical spatial metaphors to discuss time, and the results for the Mandarin speakers were more even than the English speakers. However, a smaller vertical bias was observed.

For all of the Mandarin speakers English was their second language, and hence it was expected that their overall responses would be slower than the English speakers’ responses, since the experiment was conducted entirely in English. Moreover, it was also expected that the Mandarin speakers’ error rates would be slightly higher.
There was, however, an imbalance in the exclusion rates observed in Experiment 1. The error rates and the number of responses that exceeded the allotted time limit were higher for questions following vertical spatial primes than for questions following horizontal spatial primes. 19.47% of responses were excluded after vertical primes, while only 10.53% of responses were excluded after horizontal primes. This was the case for both English and Mandarin speakers, although the effect was more noticeable among the Mandarin speakers. The number of errors produced after vertical primes and the number of responses that exceeded the time limit after vertical primes were almost double the number for horizontal primes.

The reason for this may be linked to the design of the experiment. The experiment was carried out online, and due to the roughly rectangular shape of a standard computer monitor there was more space for horizontal primes to be displayed than for vertical primes. On computers with small screens or with low resolutions participants may have found it necessary to scroll up the page after some of the vertical primes in order to proceed to the next page and answer the target question. This was not the case for any of the questions following horizontal primes. Consequently, some of the participants would have required slightly more time to respond to a target question after a vertical prime. This may be the cause of them “timing out” more often for questions following vertical primes than questions following horizontal primes.

In addition to a higher rate of time outs on questions following vertical primes, the error rates were also higher for questions that followed vertical primes than for questions that followed horizontal primes. It is possible that being required to scroll up the screen before answering the question affected the participants’ concentration and caused them to give an incorrect answer. This is the most likely explanation, as many of the incorrect replies coincided with replies that timed out. Moreover, since the Mandarin speakers’ response times for valid answers were faster after vertical primes than after horizontal primes it is an unexpected result that they should have exceeded the time limit more frequently after vertical primes than after horizontal primes. Furthermore, the higher exclusion rates after vertical primes were a feature of the results of both the English and the Mandarin speakers, so it can be concluded that this was not brought about by linguistic factors.

Experiment 2 examines the influence of the size of the participants’ computer screens, by using a set of primes that require less space on the screen. They are formed not from static images, but from brief animations that depict “confounded motion” in
horizontal and vertical directions. The experiment also investigates whether animated primes will have a different effect on response times to static primes.

### 4.3 EXPERIMENT 2

#### 4.3.1 Aims

Experiment 2 uses an alternative method of priming the participants for a spatial relation. Instead of the static primes that were used in Experiment 1, Experiment 2 uses a set of animated primes. Each of the primes depicts either horizontal or vertical motion. In each of them the motion is confounded. They depict scenarios where the motion goes in an unnatural direction. For example, the vertical animated primes depict objects falling upwards, while the horizontal animated primes contain scrolling English sentences, which traverse the screen from left to right in a mirror image form. The aim of Experiment 2 is to examine whether this method of priming spatial relations will have a different or similar effect to the static primes used in Experiment 1.

Additionally, Experiment 1 supported Boroditsky’s findings (Boroditsky 2001) and contradicted Chen’s (Chen 2007). All of these experiments used the same method of priming the participants for a spatial relation. Due to the contrasting results of the three experiments, it is important to study how an alternative method of priming might affect people’s responses.

#### 4.3.2 Method

*Participants*

12 native English speakers and 10 native Mandarin speakers participated in the experiment. The participants ranged in age from 19 to 39 and came from a variety of backgrounds. Some of them were postgraduate students with respective backgrounds in computer science and in the humanities, while others were in full-time employment in a variety of areas. Mandarin was the sole language of all of the Mandarin speakers until at least the age of 10 years, with the onset of English acquisition coming at a mean age of
11.2 years. Participants were not informed about the purpose of the experiment and were aware only that it was part of a study for a Masters degree in linguistics.

**Design**

As with Experiment 1, participants observed spatial primes accompanied by a descriptive statement, and then answered a temporal question. This time the primes depicted either a horizontal (see Figure 13) or a vertical scenario (see Figure 14) by means of a short animation. The targets were statements about time, in the form of ‘earlier than’ and ‘later than’ statements (e.g., “August comes earlier than October”). Each participant completed ten experimental trials. An experimental trial consisted of two spatial primes (both were horizontal or both were vertical) followed by one target question about time. The layout of the experiment corresponded exactly to that of Experiment 1.

**Materials**

A set of 20 primes and 10 targets, all true/false questions, was prepared.

Primes: Twenty spatial scenarios were used as primes. Each scenario consisted of a brief animation depicting either horizontal or vertical motion, as well as an accompanying descriptive sentence. Each experimental trial contained one prime with a true descriptive statement and one prime with a false descriptive statement. The order of the two primes before each target question was randomised. Each animated prime displayed an event out of its “natural order”. For example, some of the vertical primes consisted of an apple falling upwards from the ground into a tree, a cyclist falling upwards to the top of a cliff and a football travelling upwards through a waterfall. Some of the horizontal primes consisted of a number of sentences moving across the screen in the “wrong direction”. In English, where text is written from left to right, text that moves along a screen should move from right to left, so that the beginning of the sentence can be read first. The horizontal animated primes moved from left to right across the screen, displaying a sentence in a “mirror image”, where the beginning of the sentence still appeared first. The sentences that were used were all pangrams\(^\text{10}\), whose meanings were not relevant to the purposes of the experiment. The descriptive statements that accompanied the horizontal primes were not of the true and false variety of the vertical primes and all of the primes of

\(^{10}\) A pangram sentence is one that contains every letter of the alphabet, e.g. “Jinxed wizards pluck ivy from the big quilt.”
Experiment 1. Instead, they consisted of a cryptic remark that attempted to draw attention to the sentence. All of the animated primes gave examples of motion in an unnatural or unexpected direction.

Targets: Five statements regarding the order of the months of the year were constructed. Each of them used the purely temporal terms ‘earlier than’ and ‘later than’ (e.g. “April comes earlier than December”). Earlier and later statements were used equally often. Three of the temporal statements were true and two were false. Each of them was used twice – once after either type of prime. The full sets of primes and targets are provided in Appendix 2.

Procedure

Each participant undertook the experiment individually and online. Again the experiment was conducted entirely in English. The procedure was exactly the same as for Experiment 1.

4.3.3 Results

English speakers responded to temporal tasks more quickly after horizontal primes, while Mandarin speakers responded more quickly after vertical primes.
As with Experiment 1, only correct responses and those within the ten second time limit were taken into account. 5% of the overall responses were discarded. There was no significant difference between either native language (4.62% and 6.25% for English and Mandarin respectively) or the type of prime in the exclusion rates. The error rates and number of responses over the time limit both stood at 2.65%. The full exclusion rates are shown in Table 8 below.

<table>
<thead>
<tr>
<th>Error Rates %</th>
<th>Errors Horiz %</th>
<th>Errors Vert %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total</td>
<td>2.65</td>
<td>2.35</td>
</tr>
<tr>
<td>ENG</td>
<td>1.54</td>
<td>0.77</td>
</tr>
<tr>
<td>MAND</td>
<td>6.25</td>
<td>7.5</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Exceeded Time %</th>
<th>Time Horiz</th>
<th>Time Vert</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total</td>
<td>2.65</td>
<td>3.52</td>
</tr>
<tr>
<td>ENG</td>
<td>3.46</td>
<td>4.62</td>
</tr>
<tr>
<td>MAND</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Total Excl Rate %</th>
<th>Excl Horiz %</th>
<th>Excl Vert %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total</td>
<td>5</td>
<td>5.88</td>
</tr>
<tr>
<td>ENG</td>
<td>4.62</td>
<td>5.38</td>
</tr>
<tr>
<td>MAND</td>
<td>6.25</td>
<td>7.5</td>
</tr>
</tbody>
</table>

Table 8. Exclusion rates in Experiment 2

Figure 15. Response times for English and Mandarin speakers in Experiment 2

**English Speakers**

The results of the English speakers were similar to those observed in Experiment 1. English speakers were faster after horizontal primes (4.114 seconds) than after vertical primes (4.294 seconds). The difference was 180 milliseconds.
Mandarin Speakers

The Mandarin speakers were faster after vertical primes (4.262 seconds) than after horizontal primes (4.668 seconds). The difference was 406 milliseconds.

Comparison of English and Mandarin Speakers’ Response Times

Overall, the response times of the English speakers were faster, which is to be expected, since the experiment was conducted entirely in English. The error rates and number of excluded responses were not significantly different between the two groups in Experiment 2. English speakers responded 180ms faster after horizontal primes, while Mandarin speakers responded 406ms faster after vertical primes.

4.3.4 Discussion of Experiment 2

Experiment 2 used animated primes, while Experiment 1 used static primes. This had an impact on the results of both groups of speakers. The animated primes appeared to have an accelerated effect on the speakers’ responses. English speakers were again faster after horizontal primes than after vertical primes, but their overall response times were faster in Experiment 2 (4206ms) than in Experiment 1 (4531ms). Similarly, Mandarin speakers’ overall response times were lower in Experiment 2 (4482ms) than in Experiment 1 (5663ms).

Error rates and responses exceeding the time limit were significantly lower in Experiment 2 (5%) than in Experiment 1 (15%). This confirms that the responses to some of the target questions following vertical primes in Experiment 1 were affected by the size of the participants’ computer screens (cf. section 4.2.4). However, this was not the case for either type of prime in Experiment 2, as the animated primes required less space in order to portray motion in either direction.

Experiment 2 supports the idea that spatial metaphors influence a person’s conceptualisation of time. English has a “horizontal bias” in the spatial metaphors that it uses to talk about time, and the results of the English speakers support this. Mandarin uses both horizontal and vertical spatial metaphors to talk about time, but Experiment 2 shows that Mandarin speakers responded more quickly after vertical spatial primes, which verifies the data obtained by Boroditsky (Boroditsky 2001). This study provides support for the
theory that English speakers think about time horizontally, while Mandarin speakers think about time vertically.

4.4 Comparison of Experiments 1 & 2 with Boroditsky’s and Chen’s Experiments

The results of the English speakers in Experiments 1 and 2 replicated the results obtained by Boroditsky (Boroditsky 2001). The English speakers were significantly faster in their responses to temporal tasks after horizontal spatial primes in both experiments. In contrast, Chen’s results did not find any such difference among English speakers (Chen 2007). The results for the Mandarin speakers from both experiments also replicated Boroditsky’s results. Mandarin speakers responded to temporal tasks more quickly after vertical spatial primes. Again, these results contradicted Chen’s findings.

Due to the contrast in the results of these three sets of experiments, it was important to examine the effect of a different method of priming on people’s responses. Experiment 1, as well as the experiments undertaken by Boroditsky and Chen, used a set of static primes, displaying either a horizontal or a vertical spatial relation. Experiment 2, on the other hand, investigated the effect of a set of animated primes.

