How non-native speakers learn polysemous words:
A study of the equivalence of prototypicality across languages.

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Abstract

This study investigated whether English second language learners learn the senses of *polysemous* vocabulary items in an order from a core sense to more extended senses. Polysemous words have one form but many interrelated meanings. It was hypothesised that such an order could be explained by way of the theory of *prototypicality.*

48 ESL learners from three language groups, French, Japanese and Chinese, took part in the study. The participants translated into their first language 29 English sentences using different senses of the word *over.* Translations were coded for correct translations of the sense of *over* and for variation in the correct translations. A *MANOVA* analysis showed that core senses were translated significantly more correctly than extended senses. A negative correlation was shown between variation in translation and correctness of translation. Following Krzeszowski,T. (1990), the study confirms that the theory of prototypicality offers an effective way of explaining language transfer.

Résumé

Cette recherche vise à étudier si les apprenants de langue seconde apprennent le sens des mots polysémiques dans un ordre à partir d'un sens central jusqu'à un sens périphérique. Les mots de polysémie désignent plusieurs notions ayant un caractère commun. On émet une hypothèse qu'un tel ordre soit expliqué par la théorie des prototypes.

48 apprenants de trois groupes, ayant comme langues maternelles le français, le japonais et le chinois, ont participé dans la recherche. Les participants ont traduit de l'anglais en leurs langue maternelles 29 phrases qui utilisent les différant sens du mot *over* Les traductions ont été codées pour justesse de compréhension du sens et pour variation des traductions exactes. Une analyse de *MANOVA* a montré que les traductions du sens central ont été traduites avec plus de justesse que les sens périphériques. Une corrélation négative a montré entre variation à la traduction et justesse de traduction. Suite à Krzeszowski, T. (1990), cette recherche confirme que la théorie des prototypes offre une méthode efficace d'expliquer le transfert linguistique.

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INTRODUCTION

This study will look at how second language learners acquire polysemous words, which are words that have one form but many (interrelated) senses. Specifically, the study seeks to account for the general order in which learners acquire the different polysemous senses. In the field of second language vocabulary acquisition, much work has investigated how learners increase the size of their vocabulary, size in this case being a question of breadth of knowledge. Less work has investigated the question of depth of knowledge, which asks how learners develop their understanding of the ways each individual word can be used. In one respect, it is more difficult to measure depth of knowledge than it is to measure breadth of knowledge. Breadth of knowledge can be measured by counting the number of words learners can either use or know the equivalent of in their first language. Depth of knowledge cannot usually be measured by the same additive method because this type of knowledge is not naturally divided into separate units. The study of polysemy presents an interesting way of investigating this problem, because it presents a case where one word is naturally divided into individual units according to its different senses. Thus by investigating how learners acquire the different senses of a polysemous word, we can investigate how their depth of vocabulary knowledge develops.

Two main hypotheses are presented to account for second language learners' acquisition of polysemous words. The hypothesis of frequency states that learners will learn the senses according to their frequency in the input. This

hypothesis considers that each sense is equally easy for the learners to learn. In contrast, the hypothesis of prototypicality does not consider that all the senses are equal, but that more prototypical senses will be more easily learned than less prototypical senses. The hypothesis of prototypicality is divided into two parts: the hypothesis of prototypicality *across* languages, and the hypothesis of prototypicality *within* languages. The hypothesis across languages considers that the prototypicality of the senses in the L2 will influence learners regardless of their L1, whereas the hypothesis within languages considers that the degree of prototypicality of the senses in the learners' own L1 will influence their acquisition. To investigate these hypotheses, second language learners *translated* English sentences using different senses of a polysemous word into their first language. Whether they translated the sense correctly or not, as well as the ways in which they were translated, indicated whether or not they knew the sense of the polysemous word. These data were used in different analyses to confirm or refute the different proposed hypotheses.