One difference between Chen’s experiment and that of Boroditsky and the two experiments described here is that Chen used target questions containing days, seasons and years, in addition to months, which were used both here and by Boroditsky. However, it is unlikely that there could be a difference between the way that the order of the months of year is conceptualised and the way that the order of other temporal events likes days, seasons and years is conceptualised. Furthermore, Chen’s individual results for the ordering of months were not in accord with the results obtained here. Chen’s results also varied from a horizontal bias among Mandarin speakers for questions containing the words ‘earlier’ and ‘later’ to a vertical bias for questions containing the horizontal spatial words ‘before’ and ‘after’, which was not the expected result. Furthermore, English speakers did not exhibit a horizontal bias in Chen's findings.

While Chen’s findings did not concur, the results of Experiments 1 and 2 were in accord with the findings of Boroditsky. They support the idea that English speakers and Mandarin speakers think about time differently due to the way that time is described in their native languages. The fact that Mandarin speakers exhibited a vertical bias even when
thinking about time in a non-native language strengthens the claim about the role of language in influencing the conceptualisation of abstract concepts.
Chapter Five

Negation
5.1 Introduction

The concept of negation is universal. Every community of language speakers in the world has the need to negate a proposition or to deny that a proposition is true (Horn 1989). If one can declare that “it is raining”, then one should equally be able to declare that “it is not raining”.

Many studies of negation have concerned themselves with comparing the ways that people process negated and affirmative propositions (Klima 1964; Wason 1959; 1965; Horn 1989). Chapter 5 first discusses the nature of negation and then examines the ways that negation is formed differently in different languages. These cross-linguistic differences are discussed with relation to the principle of linguistic relativity. Chapter 6 investigates and finds support for the idea that different systems of negation lead to different interpretations of negative information.

5.2. The Cost of Expressing Negative Information

The following pair of sentences illustrates the difference in expressing affirmative and negative information.

(1) a. It is raining
    b. It is not raining

The difference between the two English sentences in (1) is one single word, ‘not’, which inverts or negates the meaning of the sentence. This basic example illustrates not only how negation is constructed in English, but how it relates to affirmative sentences in all languages. In every language, negation requires a linguistic marker, while affirmation does not (Horn 1989).

The linguistic marker that causes negation is usually an n-word, such as ‘not’, ‘no’, ‘ne’, ‘non’, ‘nicht’, ‘ni’ or ‘не’ (ne) in various languages. Negation can be formed in adjectives by means of an affix, such as in-, im- or un-. It is interesting to note that while many adjectives with an inherently positive meaning can be ‘negated’ with such an affix, inherently negative adjectives are rarely converted to positive ones (Horn 1989). Examples of the former include happy/unhappy, friendly/unfriendly, kind/unkind and
honest/dishonest. In contrast, adjectives such as sad/*unsad, crafty/*uncrafty and stupid/*unstupid cannot have their meaning altered with an affix. A couple of exceptions to this rule are ‘unperturbed’ and ‘unconcerned’, which have positive meanings and are formed from words with more negative meanings. However, examples like this are in the extreme minority. These examples, together with the formation of negation by the word ‘not’, show that languages have a natural preference for affirmative information over negative information. Horn commented that no language has ever been documented where this trend was not observed. In every language, affirmation does not require a linguistic marker, while negation does (Horn 1989).

It appears that truth is more salient than falsity, and consequently affirmative statements are more salient than negative ones. Horn added that “this formal pattern is reflected even within the austere confines of mathematical and logical symbolism” (Horn 1989: 156). Negative numbers must be designated as being negative (-12), while positives do not require an overt marking (either 12 or +12). Linguistic markers are also used to designate things other than negation.11

5.3 The Contents of Negated Propositions

Further to being more difficult to process than affirmative statements, negative statements, generally speaking, also provide less information. Sentence (1a) succinctly informs the interlocutor what they should expect to see if they take a look outside. However, (1b) leaves the interlocutor less well prepared than (1a). (1b) may be just as felicitous as (1a), but it provides the interlocutor with less information. (1b) only informs the interlocutor what not to expect and does not inform them what they should expect. According to (1b), it may be snowing, hailing, be very windy, sunny, cloudy, or it may be dark outside. Affirmative statements provide more information than negative statements (Horn 1989). The following pair of sentences further illustrates this.

11 Linguistic markers are used to express things other than negation. With negation they can be seen to express deviations from a norm, where an expression has an affirmative meaning in the absence of any negative components. Linguistic markers also express gender as a deviation from an accepted norm, as in lion/lioness, duke/duchess, prince/princess and even man/woman. This happens in many languages other than English. In German for example the word for ‘queen’ is ‘Königin’, coming from ‘König’ (king). The –in suffix is a common designation of feminine gender in German and is used in many cases where English does not specify gender, such as Präsident(in) (president), Student(in) (student) and Freund(in) (friend). Diminutives are also commonly expressed by linguistic markers, such as river/rivulet. This is also common in Irish – bóthar/bóreen (road/small road), rón/rónán (seal/little seal), in German – Kind/Kindchen (child/little child), Haus/Häusle (house/small house), in Italian – momento/momentino (moment/short moment), libro/libretto (book/little book), and in Russian, where there is a diminutive form for most names and nouns – вода/водичка (water/little water), мама/мамочка (mum/mummy).
(2) a. The capital of Ecuador is not Copenhagen
b. The longest river in the world is the Nile

The first sentence tells the reader only that a particular city is not the capital city of Ecuador, but the reader is little closer to finding out what its capital city is. The second sentence informs the reader of the longest river in the world, clearly providing them with more information than the first sentence. While the function of affirmative statements is to provide information, the function of negative statements is to deny the truth of a proposition (Wason 1959; Horn 1989). In doing this, they necessarily provide less information than affirmative statements. There are a few exceptions to this rule, depicted in the following sentences.

(3) a. The referee is breathing.
b. The referee is not breathing.
c. In spite of the savage attack the referee is breathing.

(4) a. The 2007 General Election will be held.
b. The 2007 General Election will not be held.
c. In spite of major unrest the 2007 General Election will be held.

(3a) and (4a) are meaningless sentences that offer little in valuable information. The reason for this is that they simply reaffirm a fact that one already assumes to be true. In contrast, (3b) and (4b) provide more valuable information as they deny the truth of an expected fact. (3c) and (4c) provide a special context in which the sentences are reasonable ones, by adding a background against which they need to be reaffirmed. Affirmative propositions state a fact, and negated propositions deny a fact, and in general, negated propositions offer less information than affirmative ones.

5.4 Processing Negated Propositions

Since negative phrases and sentences contain an additional linguistic marker that affirmative ones do not, it follows that affirmatives should be easier to process than negatives. Just & Carpenter remarked that the fact that “affirmatives are unmarked and negatives are linguistically marked is completely correlated with the finding in this study and previous studies that affirmatives are psychologically less complex than negatives” (Just & Carpenter 1971: 248–49). There is a significant amount of empirical evidence that
shows that people require more time to process negated statements than affirmative ones (Wason & Jones 1963; Horn 1989; Hasson & Glucksberg 2006).

The reason why people require more time to process negated propositions is that they first consider the affirmative form of the proposition (Wason 1959; Just & Carpenter 1981; Horn 1989; Hasson & Glucksberg 2006). Hasson & Glucksberg remarked that “negation is a linguistic device that can prompt consideration of alternative possibilities” (Hasson & Glucksberg 2006: 14). Negated propositions are less economic than affirmative ones in terms of the effort of processing, as there is a second double layer involved in deciphering them. The following sentence, for example, must first be processed as an affirmative statement before the negation can be taken into account.

(5)  

a. The house is not made of bricks and mortar  
b. The house is made of bricks and mortar

Research has shown that in order to process a sentence like (5a), people first consider (5b) (Horn 1989), since the function of (5a) is to deny the truth of (5b). One cannot accept the denial of a proposition without first considering its validity.

Negation works best when it denies the truth of a viable proposition. For instance, sentences (3b), (4b) and (5a) deny the truth of a fact that one might have expected to be true. However, when an improbable fact is denied the negated proposition takes longer to process. Consider the following example.

(6)  

a. The house is not made of shoes and jam  
b. The house is made of shoes and jam

Wason & Jones showed that a proposition like (6a) takes consistently longer for people to process than a negated proposition like (5a) (Wason & Jones 1963). In order for a proposition to be negated, it should state a plausible fact. That is, it must first be believed in order to be disbelieved, or denied. (6b) is difficult to imagine, and thus when it is negated it takes longer to process.

5.5 Plausibility of Denial

Wason & Jones called this the “plausibility of denial” (Wason & Jones 1963). The function of negation is to deny the truth of a plausible scenario, and there is little need to suppress a thought that would not arise. Consider the following examples.
Wason examined the processing times required to understand the above sentences (Wason 1959; 1961). As expected, the affirmative sentences (8a & 8b) took less long to verify than the negated sentences. Subjects were more quickly and more accurately able to label true affirmative (TA) sentences as true and false affirmative (FA) sentences as false, than they were for the corresponding negated sentences. However, subjects also consistently required more time to process true negative (TN) sentences than false negative (FN) sentences. Of the four types of sentences used in the study, true negative sentences (8d) took the longest for subjects to verify. The subjects were able to verify the falsity expressed in (8c) more quickly than the truth expressed in (8d). As noted above, people process negated propositions by first viewing them as affirmative ones and then applying the negation. When the word ‘not’ is removed from (8c), the sentence “7 is an odd number” remains. Subjects can quickly verify this (Wason & Jones 1963). Then the negation is applied and the subjects can conclude that (8c) expresses a falsity. In contrast, when ‘not’ is removed from (8d), the sentence “7 is an even number” remains. People required more time to assess the validity of this statement, because it is false (Wason & Jones 1963). When it is decided that the statement is false, the negation is returned, and the falsity is denied. Affirmative statements take less long to process than negated statements to process, while the denial of a falsity takes longer to process than the denial of a truth. The processing times required for the four types of sentences are summarised as follows.

(9) \[ \text{TA} < \text{FA} < \text{FN} < \text{TN} \]

While the denial of a falsity is the most complex type of denial, the process can be eased by the presence of a “context of denial” (Wason & Jones 1963). Consider the following sentence.

(10) 6 is an even number, but 7 is not an even number.

If there is a context against which a person can compare the sentence, then they are able to process it more quickly.
Feet and sandwiches may be, but the house is not, made of shoes and jam.

Processing (6a) can also be eased by creating a context of denial.\textsuperscript{12}

\section*{5.6 The Exceptionality Hypothesis}

Wason declared that “negation is most natural when it is associated with a dissimilar item” (Wason 1965). Take the following illustration as an example.

\begin{figure}[h]
\centering
\includegraphics[width=0.5\textwidth]{figure16}
\caption{The Exceptionality Hypothesis}
\end{figure}

Seven of the eight circles are red, with the one remaining circle being blue. Given a selection of sentences relating to the array of circles, some are processed more economically than others. Statements like “circle 4 is red” and “circle 7 is blue” are easy to validate. A negated sentence about the exceptional case, “circle 7 is not red”, is also easily validated. However, negated statements about the unexceptional cases take more time to process. For example, “circle 4 is not blue” takes people more time to validate than the previous sentences (Wason 1965). The explanation is one of mathematical probability. Since seven of the eight circles are red, the probability that any individual circle is red is high. Subsequently, a statement that denies the redness of a circle is an informative one. In contrast, the likelihood of a circle being blue is quite low (just one in eight). For this reason, a statement that denies the blueness of a circle is less informative. If it is known that only one of the eight circles is blue, but it is not known which one, a sentence like “circle 4 is not blue” tells little and still leaves seven options as to where the blue circle is. As noted earlier, negated propositions offer less information than affirmative propositions, and for this reason negation functions best when it is associated with a dissimilar or \emph{exceptional} item, for it is there that negation provides more informative statements.

\textsuperscript{12} Although feet are not “made of” shoes, the relation between them still reduces the cost of processing the sentence.
5.7 Double Negation and Negative Concord: Cross-Linguistic Contrast

Negation is a linguistic universal, and even young children are “aware of the social, pragmatic conditions for negation” (Pea 1980: 33). This was proven using a series of tests similar to the red and blue circles in Figure 16. Pea used pictures of cars and bottles with a group of children between the ages of two and a half and four and a half years. The study proved that the children were aware of the differences in meaning between negative and affirmative statements (Pea 1980).

While negation is a linguistic universal, languages form negated constructions in different ways. All languages use a form of linguistic marking to form negation, while affirmative propositions do not require any overt marking (cf. section 5.2). However, van der Wouden & Zwarts remarked that “it is not uncommon in natural languages that negation seems to behave in an illogical manner” (van der Wouden & Zwarts 1992: 1).

5.7.1 Double Negation

Van der Wouden & Zwarts meant that negation in natural language does not always behave in a manner adhering to the laws of logic, namely that two values of false should equate to a value of true. In mathematics -7 times -5 equals (+)35, and similarly, in Standard English and Standard German two negatives lead to a positive as is shown in (12a) and (12b)\(^{13}\). However, in many languages of the world this is not the case (Brown 1999).

\[(12)\]
\[
\begin{align*}
\text{a.} & \quad \text{I do not see no mailbox on the street (Standard English)} \\
& \quad \text{I see a mailbox (at least one) on the street} \\
\text{b.} & \quad \text{Ich sehe nicht keinen Briefkasten auf der Straße (Standard German)} \\
& \quad \text{I see not no mailbox on the street} \\
& \quad \text{‘I see a mailbox (at least one) on the street’}
\end{align*}
\]

The two negative components in the sentence have a cancelling effect on one another, resulting in an affirmative meaning. This process is known as Double Negation (DN) (Jespersen 1917; Klima 1964; Horn 1989). In many non-standard dialects of English

\(^{13}\) The first translation of the German sentence in (12b) is a literal translation, and the second translation is the equivalent English sentence.
this sentence would maintain a negative reading (Labov 1979). This is discussed in more
detail later in this chapter. In German, like in English, the above sentence results in double
negation, and thus in an affirmative meaning. This is also the case in all other Germanic
languages, except for Afrikaans, and in limited circumstances, the West Flemish dialect
(Haegeman & Zanuttini 1996; Brown 1999). In languages that employ double negation
there can only be one negative component in a sentence in order to achieve a negated
meaning. In English this may be the negative particle ‘not’ (alternatively in the form of
n’t), an affix attached to an adjective, or one of a number of negative pronouns, including

**It is not common in Standard English and Standard German for a sentence to**
**contain more than one negative component,** although the sentence in (12a) would be a
valid one colloquially in certain dialects of English. Sentences with two negative
components are often meant in an ironic sense in English, and this may be implied by the
tone of voice. Double negation is most frequently avoided in Standard English and
Standard German.

Although sentences with double negation result in an affirmative meaning, this
does not mean that a sentence with two negative components means exactly the same thing
as a sentence without any negative component. For example, the sentence in (13b) would
require a longer time to process than the sentence in (14) (cf. section 5.4). As a result of
this, (13b) is likely to be used only in an ironic sense, while (14) will be used more
frequently.

(13)  a. I don’t see anything at any time
b. I don’t see nothing at any time
c. I don’t never see anything
d. * I don’t never see nothing
e. I never see anything
f. I never see nothing

Of the six sentences in (13), only two, (a) and (e), have a basic negated meaning.
Sentences (b), (c) and (f) are all examples of double negation, leading to an affirmative
reading, which is given in (14). **Sentences (b) and (c) are unlikely to be used in Standard
English, although they are not ungrammatical.** Sentence (d) has three negative components
and is not permitted in Standard English.

(14) I see something at some time
In English, German and other Germanic languages negation behaves in a similar way to formal logic, where two false values result in a true value. Similarly, many non-European languages exhibit double negation, where the presence of two negative components leads to an affirmative meaning. Arabic and Chinese, for example, exhibit double negation (Xiao & McEnery 2005).

(15) 房间里不是没有 (Chinese)
There is not nobody in the room
‘There is somebody in the room’

5.7.2 Negative Concord

In contrast to the system of double negation employed by the Germanic languages, in the Romance and Slavic languages it is common to encounter sentences with more than one, and often several, negative components (Babby 1980; Brown 1999). This is known as Negative Concord. This refers to the co-occurrence of multiple negative components in a sentence to express a single instance of negation (Labov 1979).

(16) Non vedo mai niente (Italian)
NEG I see never nothing
‘I never see anything’

Italian follows a principle of negative concord (Rizzi 1982; Proudfoot & Cardo 1997). (16) contains three negative constituents (non, mai, niente), yet the meaning of the sentence is the same as that of (13a) and (13e) above. The words ‘mai’ and ‘niente’ mean ‘never’ and ‘nothing’ respectively, but they are used with the negative particle, ‘non’ (not), to form a single instance of negation.

The sentence in (17a) is similar to (16), except that the meaning is less intensified without the presence of the negative pronoun ‘mai’ (never). In both of these sentences negation behaves in the “illogical manner” that van der Wouden and Zwarts referred to (van der Wouden & Zwarts 1992), where multiple values of false do not combine to form value of true. (17) provides a selection of sentences from various languages that employ negative concord (Jespersen 1917; Grevisse 1988; Espinal 1991; Rizzi 1992; Vallduví 1994; Brown 1999).
(17) a. Non vedo niente (Italian)
    NEG I see nothing
    'I see nothing'

b. Não tenho nada (Portuguese)
    NEG I have nothing
    'I have nothing'

c. No ho sap ninguém (Catalan)
    NEG it knows nobody
    'Nobody knows (it)'

d. No me gusta nada (Spanish)
    NEG to me likes nothing
    'I like nothing'

e. Je ne vois rien (French)
    I NEG see nothing
    'I see nothing'

f. Ek kan nie Afrikaans praat nie (Afrikaans)
    I can NEG Afrikaans speak NEG
    'I cannot speak Afrikaans'

g. פָּא דַּחַא אל הַצֶּרֶת (Hebrew)
    NEG I want to do it
    'Nobody wanted to do it'

h. Delem niz iciz bekenam (Farsi)
    I want NEG to do nothing
    'I don’t want to do anything'

i. Kimse kursuzsuz değildir (Turkish)
    Nobody isn’t perfect
    'Nobody is perfect'

j. Nikdo nic neví (Czech)
    Nobody nothing does not know
    'Nobody knows anything'

k. Nie chcę niczego (Polish)
    NEG I want nothing
    'I don’t want anything'

(17) shows that a large number of languages differ to English and the Germanic language and employ a system of negative concord. The sentence in (17f) highlights that Afrikaans is an exception among the Germanic languages, in that it employs negative concord.

In addition to the above languages, Weiß observed that the Bavarian dialect differs to Standard German and to all other dialects of German by allowing negative concord (Weiß 2003). The following sentences show the use of negative concord in Bavarian.
The sentence in (18b) is an example of negative concord, as it contains two negative components and maintains a negated meaning (Weiβ 2003). In contrast, the Standard German example in (18c) contains just one negative component.

The French sentence in (17e) contains the pronoun ‘rien’, which means ‘nothing’. ‘Rien’ has undergone a significant shift in meaning. It was derived from the Latin word ‘res’, meaning ‘thing’ and was often used in conjunction with the negative particle ‘ne’, to mean ‘no thing’ (Corblin et al. 2004; Watanabe 2004). Later, ‘rien’ took on the meaning of ‘nothing’ by itself, and ‘ne’ was no longer required to negate it. ‘Rien’ now possesses independent negative force (cf. section 5.7.4 on negative polarity items).

5.7.3 Negative Concord in Russian

Like all other Slavic languages, negative concord is mandatory in Russian (Crockett 1977; Švedova 1980; Babby 1980; Brown 1999).

(19)  
Неужели никто нигде никогда не видел ничего подобного?
Can it really not be no-who no-where no-when NEG seen no-what like that?
‘Can it really be that no one has ever seen anything like that anywhere?’

In this sentence there are six negative components, including each of the first five words, but there is just one semantic instance of negation and just one possible interpretation of the sentence. Chapter 6 investigates whether there are differences between the way that a Russian speaker processes a sentence like this one and the way that an English speaker processes a typical English negated sentence.

When the verb in (19) is negated, then every indefinite pronoun in the sentence must also be negated (Švedova 1980; Babby 1980; Brown 1999). As a result of this, the negative pronouns ‘никто’ (nobody), ‘нигде’ (nowhere), ‘никогда’ (never) and ‘ничего’
(nothing) are used. These words cannot be in the form of the English words in the translation of the sentence, where the indefinite pronouns ‘ever’, ‘anything’ and ‘anywhere’ are used. These English words only take on a negative meaning when they are accompanied by the negative particle ‘not’ (cf. section 5.7.4). In contrast to the English indefinite pronouns, the Russian pronouns ‘никто’ (written as ‘nikto’ in the Latin alphabet), ‘нигде’ (nigde), ‘никогда’ (nikogda) and ‘ничего’ (nichego) independently possess a negative meaning. Each of these Russian words is formed from a combination of ‘не’ (not) and the interrogative words for ‘who’, ‘where’, ‘when’ and ‘what’ respectively. In addition, the negative particle, ‘не’ (ne), must be present in all Russian negated sentences, as is shown in (20) and (21).

(20) Никто *(не) звонил
No-who NEG called
‘No one called’

(21) Никто *(не) видел никого
No-who NEG saw no-who
‘No one saw anyone’

Without the negative particle ‘не’, neither (20) nor (21) are permitted in Russian. In English, the words “no one called” are enough to achieve the meaning of (20), but in Russian the negative particle is required in addition to the negative pronoun ‘никто’ (no one). In English, if the word ‘not’ was included in the sentence, then the meaning would shift to the opposite affirmative meaning, namely “someone called”.

As noted above, the English indefinite pronouns ‘ever’, ‘anyone’, ‘anything’ and ‘anywhere’ do not possess any independent negative force and require the presence of ‘not’ to form negated propositions. The ungrammatical English sentences in (22) illustrate this.