The study has theoretical implications for the use of prototype theory in the investigation of language transfer between the learners' first language and their second language. Specifically, these implications are for the study of depth of vocabulary acquisition, but potentially prototype theory could have implications for the study of other types of language transfer as well.

Chapter 1
LITERATURE REVIEW

I. Prototype theory

Why is it that learning a second language seems effortless at times and at other times frustratingly difficult? For the researcher of second language acquisition, prototype theory offers one interesting perspective on this question. In order to analyse a second language for its ease or difficulty of learning, it is helpful to analyse the categories of each language to facilitate comparison. Prototype theory provides a method of categorisation which is based on research into how people conceptually categorise not only language, but also colour, animals and other elements of the natural world. As will be shown below, people do not categorise the world in the same way; there can be differences between cultures and even between individuals. These differences in category have the potential to cause difficulty for the second language learner. Confusion could arise for learners if they expected the categories in the second language to be the same as those in their first. Even if learners did conservatively expect that categories would be different between languages, there is no way they could know how or where these differences would be manifested. Through prototype theory we find a way of identifying some possible sources of difficulty for the learner. Before going on to look at differences between the categories of different languages, it will be worthwhile to consider how prototype theory is grounded in the studies of psychology and first language learning.

Prototype theory first developed in the field of experimental psychology out of the research of Eleanor Rosch and her associates in the 1970's. Through a series of experiments, Rosch and her associates presented empirical evidence which countered the classical model of categorization. The classical model posited that categories had strict criteria boundaries which classified items as being either in or not in a category (Lakoff, 1987). For example, if an animal meets certain criteria it will be classified as a dog, but it won't be classified as such if the criteria aren't met. Classical categorization justifies this assertion by arguing that an animal cannot be both a dog and not a dog. As a corollary to this argument, all dogs are considered equal: no dog is considered a better example of a dog than another. With its strict criteria boundaries, the classical model assumes a certain orderliness in the way the world is organised and that this orderliness is mirrored in the conceptual structure of the human mind. This assumption about the organization of information in the mind was reportedly not investigated by proponents of the classical model (Lakoff, 1987). When the structure of the mind's categorisation was investigated in the experiments of Eleanor Rosch, the results pointed to a different type of conceptual structure altogether.

The development of prototype theory started with an investigation of colour identification. Berlin and Kay (1969) presented English speaking participants with a wide range of colour chips. They found that people uniformly agreed on the best example of a colour category. Thus, when asked for the best example of blue, people choose a chip of the same blue colour. These best

examples of a colour category they termed focal colours. Another study (Rosch,1973) dealt with monolingual speakers of the New Guinea language Dani, which has only two colour words, *mili* (for dark colours) and *mola* (for light colours). In this study, participants were found to remember new colour names more easily for words referring to focal colours than for words referring to non-focal colours. The differences between the naming of focal colours to those of non-focal colours produced asymmetries in the data. Rosch termed these types of asymmetries *prototype effects*, which is to say that focal colours are more prototypical examples of a colour category than non-focal colours.

In dealing with colour, there is a neurophysiological basis to prototype categorisation. Within the retina there are light sensitive cells (rods) and colour sensitive cells (cones), which react to red, blue and green light. Beyond the retina, the colour information is processed by complementary cell responses, of blue or yellow, and red or green (Taylor, 1995). Thus, for colour it seems that there is a neurophysiological basis to categorisation, in that focal red, for example, would produce a high response in the cells which deal with red information.

Because of this neurophysiological basis, it is to be expected that people throughout the world will recognise colours in similar ways. However, Rosch extended the study of colour categorisation to the categorisation of things without a neurophysiological basis. For example, she found that the way people of a certain culture classify birds also produces prototype effects (Rosch, 1975). Using the evidence of prototype effects, in these and other experiments, Rosch

demonstrated that the mind categorises semantic information according to prototypicality, so that some examples of a category will be more central than other examples. Furthermore, the subjects' choice of the quality of a given example is culturally and geographically biased. Thus, a robin can be said to be more central to a North American's concept of a bird than a penguin.