(22) а. * Anyone called
b. * Anyone saw anyone

5.7.4 Negative Polarity Items

Words like ‘anyone’, ‘ever’, ‘anywhere’ and ‘anything’ are known as negative polarity items (NPIs), since they are only grammatical when they either co-occur with some negative component or appear in interrogative statements. NPIs are found in many
other languages apart from English (Giannakidou 1998). In sentences (19) to (21) above, the Russian negative pronouns exhibit similar behaviour to NPIs, in that the sentences demand the presence of the negative particle ‘не’. However, the Russian pronouns also possess independent negative force and can therefore be used in elliptical expressions, as illustrated in (23). This shows that Russian negative pronouns do not behave in the same way as the aforementioned English NPIs (Brown 1999).

(23) a. Кого ты видел? Никого.
    who you saw? no-who
    ‘Who did you see? No one.’

b. Who did you see? *Anyone.

In (23) ‘никого’ (no one) is used in an elliptical expression without the co-occurrence of ‘не’. The other Russian negative pronouns can also be used to answer questions in the form of elliptical expressions (Švedova 1980; Brown 1999). In English, on the other hand, the question posed in (23) cannot be answered simply by the word ‘anyone’, since there is no negative word to “licence” its negative meaning (Klima 1964; Horn 1989; Brown 1999). The question would have to be answered by either the inherently positive ‘someone’ or the inherently negative ‘no one’. ‘Никого’ cannot be said to correspond completely to either of the English words ‘no one’ or ‘anyone’, since it can be translated as either of them in different contexts.

(24) a. I don’t see anything

b. * I see anything

In (24a) ‘anything’ is licensed by the presence of the negative particle ‘not’ (in the form of don’t), whereas in (24b) it is not allowed because it does not co-occur with a negative constituent. A further difference between English and Russian is that the word ‘anyone’ can be assigned negative force by its negative counterpart ‘no one’ in English, as seen in (25). In Russian, the negative particle ‘не’ must be present, as (21) showed.

(25) No one saw anyone

NPIs like are assigned negative force by the presence of another negative word. Without the presence of another negative word NPIs do not possess any independent negative force. In contrast to this, the negative force contained in Russian negative pronouns is merely activated by the presence of ‘не’ in complete sentences.

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5.7.5 Differences between Negation in Russian and Italian

There are some important differences between the negation systems of Russian, Italian and Catalan, which stand in some ways between the former two languages (Brown 1999).

In (21), reprinted here as (26), the negative pronoun ‘никто’ (no one) appears as a preverbal negative constituent. There is also a postverbal negative constituent, ‘никого’ (no one), as well as the negative particle ‘не’. The Italian sentence in (27) also contains preverbal and postverbal negative constituents, but unlike the Russian sentence, the use of the negative particle ‘non’ is prohibited in this case.

(26) Никто *(не) видел никого
'No one saw anyone'

(27) Nessuno (*non) ha visto nessuno
'No one has seen no one'

When there is a preverbal negative constituent in an Italian sentence the negative particle ‘non’ cannot be used. (28) shows a similar case where ‘non’ is prohibited due to a preverbal negative object. However, with postverbal negative constituents the presence of ‘non’ is mandatory, as illustrated in (29).

(28) A nessuno Gianni (*non) dice niente
'Gianni did not see anyone’

(29) Gianni *(non) ha visto nessuno
'Gianni NEG has seen no one'

In Russian the presence of the negative particle ‘не’ is mandatory in the case of both preverbal and postverbal negative constituents (Švedova 1980). An interesting counterpart to the differences between Russian and Italian is observed in Catalan.

(30) Ningú (no) ha vist en Joan
'No one NEG has seen DET Joan'

(31) En Pere no ha fet res
If the negative particle ‘no’ is included in (30) the sentence exhibits negative concord, while (31) is also an example of negative concord. (30) contains a preverbal negative constituent, while (31) possesses a postverbal negative constituent. The word ‘no’ is obligatory in (31), as it is in all Catalan sentences containing postverbal negative constituents, while in (30) it is optional. (Espinal 1991; Vallduví 1994). Catalan sentences containing preverbal negative constituents can be like either Italian or Russian sentences. While in Russian ‘не’ is mandatory in these cases, and in Italian ‘non’ is prohibited, in Catalan the use of ‘no’ is optional.

The current situation in Catalan strongly resembles the former situations of Old Russian and Old Church Slavonic, where the use of the negative particle was optional with preverbal negative constituents (Brown 1999). However, in Russian, as well as in other modern Slavic languages, the use of ‘не’ is now mandatory in all cases. This is summarised in Table 9.

<table>
<thead>
<tr>
<th></th>
<th>Russian ‘не’</th>
<th>Catalan ‘no’; Old Church Slavonic / Old Russian ‘не’</th>
<th>Italian ‘non’</th>
</tr>
</thead>
<tbody>
<tr>
<td>with preverbal</td>
<td>OBLIGATORY</td>
<td>OPTIONAL</td>
<td>PROHIBITED</td>
</tr>
<tr>
<td>negative</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>constituents</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>with postverbal</td>
<td>OBLIGATORY</td>
<td>OBLIGATORY</td>
<td>OBLIGATORY</td>
</tr>
<tr>
<td>negative</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>constituents</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 9. Rules governing the negative particle in Russian, Catalan and Italian

### 5.7.6 The Development of Negation

Brown speculated that it may be the destiny of Catalan for its negation system to develop in a way similar to Russian and other Slavic languages (Brown 1999: 43). This raises a question about how changes arise in areas of languages that are deeply grammatical. Certain types of grammatical changes may be more salient than others, and change may be more likely to occur in a particular direction. That is to say, it may be the case that languages move from allowing a state of optionality for the use of the negative particle with preverbal negative constituents to requiring that it be used, but that they never move in the opposition direction and change from obligation to optionality (Brown 1999;
Kallel 2007). Change in negation is often brought about by borrowing from other languages. Borrowing is a common phenomenon in language and is not confined merely to the lexicon. It can occur in grammatical aspects of language that are more deeply encoded, including negation (Joseph 2001; Kallel 2007).

Engert described negation as a “Kriterium des Sprachgeistes”, or a “criterion for the spirit or soul of a language” (Engert 1937: 116). He remarked that the Germanic languages, which exhibit double negation, were rational or logical languages, whereas the Slavic languages, which exhibit negative concord, were more irrational and psychological as a result (Engert 1937). This claim does not stand up to scrutiny when the cross-linguistic development of negation is taken into account. The negation systems of both Old English and Old German have changed over time, for example. Both of these languages formerly had systems of negative concord (Weiß 2002; Ingham 2006; Kallel 2007). Similarly, the negation system that is present in modern Russian has some fundamental differences to the ones of Old Russian and Old Church Slavonic (cf. section 5.7.5).

Jespersen gave an account of a “negation cycle” (sometimes referred to as “Jespersen’s Cycle”), namely the historical shift from preverbal to postverbal negation (Jespersen 1917). Initially negation is expressed using a preverbal negative marker. In the next stage the marker weakens and is reinforced by another element (a noun phrase or an adverb). The use of a reinforcing element is initially optional, but eventually it becomes compulsory. Later, the preverbal marker itself becomes optional and eventually disappears entirely from the language (Jespersen 1917). This process has already occurred in many European languages, including French and Welsh (Corblin et al. 2004; Willis 2006).

Contrary to Engert’s claim that the system of double negation is more logical than negative concord (Engert 1937), Weiß made almost the opposite claim (Weiß 2002). Not only is it not the case that double negation languages are more logical, Weiß argued that the process of double negation is an artificial one, and that there is a natural preference in language for negative concord over double negation.

It is known that in Old English and Old German negative concord was allowed (Ingham 2006; Kallel 2007), whereas in the modern languages double negation is practised. Weiß claimed that double negation came about through factors external to language, mainly as a result of prescriptivism, with considerations of the relation of language to logic (cf. section 5.7.1), and as a result of the idea of modelling languages on Latin grammar (Weiß 2002). He remarked that language has a natural preference for negative concord over double negation (Weiß 2002). If the change from negative concord to double negation was contrived through a consideration for the laws of mathematical
logic, then the negation of negative concord languages could not be regarded as being less logical than double negation languages. If negative concord had been in place before double negation then it had arisen through natural means, and there must be a reason for this.

Weiß’ claims are lent support by the fact that a great number of the languages of the world favour negative concord over double negation. Of the European languages, the Romance and Slavic languages are negative concord languages, while the Germanic languages, with the exception of Afrikaans, are double negation languages. Furthermore, English, German and Dutch all have dialects that prefer negative concord to double negation. West Flemish and Bavarian are the dialects of Dutch and German respectively that favour negative concord (Weiß 2003; Haegeman & Zanuttini 2006), while in many dialects of North American English there is also a strong preference for negative concord (Labov 1979; Brown 1999). Negative concord sentences like “I didn’t see nothing” are also commonly uttered in some sub-dialects and idiolects of British English and Hiberno-English, where the intended meaning is one that is formed by negative concord and not by double negation.

Kallel provided an alternative explanation for the shift from negative concord to double negation in the Germanic languages to that of Weiß (Kallel 2007). Through a diachronic investigation of Late Middle English and Early Modern English, Kallel claimed that the shift from negative concord to double negation occurred through internal factors. Kallel claimed that for a short period of time there was a competition between n-words (never, nobody, nowhere, nothing) and NPIs in negative contexts. This competition culminated in the establishment of NPIs over n-words. Subsequently, n-words could not be used in this context, which led to a lexical reanalysis. The ambiguity of whether negation should be single or double was removed when the n-words were reshaped as negative quantifiers. From this point, if an n-word was used in conjunction with ‘not’ or with another negated word, the result would be double negation and an affirmative meaning (Kallel 2007).

5.8 Implications of Double Negation and Negative Concord

Chapter 6 investigates whether the differences that exist in the negation systems of Russian and English lead to differences in the ways that the speakers of these languages process and understand negation. The results of the research show that speakers of the two
languages consider alternative possibilities in different ways. This section explains why the differences between double negation and negative concord might lead to conceptual differences.

Different languages do not merely express the same things in different words; they exhibit different ways of looking at and describing the world (Sapir 1958 [1929]; Whorf 1945; Quine 1960; Grace 1987; Hunt & Banaji 1988). Depending on the way that a sentence is phrased, its focus can be shifted onto different aspects.

For example, Moxey & Sanford discussed the differences expressed by the English sentences “Few of the balloons are red” and “A few of the balloons are red”, which place their semantic focus on different aspects (Moxey & Sanford 1992). The former sentence focuses on the balloons that are not red (the majority), while the latter focuses on the balloons that are red (the minority).

As discussed in section 2.3, people may be led to attend to different aspects of an experience due to the way that their language describes it. Despite the fact that anything that can be expressed in one language can be roughly translated to any other language, the speakers of two languages may be inclined to focus on different aspects of a proposition (Malinowski 1935; Chafe 2000). This is also the case in negated propositions. For example, the following two English sentences both express the same meaning in different ways.

(32)  
<table>
<thead>
<tr>
<th>a.</th>
<th>I did not see anything</th>
</tr>
</thead>
<tbody>
<tr>
<td>b.</td>
<td>I saw nothing</td>
</tr>
</tbody>
</table>

Both sentences express the same meaning, but each places the focus upon different aspects. In (32a) the focus is on the word ‘anything’. Hasson & Glucksberg have shown that when people deal with negations, they first process them as affirmatives and later ‘apply the negation’ (Hasson & Glucksberg 2006). This is also true in this sentence. (32a) can at first be visualised as “I saw something”, where the NPI ‘anything’ is substituted for the affirmative word ‘something’. Once a person accepts the statement “I saw something”, it can then be negated. Overall, a person processing this sentence can visualise a scenario where something existed, although they did not see it. In contrast, (32b) focuses on a different aspect, namely the word ‘nothing’. This sentence should be more easily processed, not only because it contains fewer words, but because, unlike (32a), it is not a denial of an event. The independent negative force wielded by the word ‘nothing’ should enable a person to process this sentence more quickly than a sentence containing the words
‘not’ and ‘anything’. In (32b) a person processing the sentence can visualise a scenario where nothing existed, and therefore, nothing was seen.

While the overall meaning of the two sentences in (32) may be the same, the way that people will arrive at this meaning differs for either one. This distinction is further illustrated in Figure 17.

The upper diagram presents a visual representation of the basic affirmative sentence “I saw something”. Here ‘something’ exists within the visual field.

The middle diagram depicts the negated sentence “I didn’t see anything”. For this sentence ‘something’ exists outside of the visual field, since the negated sentence is processed by first treating it as an affirmative sentence (Hasson & Glucksberg 2006). “I didn’t see anything” denies that the speaker saw something and places the focus of the sentence outside the visual field.

The lower diagram represents the sentence “I saw nothing”. Here ‘nothing’ exists within the visual field. This does not make any claims about what might exist outside of the visual field, but unlike the sentence “I didn’t see anything”, the focus remains within the visual field.

The sentence “I saw nothing” is a more direct way of saying “I didn’t see anything”. Instead of denying that something was seen, it simply states that nothing was seen. It might be regarded as removing a layer of processing. Consequently, people should be able to process sentences containing negative quantifiers more quickly than sentence containing NPIs in conjunction with ‘not’. There is a key difference in the structure of sentences involving negative quantifiers and sentences involving NPIs. Sentences with
negative quantifiers place the focus of the sentence upon the negative quantifier, e.g. ‘nobody’, thus strengthening the meaning of the sentence. Consider the following pair of sentences.

(33) a. There isn’t anybody at the door
    b. There is nobody at the door

Similar to (32), the two sentences express the same meaning, but they each focus on different aspects. The second sentence contains a more direct expression with an inherently negative meaning. As a result of this, the meaning that is obtained from a sentence containing a negative quantifier might be stronger and more enduring than the meaning obtained from a sentence containing an NPI and the word ‘not’. This is supported by the following elliptical sentences.

(34) a. Who is at the door? Nobody.
    b. Who is at the door? *Not anybody.

The negative sentiment that is expressed independently by ‘nobody’ is strong enough to satisfy the question in (34). In contrast, the question cannot be answered in the same way by the phrase “not anybody”.

In other languages sentences containing negative quantifiers also focus on similar aspects of a proposition to (32b) above. Consider the following Italian example.

(35) Non vedo niente
     NEG I see nothing
     ‘I don’t see anything’

The Italian negative concord sentence contains two negative constituents. In this sentence, the focus is placed upon the word ‘niente’ (nothing). Similar to the English sentence in (32b), the proposition may be visualised by an Italian speaker like the lower diagram in Figure 3 above.

(36) a. I never see nothing
    b. Non vedo mai niente
       NEG I see never nothing
       ‘I never see anything’
The meaning of the Standard English sentence in (36a) is the opposite to that of the Italian sentence in (36b). The English sentence is an example of double negation and takes on an affirmative meaning (the speaker always sees something). Although (36a) contains only two negative constituents and (36b) contains three, (36a) is the semantically more complex sentence. The Italian sentence contains only one instance of semantic negation and should be processed more quickly than the English sentence, which has two instances of negation, and involves negating a negated meaning to form an affirmative meaning. Double negated sentences are more complex than negative concord sentences and, consequently, people should require more time to process them.

5.9 Relation of Negation to the Principle of Linguistic Relativity

Sentences with negative quantifiers, such as ‘nobody’ or ‘nothing’, are more direct in expressing a negated meaning than sentences with negated NPIs, such as ‘not anybody’ or ‘not anything’. Negative quantifiers also possess an independent negative force that NPIs do not have.

As a result of this, sentences with negative quantifiers should be easier to process than sentences with negated NPIs, and they might lead to a stronger and more enduring interpretation of the meaning, despite the fact that both types of sentences attempt to express the same meaning. NPIs are predominantly the possession of double negation languages, as it was their formation that signalled the end of the use of negation concord in the Germanic languages (Kallel 2007). Negation in negative concord languages uses negative quantifiers in conjunction with one another other and with the negative particle, as opposed to the use of negated NPIs in double negation languages.

If a negative quantifier makes a stronger statement than a negated NPI, then a Russian sentence that contains more than one negative quantifier should make a stronger statement than an English sentence containing NPIs. Consider the following sentences:

(37) a. There is never anybody at the door
b. There is always nobody at the door
c. Es gibt immer niemanden an der Tür
d. Es gibt nie jemanden an der Tür
e. Non c’è mai nessuno alla porta
f. Нет никогда никого в двери.
(37a) and (37b) show that the sentence can be constructed in more than one way in English, depending on which aspect of the proposition needs to be emphasised. In the absence of any special context the emphasis falls upon the negated word, ‘never’ in the first sentence, and ‘nobody’ in the second. **Due to the presence of the NPI ‘anybody’ in sentence (a) this sentence is perhaps less strong than the one in (b).** In German the proposition can also be constructed in different ways according to the point of focus. “Immer niemand” means “always nobody” and “nie jemand” means “never anybody”. Like the pair of English sentences (d) can be regarded as less strong than (c). There is just one negative quantifier in each of these four English and German sentences, since the overall meaning is required to remain negative.

In contrast, the Italian and Russian sentences are each comprised of three negative components, two negative quantifiers and a negative particle. If the strength of the meaning of a proposition is influenced by the number of negative quantifiers, then the Italian and Russian sentences should possess a stronger negated meaning than any of the four sentences in English and German.

The effects of this might be observed in the way that speakers of these languages conceptualise alternative possibilities.

Chapter 6 investigates this and discovers that this is the case for English and Russian speakers. By providing negated propositions and then altering the conditions of these propositions, the research shows that Russian speakers extend the negative sentiment expressed by the initial proposition into related areas more than English speakers.

**5.10 Conclusion**

The aim of Chapter 5 was to provide a detailed account of negation and the ways that negation differs in different languages. Negation was chosen, since the concept of negation is universal to all societies, and is universally expressed in terms of affirmative statements. Yet there are also a number of important differences in the ways that different languages express negation.

The chapter discussed the functions of negation and the differences between negated propositions and affirmative propositions. Propositions are negated by the addition of a linguistic marker, which distinguishes negated propositions from affirmative ones (Horn 1989). Negated propositions generally provide less information than affirmative ones (Horn 1989) and take more time to process (Hasson & Glucksberg 2006). Since the
The primary function of negation is to deny the truth of a proposition (Horn 1989), negation works best when the proposition that it is denying is a plausible one (Wason 1959). Negation functions best with dissimilar or exceptional items (Wason 1965).

The chapter then described the contrasting modes of negation that are used in natural languages, namely double negation and negative concord. While all of the Germanic languages except Afrikaans employ double negation, the Slavic and Romance languages use negative concord. In the Germanic languages the presence of more than one negative constituent in any sentence results in a cancelling effect and an affirmative meaning. In contrast, in the Slavic and Romance languages sentences are permitted to have several negative constituents. The negative concord languages also have some differences in their own systems of negation, notably regarding the rules governing preverbal negative constituents. The main difference between negation in double negation and negative concord languages is that the NPIs used in double negation languages do not have an independent negative force, while the negative quantifiers used in negative concord languages all do.

The chapter presented two alternative views regarding the shift from negative concord to double negation in Middle English (Weiß 2002; Kallel 2007) and discussed the idea that natural languages have a preference for negative concord over double negation.

The chapter then examined the differences between the use of negative quantifiers like ‘nobody’ and ‘nowhere’ and negative polarity items like ‘anybody’ and ‘anywhere’ in negated propositions. It proposed that since negative quantifiers possess an independent negative force, negated propositions containing negative quantifiers cause people to focus upon different aspects of the proposition than negated propositions containing negative polarity items. As a result of this, the chapter postulated that Russian speakers might consider alternative possibilities in a different way to English speakers. Chapter 6 takes up this idea in the form of empirical research.
Chapter Six

Empirical Investigation into the Effects of Double Negation and Negative Concord on the Processing of Negative Information
6.1 Introduction

Chapter 5 discussed the features and functions of negation and illustrated how negation differs in various languages. Standard English, like other Germanic languages, with the exception of Afrikaans, disallows negative concord (the use of multiple negative components to create a single semantic instance of negation). When two negative components are used in a Standard English sentence, double negation occurs (the negative components cancel one another out and create an affirmative meaning). In contrast, all of the Slavic languages and most of the Romance languages allow negative concord, resulting in sentences that contain several negative constituents (Brown 1999; Watanabe 2004; Paslawska 2005).

Chapter 6 investigates whether the differences exhibited in languages in expressing negation lead to differences in the processing of negative information. While an English sentence expressing a negated meaning contains only one negative constituent, a Russian sentence may contain several more. This chapter presents research that examines whether this mandatory distinction leads to a difference in how English speakers and Russian speakers interpret negated sentences and understand negative information.

The way that a language forms negated propositions can provide information about the way that the speakers of that language deal with the consideration of alternative possibilities (Horn 1989; Hasson & Glucksberg 2006). The experiment described here shows that Russian and English speakers deal with alternative possibilities in different ways.

In many dialects of English it is common to use more than one negative constituent in a sentence, in order to place more emphasis on the meaning of the sentence (Labov 1979; van der Wouden & Zwarts 1992; Brown 1999). Popular culture contains many examples of negative concord in English.14 If sentences are intentionally created in this way in certain dialects of English, then this may show that negative concord creates a stronger negated meaning than double negation. All of the English sentences in Experiment 3a are in Standard English.

14 The line, “there ain’t no one for to give you no pain”, is contained in the song, ‘A Horse with No Name’, by the band America, while a song by the Rolling Stones is entitled ‘I Can’t Get No Satisfaction’. Both are examples of negative concord, rather than double negation.
6.2 EXPERIMENT 3a

6.2.1 Method

Participants

24 native English speakers took part in this experiment. The participants ranged in age from 19 to 42 and came from a variety of backgrounds, including university and full-time employment in a variety of areas. Participants were not aware of the purpose of the experiment and were aware only that it was part of a study for a Masters degree in linguistics.

Materials and Design

Participants completed nine experimental trials. An experimental trial consisted of a basic statement, followed by a question related to the preceding statement. Participants chose their answer to the question from one of five options provided. The experiment and all of its instructions were in English.