The definition of the structure of a prototype is a matter of debate. Nevertheless, as a negative qualifier, it should be understood that the best example of a category is not necessarily the de facto prototype. In the bird example above, the prototype should not be understood as a mental image of a robin against which all other birds pale in comparison. To talk about a prototype is to say that the mind is structured in such a way as to produce *prototype effects*. The central prototype itself is best understood as a cluster of semantic features. Any example of the prototype will express some of these features and the best example will express the most; but rarely, if ever, will one example express all the semantic features in total (Geeraerts, 1989). A robin, for example, expresses the common bird features of flight, feathers, singing, eggs, and size; however, unlike most birds, the robin's eggs aren't white, but blue.

In a paper on the then state of the art of prototype theory, Geeraerts (1989) discusses four characteristics of the definition of prototypes. The first is that prototypical categories are not criterially organised; that is to say, there is no finite set of criteria which defines whether an item is part of a category or not. The second characteristic is that prototypes exhibit family resemblances. This idea draws on Wittgenstein's analogy of category structure to physical similarities

between family members. Two people from a family may look quite different when compared individually. But when these individuals are considered within the larger family group, the two are then seen to share in common some family traits; this is so despite there being no obvious common traits between them. The third category was discussed above in the bird example, that there are degrees of category membership. It is by this characteristic of a prototype that a robin is considered a "better" example of a bird than a penguin. According to the fourth category, prototypes may have fuzzy boundaries: that is, it can be debateable whether items which are far removed from the central prototype are part of the category or not. Classification may thus change on an individual basis; for some people an item may be part of the category, while for others it would lie outside the category.

What is attractive about Geeraerts's model is that the category of the prototype is itself prototypical. Not all prototypes will exhibit all four of these characteristics, but they will all contain at least one. The bird prototype, for example, does not exhibit fuzzy boundaries. An animal is either a bird or it is not a bird. The bat, for example, is not a bird, despite its flight, and the platypus is not a bird, despite its beak and eggs. Another interesting example of a prototype, which Geeraerts (1989) presents, is that of the odd number. While there is no debate that natural numbers are either odd or even, these numbers do exhibit degrees of representativeness. When asked whether a number is odd or not, subjects will respond considerably faster for numbers 1-10 and more slowly for larger numbers. Thus, while the category of odd numbers does not share in the

other three prototype characteristics, it does exhibit degrees of category membership in that odd numbers from 1-9 display greater prototypicality.

Prototype theory has a certain appeal in studies of second language acquisition. When cognitively mature people learn a second language they come to the task with a complete knowledge of their first language. When considered in relation to prototype theory, we see that this first language knowledge doesn't merely entail knowledge of a grammar and a vocabulary. Competent knowledge of a language means that the speaker also has a conceptual understanding of the world which in turn has a prototype structure. To what extent the prototype structure which informs the first language is similar to that which informs the second is a matter of degree. It is a question whether the differences between the prototype structures of the two languages will cause learning difficulties for the learner; furthermore, if these differences do cause learning difficulties, then it is a question as to when and how these difficulties will arise. At the outset then, we want to first ask whether there is any universal similarity between prototypes. If there is some universality, then it might be the case that positive transfer from the L1 to the L2 will facilitate learning. Secondly, we will want to ask what learning difficulties can be attributed to the differences in prototype structure between the two languages: the learners' difficulties could be attributed to many other factors, both specifically linguistic and due to more general psychological factors. While it is beyond the scope of this study to discuss the psychological differences between learners, some questions of linguistic difficulties are addressed in Section IV, on Lexical Transfer, and in Section V, on Frequency.