Each participant undertook the experiment individually and in their own time. Participants were allowed to read the sentences for as long as they wanted before answering the questions. There were eleven questions to be answered in total, as two of the experimental trials contained an additional question. Seven of the questions were targets and four were fillers. All of the questions contained a multiple choice answer with five options (definitely, probably, don’t know, probably not, definitely not). The multiple choices were arranged in a random order for each question.

Each of the target statements presented a negated scenario and was in the form of “Mary doesn’t ever ask anything of anybody”. Each of the statements contained at least one negative polarity item and the word ‘not’ (in contracted form). A target question extended the conditions set out by the preceding statement and required participants to make a judgment. An example target question was “Would Mary ask for help if she had a problem that she could not solve?”. There were no correct or incorrect responses. Participants were asked to choose the response that they believed was most likely. None of the questions prompted a particular answer, but rather each question in its own way left the participants with some room for interpretation. The goal of experiments 3a and 3b was to examine the effect of the negative components contained in the preceding statement on the
participants’ interpretation of the scenario, and then to compare the English speakers’ responses with the responses of Russian speakers to the equivalent questions in Russian.

Filler statements did not contain any elements of negation. The full list of statements and questions is provided in Appendix 3.1.

6.2.2 Results

The responses of the English speakers were mixed. Some of the target questions attracted more definite responses than others. The following diagram shows the overall spread of their responses for the seven target questions. Responses on the right side of the graph extend the negative sentiment expressed in the preceding statements onto the conditions set out in the questions, while responses on the left side do not extend the negative sentiment. Figure 18 shows that the results were mixed, with a slight majority of responses on the left side.

![Figure 18. English responses to the target questions in Experiment 3a](image)

The following five target statements were given to the participants.

1. Mary picks up the phone and doesn’t hear anything
2. Priska goes into the castle and doesn’t see anybody doing anything
3. Olivia doesn’t ever give anybody anything for their birthday
4. Grace doesn’t travel anywhere with anybody
5. Alannah doesn’t ever ask anything of anybody

Following sentence (1) the participants were asked what a second person, called Elizabeth, would hear if she took the phone directly from Mary. The options ranged from “definitely just silence” to “a loud voice”. After (2) the question asked whether Priska had taken a thorough look around the castle. The options ranged from “definitely” to “definitely not”.

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The question that followed (3) inquired whether Olivia would give her son and daughter a Christmas present. Question 4 asked whether Grace frequently travelled alone. Question 5 inquired whether Alannah would ask for help if she had a problem that she could not solve. The target statements (2) and (5) additionally contained a second question of a slightly different nature. The results of this latter pair of questions are discussed later.

The English speakers expressed no significant difference in their responses to questions 1 and 3. For questions 2 and 4 their responses did not extend the scope of the negation to the conditions expressed in the questions. That is, the majority of them decided that Priska had not taken a thorough look around the castle in (2) (thus not being able to ascertain what was happening in all parts of the castle) and that Grace travels frequently by herself in (4). The results for the first five target questions are provided in the following tables.

<table>
<thead>
<tr>
<th></th>
<th>Negative meaning strongly not extended onto new conditions</th>
<th>Negative meaning not extended onto new conditions</th>
<th>Don’t Know</th>
<th>Negative meaning extended onto new conditions</th>
<th>Negative meaning strongly extended onto new conditions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Q1</td>
<td>16.67</td>
<td>29.17</td>
<td>12.5</td>
<td>25</td>
<td>16.67</td>
</tr>
<tr>
<td>Q2</td>
<td>29.17</td>
<td>29.17</td>
<td>16.67</td>
<td>16.67</td>
<td>8.33</td>
</tr>
<tr>
<td>Q3</td>
<td>25</td>
<td>20.83</td>
<td>8.33</td>
<td>25</td>
<td>20.83</td>
</tr>
<tr>
<td>Q4</td>
<td>41.67</td>
<td>16.67</td>
<td>12.5</td>
<td>12.5</td>
<td>16.67</td>
</tr>
<tr>
<td>Q5</td>
<td>12.5</td>
<td>20.83</td>
<td>8.33</td>
<td>29.17</td>
<td>29.17</td>
</tr>
</tbody>
</table>

Table 10. English speakers’ responses in Experiment 3a

<table>
<thead>
<tr>
<th></th>
<th>Did not extend negated meaning</th>
<th>Extended negated meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>Q1</td>
<td>45.83</td>
<td>41.67</td>
</tr>
<tr>
<td>Q2</td>
<td>58.33</td>
<td>25</td>
</tr>
<tr>
<td>Q3</td>
<td>45.83</td>
<td>45.83</td>
</tr>
<tr>
<td>Q4</td>
<td>58.33</td>
<td>29.17</td>
</tr>
<tr>
<td>Q5</td>
<td>33.33</td>
<td>58.33</td>
</tr>
</tbody>
</table>

Table 11. Percentage that either extended the negated meaning or not

<table>
<thead>
<tr>
<th></th>
<th>Strongly did not extend negative meaning</th>
<th>Strongly extended negative meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>Q1</td>
<td>16.67</td>
<td>16.67</td>
</tr>
<tr>
<td>Q2</td>
<td>29.17</td>
<td>8.33</td>
</tr>
<tr>
<td>Q3</td>
<td>25</td>
<td>20.83</td>
</tr>
<tr>
<td>Q4</td>
<td>41.67</td>
<td>16.67</td>
</tr>
<tr>
<td>Q5</td>
<td>12.5</td>
<td>29.17</td>
</tr>
</tbody>
</table>

Table 12. Percentage that either strongly did not extend the negative meaning or strongly extended it
The figures in Tables 10-12 show that the English speakers only extended the scope of the negative meaning expressed in the preceding statements for one of the five scenarios (Q5). In contrast, for two of the five scenarios they decided that the negative meaning did not apply (Q2 & Q4). The results for the remaining two scenarios were more even (Q1 & Q3).

The results for the additional two target questions mentioned earlier are provided below. For these questions the English speakers again did not extend the scope of the negation onto the new conditions. These questions presented alternative scenarios where it was thought that the scope of the negation would be less likely to apply than in the previous questions. After (2) the English speakers were asked to estimate how many people were in the castle (“zero, don’t know, more than three”), and after (5) they were asked whether Alannah would accept help if somebody offered it.

<table>
<thead>
<tr>
<th></th>
<th>Negative meaning strongly not extended onto new conditions</th>
<th>Negative meaning not extended onto new conditions</th>
<th>Don’t Know</th>
<th>Negative meaning extended onto new conditions</th>
<th>Negative meaning strongly extended onto new conditions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Q1</td>
<td>45.83</td>
<td>---</td>
<td>37.5</td>
<td>---</td>
<td>16.67</td>
</tr>
<tr>
<td>Q2</td>
<td>33.33</td>
<td>29.17</td>
<td>8.33</td>
<td>12.5</td>
<td>16.67</td>
</tr>
</tbody>
</table>

Table 13. Results for the final two target questions

For the first question, only 16.67% of the responses stated that there were ‘zero’ people in the castle, while 45.83% replied that there were more than three. Additionally, the majority of people replied that Alannah would accept offered help in the second question.

Overall in Experiment 3a, the English speakers rarely extended the scope of the negation expressed in the preceding statement onto a question that set out alternative conditions.

### 6.3 EXPERIMENT 3b

#### 6.3.1 Method

*Participants*
21 native Russian speakers took part in this experiment. The participants ranged in age from 12 to 45 and came from a variety of backgrounds, including secondary school, postgraduate degrees at university and full-time employment in a variety of areas. Participants were not informed about the purpose of the experiment and were aware only that it was part of a study for a Masters degree.

Materials and Design

The experiment followed exactly the same layout as Experiment 3a, with nine experimental trials and eleven questions. This time the entire experiment, including all of its instructions, was in Russian. Participants read Russian translations of the statements, questions and answers that were used in Experiment 3a. The translations were verified by a Russian-English speaker, whose first language was Russian.

Each of the target statements contained at least two negative constituents, ranging from two to five. There were no negative elements in any of the filler statements. The participants answered seven target questions and four filler questions related to the statements they had read. None of the questions contained any negated words. The five multiple choices for each question covered the same level of certainty as the choices in Experiment 3а (Да, конечно, да, наверно, я не знаю, наверно нет, конечно нет).

The entire list of Russian statements and questions is provided in Appendix 3.2.

6.3.2 Results

In their answers to the multiple choice questions, the Russian speakers paid close attention to the negative quantifiers that were used in the statements. The following diagram shows the spread of their responses for the seven target questions. Responses on the right side of the graph extend the negative sentiment expressed in the preceding statements onto the conditions set out in the questions, while responses on the left side do not extend the negative sentiment. Figure 19 shows a majority of responses fall on the right side.
The five target statements that were given to the participants were the following.

1. Анна берет телефон, и она ничего не слышит.  
   ‘Anna takes telephone, and she nothing not hears.’

2. Светлана входит в замок, и она видит, что никто, ничего, не делает.  
   ‘Svetlana enters the castle, and she sees, that nobody, nothing, not does.’

3. Татьяна никогда, никому, ничего, не дарит для их дня рождения.  
   ‘Tatiana never, nobody, nothing, not gives for their birthday.’

4. Вера никогда, никуда, ни с кем, не путешествует.  
   ‘Vera never, nowhere, not with who, not travels.’

5. Наташа никогда, никого, не о чем, не спрашивает.  
   ‘Natasha never, nobody, nothing, not asks.’

Following these statements the Russian speakers were asked the same questions that the English speakers were asked in Experiment 3a. Overall, the Russian speakers clearly extended the scope of the negation onto the conditions set out by questions 1, 3 and 5. While the results for questions 2 and 4 were more even overall, for both of these questions more Russian speakers strongly extended the scope of the negation than strongly did not.

For each of the five scenarios the participants’ responses extended the scope of the negative quantifiers found in the preceding statement. The complete results are provided in Tables 14 to 16.
For each of the first five target questions a majority of the Russian speakers extended the scope of the negative sentiment from the original statement. The effects were clearer for questions 1, 3 and 5, but also in questions 2 and 4 more Russian speakers strongly felt that the negated meaning applied under the new conditions than strongly felt that it did not.

The results showed that the Russian speakers extended the negative meaning of the original statement when the question left them the choice between a positive and negative answer.

Below are the Russian speakers’ responses for the additional pair of target questions, which were the same as the additional two target questions in Experiment 3a. These two questions presented alternative scenarios where it was considered less likely that the scope of the negation would apply to the new scenario.
For the first question more people thought there were more than three people in the castle than ‘zero’ people, while for the second question a large majority of people replied that Natasha would accept the offer of help.

The results for these two questions were expected. The statement in (5) does not suggest anything about Natasha’s tendency to accept help, and consequently the participants had no information to base their responses on. In this case they chose the most salient option. In contrast to this, question 5, which inquired whether Natasha would ask for help if she had a problem that she could not solve, contradicts the statement presented in (5).

Overall, Experiment 3b showed that the Russian speakers extended the scope of the negation from the preceding statement to the alternative conditions set out by the questions that followed.

### 6.4 Discussion of Experiments 3a & 3b

The replies of the English and Russian speakers in Experiments 3a & 3b were significantly different. The Russian speakers extended the scope of the negative sentiment expressed by the negative quantifiers in the preceding statements, while the English speakers’ responses were more mixed.