II. Universality of image schemas

A. The theory of embodiment

To address the question of whether there is any universality to the structure of prototypes, I will turn to the work of Lakoff (1982, 1987), who puts forward a theory of embodiment to explain how language is meaningful. Lakoff argues that the theory of embodiment is important because it reconciles the division between linguistic categories on the one hand, and the objects, experiences and phenomena in the real-world on the other. If I take the word "shoe", I am speaking of a category which can be applied to any number of different real world shoes, from the pair that is now on the mat to my right, to the red ones whose heels you tap together to take you home. One can say that it is the job of language to organise linguistic categories, like *shoe*, into a systematic string of utterances; however, these categories must be related to real world experiences in order for them to be meaningful: the category of *shoe* has no meaning without the physical experience of real-world examples. If the categories simply referred to themselves or to innate principles outside of real-world experience, then it would be impossible for two people to talk together meaningfully about the same object. This is to say that the sentence "My shoes are on the mat," is not meaningful in itself, but only insofar as it can be related to real world experience.

The meaning of any category in language is based on the physical and social experience of ourselves interacting with our physical and social world. The theory of embodiment posits that this is true of even the most abstract of categories whose meaning is derived from concrete categories which refer to real

world experience. The theory is justified to the extent that it is able to trace this connection between the abstract and the concrete as a way of showing how language is informed by real world experience.

Lakoff refers to prototypes as a type of cognitive model, a term which is more general than the term prototype and one which avoids the confusion that arises when the prototype of a category is associated with its best example. Lakoff maintains that the structure of our thought is characterised by cognitive models. The elements of these models correspond to categories of our mind, including those categories which produce prototype effects. These cognitive models, as mentioned above, are either directly embodied or are systematically linked to embodied concepts. While these embodied concepts are not predictable, they are nonetheless natural in that they can be explained by our physical and social experiences. For example, the centrality of robins to the *bird* category can be explained by their familiarity to North Americans, in contrast to other birds like ostriches. Linguistic information is then understood to be paired with these embodied cognitive models of the conceptual system by way of symbolic (non-embodied) models (Lakoff, 1987).

II. B. Image schemas

Returning to the question about universality, Lakoff does not maintain that there is a necessary universal basis to our cognitive models. No two languages, or for that matter no two speakers, will necessarily have the same prototypical structure to their linguistic concepts: differences will occur because individuals

develop their prototypes according to their individual experiences. Nonetheless, as these experiences are more or less similar between individuals, their prototypes will also be more or less similar. Cognitive models are said to be embodied because they can be understood as motivated by social and physical experiences. To the extent that these social and physical experiences seem natural or sensible to the learner, they will be easily understood. Thus, we will assume that *the more directly linguistic information relates to these embodied concepts, the more easily this information can be learned by the learner.* This assumption is similar to the overall approach taken by those who advocated the contrastive analysis hypothesis in the 1960's and 70's. A review of that literature, including the difficulties with which the approach met, is addressed in Section IV.A of this chapter.

There is a problem with asserting that prototypes between individuals are different. Since prototypes are used to organise information about the world so that two people can communicate meaningfully, it stands to reason that the prototypes of the two people must be similar. The question is, at what level are the prototypes similar between individuals to allow for meaningfulness, and yet, at another level, to still allow for individual differences? Lakoff posits that we have certain pre-conceptual structures which constitute the building blocks of concepts like those with a prototype structure. These pre-conceptual structures are universally alike to the extent that they characterise the most basic experiences of the human body interacting with the physical world. In this study, the image schema is the pre-conceptual structure which relates to spatial prepositions.

Image schemas are simple structures that mark relationships which are constantly recurring in the physical world. The two sentences "I am on the carpet" and "The tanker is on the ocean" describe very different situations, and yet they are similar because they are both using the same image schema associated with the word "on". (Lakoff, p. 453). An image schema itself is not detailed in the way a particular image is; rather, it is abstracted in the sense that it can inform the meaning of a variety of different images. For example, if the sentence "The dog jumped *over* the fence" is a truthful representation of a given image, then the sentence "The dog jumped *on* the fence" would be a false representation. This is so despite the fact that many variables, like the height of the fence or the size of the dog, are not specified. Thus, an image schema is a concept informed by our general experiences of the physical world and is in turn sufficient for representing the physical world's basic spatial relationships.

Some of the most commonly discussed image schemas are referred to as PATH, UP-DOWN, CONTAINMENT and PART-WHOLE schemas (e.g. Lakoff, 1987 and Mandler, 1992). These basic image schemas are considered universal because they describe relationships between the human body and the physical world that are assumed fundamental. For example, the PART-WHOLE schema facilitates the assumption that a whole object is made up of many parts, and that these parts can in turn signify the whole. Thus, when we see a newscaster on TV from only the waist up, we still assume his lower half is intact. The PART-WHOLE image schema is said to be universal because all people are assumed to make this type of assumption.

The application of an image schema is not restricted to the comprehension of the physical world, but is also applied to linguistic signification. Within the domain of a particular language, an image schema can be applied to more abstracted meanings. For example, if someone were to say "I've got a new set of wheels," English speakers understand that the "set of wheels" is a part which signifies a whole *car*. Lakoff hypothesises that we are able to deduce this meaning because we apply a PART-WHOLE image schema in our interpretation. It is Lakoff's contention that all languages will extend the meaning of these universal image schemas, but that they will do so in individual and idiosyncratic ways. Indeed, even though the image schema makes the "set of wheels" expression meaningful, it may not be obvious and may in fact have to be learned. For this reason, if the "set of wheels" expression were translated into another language, native speakers of that language may fail to understand its significance. Nevertheless, these speakers of another language will use different extensions of the PART-WHOLE schema individual to their own language. In summary, the image schema is assumed to be universal at the level of preconceptual structure. When the image schema is extended to the level of language, in all likelihood a great deal of variation will occur.

II. C. L1 and L2 evidence for image schema universality

Research has been done on the formation of spatial concepts in infants to see to what degree language informs the formation of concepts and to what degree the concepts inform the acquisition of the language. Mandler (1996,

1992) has stated that language acquisition only begins once spatial understandings are in place. She has said that the challenge for young infants is to map the digital form of language onto the analogue form of spatial conceptualization.

This perspective on L1 acquisition is corroborated by Bowerman and Choi (2001). They compared how children learning English as their first language differed from children learning Korean as theirs by the way the two groups used language to describe both similar and identical events. Korean and English were chosen because the categories defined by *put on* and *put in* in English are categorised markedly different in Korean. In Korean, these categories are primarily defined by words expressing 'interlock tightly' and by 'put loosely in or around'. If it is hypothesised that the pre-linguistic spatial categories describe containment and support from below, then Korean children would have more difficulty acquiring the categories of their language than children learning English; however, this is not the case. In records of spontaneous speech, both groups of children describe similar events at similar ages using the categories appropriate to their respective languages. Furthermore, in a more controlled experiment, the same results were borne out. In this experiment an object was held above its target (a cap above its pen, a ring above its post, etc.,) and the children were asked what to do with the object. In the cases of both groups, the children gave directions appropriate to the categories of respective languages.

In a large study of 38 different languages Bowerman and Choi (2001) found that the concepts described in English by *on* and *in* are described by a

variety of ways in different languages. They defined six different senses: *a.* cup on table, *b.* band-aid on leg, *c.* picture on wall, *d.* handle on door, *e.* apple on twig, *f.* apple in bowl. Some languages, like Spanish, will mark these senses by only one preposition, while others, like Japanese and Korean, mark them each individually by both adpositions and verbs. What is most interesting about this study is that all languages will define the boundaries of their different categories according to a consistent gradient. If a language uses one preposition to mark both senses *a.* and *c.* then that language will mark the intervening sense *b.* with the same preposition. This experiment indicates the possibility that children acquiring their first language come to the task with a holistic conception of space such that they understand similarities between the spatial configurations of different situations. The indication is that the children's preconceptual understanding of space facilitates their acquisition of the linguistic category.