The English and Russian speakers were affected by the double negation and negative concord of their respective languages in different ways. The Russian speakers read sentences that each contained several negative constituents, while the English speakers read sentences containing several negated NPIs. The differing results produced by the two sets of speakers can be attributed to this distinction.

While a Russian proposition and an English proposition provide the same negative information using a sequence of negative pronouns and NPIs respectively (due to the
allowance and prohibition of the use of negative concord), Russian speakers are more likely than English speakers to extend the scope of the negation of the original statement when the semantic conditions are altered.

There was no significant difference between the responses for the “don’t know” and “я не знаю” options. 14.88% of the English speakers’ responses were “don’t know”, while 12.93% of the Russian speakers’ responses were “я не знаю”. Similarly, there was no significant difference between the responses for the four filler questions, shown in Table 18. Neither the filler statements nor the questions contained any elements of negation. They each contained a cause and effect scenario, e.g. “Diana thinks that her coffee is cold” and “Do you think that Diana will drink her coffee?”. The remaining filler statements and questions are provided in the Appendices 3.1 and 3.2.

<table>
<thead>
<tr>
<th></th>
<th>Definitely not / конечно нет</th>
<th>Probably not / наверно нет</th>
<th>Don't Know / я не знаю</th>
<th>Probably / да, наверно</th>
<th>Definitely / да, конечно</th>
</tr>
</thead>
<tbody>
<tr>
<td>F1</td>
<td>0;</td>
<td>0;</td>
<td>12.5;</td>
<td>25;</td>
<td>62.5;</td>
</tr>
<tr>
<td></td>
<td>0;</td>
<td>0;</td>
<td>9.52</td>
<td>23.81</td>
<td>66.67</td>
</tr>
<tr>
<td>F2</td>
<td>14.28</td>
<td>4.17;</td>
<td>16.67;</td>
<td>25;</td>
<td>54.17;</td>
</tr>
<tr>
<td></td>
<td>12.5;</td>
<td>0;</td>
<td>16.67;</td>
<td>25;</td>
<td>54.17;</td>
</tr>
<tr>
<td>F3</td>
<td>4.76;</td>
<td>19.05;</td>
<td>23.81;</td>
<td>47.62;</td>
<td>4.76;</td>
</tr>
<tr>
<td></td>
<td>12.5;</td>
<td>0;</td>
<td>12.5;</td>
<td>50;</td>
<td>8.33;</td>
</tr>
<tr>
<td>F4</td>
<td>0;</td>
<td>8.33;</td>
<td>33.33;</td>
<td>33.33;</td>
<td>25;</td>
</tr>
<tr>
<td></td>
<td>0;</td>
<td>4.76;</td>
<td>33.33;</td>
<td>42.86;</td>
<td>19.05;</td>
</tr>
</tbody>
</table>

Table 18. Responses (%) to the four filler questions (English responses in blue; Russian responses in red)

The results for the filler questions varied only for one of the four tasks. The second filler statement was “Carla sees everybody playing in the snow”, and the corresponding question was “Do you think that Carla will go outside and play with the other people?”. For this question, a greater number of English speakers answered affirmatively than Russian speakers. There might be a cultural reason for this, as snow is more common in Russian-speaking environments than in most English-speaking environments. Hence, heavy snowfall may be regarded as more of a special occasion in English-speaking cultures, which may have influenced the participants’ responses. However, the English and Russian speakers’ responses were very similar for the other three filler questions.

Since the results of the English and Russian speakers for the filler questions do not show a similar contrast to the results for the target questions, a cultural explanation for the difference in the results can be excluded. Wierzbicka discussed that Russian culture favours “direct,” sharp, undiluted value judgments” more than Anglo culture (Wierzbicka 1997:12) (cf. section 2.2.3). This might cause Russian speakers to choose answers toward
the end of the spectrum, while English speakers might tend to select answers in the middle. However, this was not the case. Firstly, the Russian speakers’ responses differed to the English speakers’ responses only on target questions and not on filler questions. Secondly, the Russian responses did not navigate toward either “extreme” of the five choices, and the English responses did not converge in the middle. **On target questions Russian speakers more frequently extended the negative sentiment expressed in the original statement into an alternative scenario than English speakers.**

**6.5 Conclusions**

Horn speculated about the psychological effects of n-words on the language user (Horn 1989). By n-words, Horn meant negative constituents, including the word ‘not’ and negative quantifiers like ‘never’, ‘nothing’, nowhere’ and ‘nobody’. Horn suggested that these words could prime the language user for an inherently negative meaning. N-words are in contrast to negative polarity items like ‘ever’, ‘anything’, ‘anywhere’ and ‘anybody’, whose negative sentiment must be licensed by the presence of a negative quantifier or the negative constituent, ‘not’. Unlike the negative polarity items, n-words possess an independent negative meaning. Negative words often begin with the n-sound in many languages, and its presence may prime the language user for a negative meaning.

Experiments 3a & 3b support Horn’s idea about the psychological effects of n-words. The negative quantifiers found in the Russian sentences created a stronger effect on the Russian speakers than the negative polarity items found in the English sentences created on the English speakers.

These results suggest that the phrasing of a sentence can have a significant effect on the language user, and that people are sensitive to the independent negative force contained in n-words. Standard English, like most other Germanic languages, disallows the use of negative concord and limits the number of permitted negative components in a well-formed sentence to one. On the other hand, Russian, as well as the other Slavic languages and most Romance languages, requires that if the verb in a sentence is negated, that every other component in the sentence should also be negated. This results in Russian sentences containing many more words that have independent negative force than English sentences. Experiments 3a & 3b show that this leads to differing effects on the speakers of the two languages. Negative meaning in Russian extends beyond the conditions where it is originally observed. Experiments 3a & 3b show that Russian speakers are more likely to
extend the negative sentiment of the original sentence into alternative scenarios than English speakers.
Chapter Seven

Conclusion
7.1 Overview

The aim of this thesis was to study the relation between language and cognition. It examined the bi-directional relationship between culture and language and described a selection of the research that has been conducted to test the principle of linguistic relativity. It used data from a wide range of languages, a few of which included Germanic languages (English and German), Romance languages (Italian and French), a Slavic language (Russian), Native American languages (Pirahã and Aymara) and Asian languages (Mandarin Chinese, Korean and Japanese). The thesis focused on the abstract areas of time and negation, since both are concepts of universal importance and both vary in different languages. Through empirical research it was established that language has an influence on the conceptualisation of the ordering of events and that the system of negation that a language uses influences the way that people perceive alternative possibilities.

7.2 Summary of Research

Chapter 1 gave an introduction to the principle of linguistic relativity and gave an account of the voices that contributed to it.

Chapter 2 described the principle of linguistic relativity in more detail. It discussed the ways that languages identify themselves with the cultural backgrounds of their speakers and considered how the principle of linguistic relativity relates to issues in translation. It examined the problems that Pirahã causes for the principle of Universal Grammar (Everett 2005). It also provided a broad account of earlier empirical research related to the principle of linguistic relativity and discussed several findings. It established the domains where the effect of language is most likely to be observed.

Chapter 3 gave a wide account of the abstract concept of time, which was to be a focal point of the thesis. It established that time is described in terms of space in all languages, a process which can have an effect on the conceptualisation of time. The chapter examined the ways that time is described in Aymara, English and Mandarin. Research in Aymara speech and gesture has shown that speakers of the language conceptualise the future as in front of them and the past as behind them (Núñez & Sweetser 2006). This is the opposite conceptualisation to English. English and Mandarin have
further differences. Due to fact that English predominantly uses horizontal spatial
metaphors to talk about time, while Mandarin additionally uses vertical spatial metaphors,
some research has pointed to the fact that speakers of the two languages conceptualised
time as moving in those respective directions (Boroditsky 2001). Chapter 3 gave a detailed
account of this research and compared it with a contradictory study that found no support
for the principle of linguistic relativity in English and Mandarin speakers’
conceptualisation of time (Chen 2007).

Chapter 4 described a replication of Boroditsky’s research to test whether the
spatial metaphors used to talk about time influenced English and Mandarin speakers’
conceptualisations of the movement of time. Following this, it described a second
experiment, which altered the materials used by Boroditsky. Both experiments discovered
a relationship between native language and the conceptualisation of time.

Chapter 5 examined the concept of negation, which was the other focal point of
the thesis. It discussed how negative information relates to affirmative information and
examined the ways that people process negative information. Then it studied the diversity
in systems of negation present in various languages and compared the systems of double
negation and negative concord. It gave a detailed account of how negation is expressed in
languages that employ either system, including English, German, Russian and Italian. It
discussed how double negation and negative concord can lead to differences in the
processing of negative information and the consideration of alternative possibilities.

Chapter 6 described two experiments that investigated the effects of double
negation and negative concord on the processing of negative information in English and
Russian respectively. The research uncovered evidence for the differing effects of negative
quantifiers used in negated Russian sentences to negative polarity items used in negated
English sentences.

7.3 New Findings and Relationship to Existing Findings

This thesis found support for Boroditsky’s results, regarding the effects of spatial
metaphors on the conceptualisation of time among English and Mandarin speakers
(Boroditsky 2001). This was a significant result, as previous studies had failed to
corroborate with these findings (Chen 2007). Experiment 1 replicated the conclusions
made by Boroditsky.
In addition to this, Experiment 2 produced new results. This experiment replaced the system of static primes used by Boroditsky and Chen and instead used a system of animated primes that depicted confounded motion. It was shown that the animated primes were even more effective in priming speakers for responding to temporal tasks than the static primes, as they responded to temporal tasks consistently more quickly after the animated primes. The research also supported the findings of Experiment 1 and those of Boroditsky, providing evidence for the contrasting effect of spatial metaphors on the conceptualisation of time for English and Mandarin speakers.

Experiments 3a & 3b also produced new findings about the effects of the contents of negated propositions on the understanding of negative information and the consideration of alternative possibilities. Negative quantifiers, which are used in standard negated propositions in Russian, had a stronger effect than negative polarity items, which are used in standard negated propositions in English. The research showed that Russian speakers consistently extended the scope of a negated proposition to scenarios where the semantic conditions were altered. In contrast, this happened much less with English speakers. This is explained by the contrast between negative quantifiers, such as ‘никому’ (nobody) and ‘ничего’ (nothing), and negative polarity items, such as ‘anybody’ and ‘anything’. The former possess independent negative force, while the latter require the presence of ‘not’ or a negative quantifier. As a result, this led Russian speakers to consider the negated proposition in a different way to English speakers and extend the scope of the negation to other areas.