Bowerman and Choi (2001) corroborated this possibility with the observations of systematic overgeneralization taken from several experiments. In Dutch, the word "uit" is used not only for removal from containment (as in the English "out"), but also for removing clothing (as in "take off"). The polysemy of this word is seen to be the cause for a great deal of overgeneralisation of the word "uit" into the domain of "af" ("off") in L1 development. To return again to the comparison of English to Korean, children use the words "open" and "ppayta" respectively to describe similar situations, like taking a lid off a saucepan. However, unlike "open", "ppayta" does not carry the meaning of "to make accessible"; it is used for describing situations where objects are removed from

a tight, interlocking fit. Thus, children learning Korean will never overgeneralise "ppayta" to describe a situation like turning on a faucet, unlike children learning English who do overgeneralise "open" to this situation ("open" is only used regionally to mean "turn on" in English). These examples of overgeneralisation are significant because while they diverge from adult usage, they do so in a systematic way. This systematic overgeneralisation indicates that there are language-independent sources of spatial conceptualization (Bowerman and Choi, 2001). These universal spatial categorizations cannot be defined neatly in terms of containment and support, for example, because different languages will define the borders of spatial categories in radically different ways. The problem which second language learners face is that they need to reconceptualise similar spatial categories of their L1 and L2 in different but nonetheless systematic ways.

When acquiring a second language, learners face the problem of learning a new set of concepts for which they already have concepts in their native language. For this reason, second language learners face a different task from first languages learners; indeed, it seems likely that their native language concepts will influence the formation of their second language concepts. As seen in the comparison between Korean and English above, there can be radical differences between language concepts; for this reason, it is unlikely that native language concepts will be mapped directly on to the second language word form.

In fact, second language learners show similar learning *behaviours* to first language learners. Ijaz (1986) conducted a study comparing native English speakers to advanced ESL learners on a sentence completion task requiring a

decision about spatial prepositions. The items were analysed according to prototype theory, by which some sentences were considered central instances of a spatial preposition and other sentences non-central instances. For the central instances, ESL learners showed a marked tendency to overuse the best example of a spatial preposition (*over* or *on*) and an avoidance of its variants (*above* or *upon*). At times, the learners further overused a preposition in non-central instances, again in avoidance of the variants. This tendency to overuse is similar to the way first language learners develop conceptual boundaries. However, for other non-central instances, the learners avoided the best example. Ijaz concluded that in this case the ESL learners were influenced by the equivalent concept in their L1, which would not be applied in such an instance.

III. Polysemy.

A. Definition.

The explanation of how an image schema is applied to language has been used to explain the variation in the polysemy of spatial prepositions. Polysemy describes the case where one word has a number of different but related meanings. For example, the word "head" as in 'a person's head' is different from 'the head on a glass of beer' and different again from 'a head of cabbage'; yet, each of the three examples seem fairly obviously related to each other, by shape and position. This is in contrast to homonymy, which describes one word form with different, unrelated meanings: the 'bank' which keeps money does not seem easily related to the 'bank' which is found next to a river.

It is often the case with polysemous language that a single word can use an image schema to signify in one case a very literal meaning, while in another case a very abstract meaning. In the sentence "The picture is hanging over the fireplace," *over* signifies a basic spatial relationship between the picture and the fireplace; in a second sentence, "The lecture was over my head," *over* signifies an abstract relationship between a lecture and my inability to understand it. In terms of the theory of embodiment, polysemous language offers an interesting case, because it traces a semantic path, by the same word form, from meanings based very specifically on physical experience, to meanings which are abstracted and removed from such experience. Below, I will present Lakoff and Brugman's description of the polysemous term *over* (Lakoff, 1987; Brugman and Lakoff, 1988), the focal preposition of this study.