7.4 Limitations of this Study

The research was conducted by an individual researcher, which limited it in certain ways. A larger sample of both English and Mandarin speaking participants for the time-related experiments would have strengthened the results. A more advanced form of animation for the priming materials in Experiment 2 could have enabled a more thorough analysis of the effects on the participants. It would also have been desirable to study the gesturing patterns of Mandarin speakers when talking about time in both their native and a non-native language. This was not possible due to both time and logistical constraints. However, in all cases the research was conducted in a meticulous and scientific manner, with the hope that the limitations do not greatly damage the results.
7.5 Suggestions for Future Research

There is scope for further research in a number of areas to examine the relationship between language and cognition. As mentioned above, it would be valuable to study Mandarin speakers’ use of gesture when talking about time both in their native language and in a non-native language. The significance of gesture in revealing the understanding of abstract thought was discussed in this thesis (Kendon 2000; McNeill & Duncan 2000). For speakers of Aymara gesture was found to add to the wealth of data obtained from their language about their conceptualisation of time (Núñez & Sweetser 2006). A study of Chinese gesture would enrich the understanding of Mandarin speakers’ conceptualisation of time.

Further research can also be undertaken to examine the effects of alternative means of negation in different languages. This study compared the negation systems of Russian and English. Research could be conducted to study the effects of negative concord in other languages, such as Italian, Greek, or Turkish. This would establish whether the effects observed among Russian and English speakers in this study can be extended to speakers of other negative concord and double negation languages.

Deeper research could also be carried out to learn more about the psychological effects of n-words (Horn 1989). Finally, a diachronic study of the development of negation in a number of languages could reveal important information about why particular languages exhibit a preference for either negative concord or double negation.

Further research in these areas can uncover more information about the relationship between language and cognition. As wide a range of languages as possible should be examined, as each language may have a particular means of viewing the world. The more that is learnt of the relationship between language and cognition, the more that can be learnt about the diverse workings of the human mind.

7.6 Concluding Remarks

This study has given a detailed account of the principle of linguistic relativity and has covered a range of areas. An important aspect of this study was not to favour the conceptual system of any particular language. It has drawn upon data from a wide range of languages and used each of them to compare the modes of thought of speakers of different languages in a fair and balanced way.
Taking the concepts of time and negation as focal points, the research has found a correlation between language and cognition in the conceptualisation of abstract concepts.
Bibliography


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Appendix 1

1.1 Materials for Horizontal Spatial Primes in Experiment 1

The purple bird is ahead of the green bird.

The black ball is ahead of the orange ball.

The green car is going to win the race.

The blue bird is leading the race.

The red fish is leading the race.

The orange car is going to win the race.

The striped box is to the right of the halved box.

The navy fish is behind the pink fish.

The fish on the right is losing the race.

The fish on the left is leading the race.
The grey ball is behind the purple ball.

The black bird is losing the race.

The gold fish is behind the blue fish.

The blue circle is to the right of the pink circle.

The fish on the left is leading the race.

The white bird is losing the race.

The green box is to the right of the red box.

The purple ball is in front of the purple ball.

The red circle is to the left of the yellow circle.

The pink fish is behind the blue fish.

The red car is going to win the race.

The blue fish is behind the red fish.

The striped box is to the left of the halved box.

The green car is going to win the race.
The red fish is behind the green fish.

The orange car is going to win the race.

The orange fish is behind the blue fish.

The red bird is losing the race.

The pink circle is to the right of the blue circle.

The purple ball is in front of the grey ball.

The fish on the left is leading the race.

The green box is to the left of the red box.

The orange ball is in front of the black ball.

The yellow circle is to the right of the red circle.

The purple bird is losing the race.

The yellow car is going to lose the race.

The fish on the right is losing the race.

The blue bird is leading the race.
The pink fish is to the left of the blue fish. The purple car is going to win the race.

1.2 Materials for Vertical Spatial Primes in Experiment 1

The green fish is losing the race. The red ball is above the yellow ball.

The blue bird is leading the race. The purple fish is losing the race.

The pink balloon is above the green balloon. The red shape is below the orange shape.
The dark blue box is above the light blue box. The yellow ball is below the purple ball.

The green ball will hit the ground before the orange ball. The multi-coloured hot air balloon is below the green hot air balloon.

The grey ball is below the blue ball. The yellow fish is losing the race.

The green shape is above the blue shape. The red and brown bird is going to catch the worm.
The halved box is above the striped box.  
The red fish is leading the race.

The red and brown bird is going to catch the worm.  
The blue ball will hit the ground after the red ball.

The red fish is losing the race.  
The blue fish is losing the race.

The orange shape is above the red shape.  
The red balloon is below the blue balloon.
The brown fish is leading the race. The light blue box is under the dark blue box.

The red ball is below the yellow ball. The green fish is leading the race.

The purple ball is below the yellow ball. The orange ball will hit the ground after the green ball.

The multi-coloured hot air balloon is above the green hot air balloon. The green balloon is above the pink balloon.
The grey fish is leading the race. The green shape is below the blue shape.

The blue bird is not going to catch the worm. The pink bird is losing the race.

The red ball will hit the ground before the blue ball. The blue ball is below the grey ball.

The green hot air balloon is above the multi-coloured hot air balloon. The striped box is below the halved box.
The red balloon is below the blue balloon. The green bird is going to catch the worm.

1.3 List of Temporal Questions for Experiment 1

1. November comes later than September - true or false?
2. August comes later than March - true or false?
3. December comes earlier than February - true or false?
4. May comes earlier than July - true or false?
5. February comes later than June - true or false?
6. October comes later than July - true or false?
7. February comes earlier than April - true or false?
8. December comes later than September - true or false?
9. March comes later than May - true or false?
10. August comes earlier than April - true or false?
11. July comes earlier than November - true or false?
12. June comes earlier than January - true or false?
13. October comes later than February - true or false?
14. March comes later than January - true or false?
15. June comes earlier than August - true or false?
16. March comes later than September - true or false?
17. November comes earlier than August - true or false?
18. January comes earlier than June - true or false?
19. November comes earlier than October - true or false?
20. February comes earlier than December - true or false?
21. August comes later than October - true or false?
22. July comes earlier than November - true or false?
23. December comes later than September - true or false?
24. July comes earlier than March - true or false?
25. February comes earlier than April - true or false?
26. September comes earlier than February - true or false?
27. October comes later than February - true or false?
28. August comes later than March - true or false?
29. November comes earlier than February - true or false?
30. June comes earlier than August - true or false?
31. October comes later than July - true or false?
32. January comes earlier than June - true or false?
33. July comes later than August - true or false?
34. September comes later than November - true or false?
35. March comes later than January - true or false?
36. April comes later than September - true or false?
37. February comes earlier than December - true or false?
38. January comes later than April - true or false?
39. November comes later than September - true or false?
40. May comes earlier than July - true or false?
Appendix 2

2.1 Materials for Horizontal Spatial Primes in Experiment 2

Dance quickly!

Those damned sorcerers will stop at nothing.

Will sixty be enough?
The interred were not to be deterred.

2.2 Materials for Vertical Spatial Primes in Experiment 2

This would have changed Newton’s formula.

All the king’s horses and all the king’s men were able to take the day off.

Upstream the ball tumbles.
The cyclist might fall off the cliff.

2.3 List of Temporal Questions for Experiment 2

1. March comes earlier than July - true or false?
2. January comes later than December - true or false?
3. August comes earlier than May - true or false?
4. February comes later than January - true or false?
5. October comes later than June - true or false?
6. July comes earlier than September - true or false?
7. May comes later than November - true or false?
8. September comes earlier than December - true or false?
9. April comes later than February - true or false?
10. December comes earlier than March - true or false?
Appendix 3

3.1 English Statements and Questions for Experiment 3a

1. Mary picks up the phone and doesn’t hear anything.
   ➔ What do you think Elizabeth will hear if she picks up the phone immediately after Mary?
   Silence; Probably silence; Don’t Know; A faint voice; Somebody speaking

2. Julia always looks forward to Halloween
   ➔ Does Julia like to scare people?
   Definitely; Probably; Don’t Know; Probably not; Definitely not

3. Priska goes into the castle and doesn’t see anybody doing anything.
   ➔ Do you think that Priska takes a thorough look around the castle?
   Definitely not; Probably not; Don’t Know; Probably; Definitely
   ➔ About how many people do you think were in the castle?
   Zero; Don’t Know; More than three

4. Carla sees everybody playing in the snow
   ➔ Do you think that Carla will go outside and play with the other people?
   Definitely not; Probably not; Don’t Know; Probably; Definitely

5. Olivia doesn’t ever give anybody anything for their birthday.
   ➔ Do you think Olivia will give her son and daughter a Christmas present?
   Definitely; Probably; Don’t Know; Probably not; Definitely not

6. Diana thinks that her coffee tastes bitter
   ➔ Do you think that Diana will drink her coffee?
   Definitely; Probably; Don’t Know; Probably not; Definitely not

7. Grace doesn’t travel anywhere with anybody.
→ How often do you think Grace travels alone?
Frequently; Occasionally; Don’t Know; Rarely; Almost never

8. Emily smells smoke coming from the kitchen
→ Did Emily forget to turn the cooker off?
Definitely not; Probably not; Don’t Know; Probably; Definitely

→ Do you think that Alannah would ask for help if she could not solve a problem?
Definitely not; Probably not; Don’t Know; Probably; Definitely
→ Do you think that Alannah would accept help if somebody offered it?
Definitely; Probably; Don’t Know; Probably not; Definitely not
3.2 Russian Statements and Questions for Experiment 3b

1. Анна берет телефон, и она ничего не услышит
→ Если Ольга берет телефон после Анны, что она услышит?
Просто молчание; Вероятно просто молчание; Я не знаю; Слабый голос; Громкий голос

2. Елена всегда с нетерпением ждет Рождество
→ Елена любит дарить и получать подарки?
Да, конечно; да, наверно; Я не знаю; наверно нет; конечно нет

3. Светлана входит в замок, и она видит, что никто, ничего, не делает
→ Светлана смотрит тщательно вокруг замка?
Конечно нет; наверно нет; Я не знаю; да, наверно; Да, конечно
→ Кроме Светланы, сколько людей в замке?
Никто; Один; Больше чем три; Я не знаю

4. Ирина видит, что каждый играет в снегу
→ Ирина пойдет наружу играть с другими людьми?
Конечно нет; наверно нет; Я не знаю; да, наверно; Да, конечно

5. Татьяна никогда, никому, ничего, не дарит для их дня рождения
→ Ты думаешь, Татьяна даст своему сыну и дочери подарки в их дни рождения?
Да, конечно; да, наверно; Я не знаю; наверно нет; конечно нет

6. Анастасия думает, что ее кофе холодный
→ Анастасия выпьет свой кофе?
Да, конечно; да, наверно; Я не знаю; наверно нет; конечно нет

7. Вера никогда, никуда, ни с кем, не путешествует
Вера часто путешествует одна?

Да, конечно; да, наверно; Я не знаю; наверно нет; конечно нет

8. Лилия видит дым на кухне

→ Лилия забыла выключить духовку?

Конечно нет; наверно нет; Я не знаю; да, наверно; Да, конечно

9. Наташа никогда, никого, не о чем, не спрашивает.

→ Наташа спросила бы о помощи если бы у нее была проблема?

Конечно нет; наверно нет; Я не знаю; да, наверно; Да, конечно

→ Наташа приняла бы помощь если кто-то предложил ей?

Да, конечно; да, наверно; Я не знаю; наверно нет; конечно нет