III. B. A description of *over* and the idea of motivation

When lexicographers define the various meanings of polysemous items, they face the problem of where to draw the line between senses. They must decide what constitutes a different sense of the word as opposed to considerations which are specific to the particular semantic context and do not differ intrinsically. Brugman and Lakoff approach this problem by identifying each different sense of a word with a different schema. The structure within each schema allows for variation of certain components and constrains the variation of other components. Brugman and Lakoff describe their first schema for *over* as the Above-across sense, for which the sentence "The plane flew over," may refer

to the most core meaning. In the example, there is a trajector (the plane) which flies above an unspecified landmark below, with which it makes no contact. Within this sense, variation is permitted for the length and height of the landmark as well as for whether there is contact between it and the trajector. This second feature can be seen in the sentence "Sam climbed over the wall" which maintains the conditions of the Above-across sense. The sentence "Hang the painting over the fireplace" does not maintain the Above-across conditions because there is no movement of the trajector. Thus, it is considered a different sense, informed by a different schema, which Brugman and Lakoff term the Above sense.

Tyler and Evans (2003) take issue with the description of internal variation which Brugman and Lakoff describe. They maintain that the internal structure of the different senses is not as constrained as the description Brugman and Lakoff present. Tyler and Evans remark that the sentence "The hummingbird hovered over the flower" describes equally well situations where the flower is extended vertically like a tulip or without verticality like a water lily. The key point in the matter is that the bird is higher than the flower. Despite the contention between researchers over the internal structure of the schemas, there is more general consensus about the presentation of the general schemas for the term of *over*. In addition to the two senses above, Brugman and Lakoff present four more: the Covering sense "The board is over the hole," the Reflexive sense "Roll the log over," the Excess sense "The bathtub overflowed," and the Repetition sense "Do it over." Tyler and Evans concur in general with these six senses of Brugman and Lakoff; however, they reconfigure them somewhat. For example, they

detach from the Covering sense the sense of *examining,* as in "Phyllis is looking over the entrance to the underground chamber" (Tyler and Evans, 2003).

Significantly however, Tyler and Evans distinguish the Above sense as the most prototypical, or as they term it, the "proto-scene". It is their hypothesis that all other senses of a polysemous word are ultimately derived from the proto-scene at some point in its diachronic history. They determined the Above sense as the proto-scene primarily because it is the earliest recorded meaning according to the *Oxford English Dictionary* and it is used most predominantly of all the senses. Thus, according to this line of logic, *over* as a polysemous item forms a radial category where the proto-scene at the centre either directly motivates all the other senses of the word or indirectly does so by way of intervening senses.

If there are connections between the different senses of a polysemous item, then how are the connections made? Lakoff (1987) answers this question by developing a "principle of motivation" to describe how the connections between senses, while not predictable, are natural and understandable. For example, Brugman and Lakoff (1988) maintain that the Above sense, as in "The power line stretches over the yard," is derived from the Above-across sense, as in "The bird flew over the yard." They claim that the extended path (of the bird's flight) motivates the schema transformation into the one-dimensional trajector (i.e. of the power line's motionless length). However, while Tyler and Evans agree with the motivated transformation between the two schemas, they assert that the Above sense alone motivated the Above-across sense.

In any case, the diachronic path of polysemous items may be considered a moot point. What is more significant to second language research is whether or not the different senses of the item are acquired synchronically by a native speaker according to the same diachronic path. This question is significant because as a corollary question, one asks whether native speakers have intuitions about the relations between the different senses which help either in their acquisition of the item or in how they use it. It may be that native speakers learn the different meanings of the polysemous word as individual items, much as they would learn different words. If this were the case, any radial structure derived from the relationship between the meanings of the polysemous word would constitute how the meanings evolved in the past, not how they were learned by any individual today.

III. C. Recognition and acquisition of polysemy in native speakers

Rice, Sandra and Vanrespaille (1999) conducted an experiment investigating whether native speakers have intuitions about the metaphoric basis of polysemous prepositions in Dutch and English. Specifically they looked at the TIME IS SPACE metaphor, which is pervasive not only in these two languages but also in a wide range of other languages. Certain prepositions refer to this metaphor: in English, common examples would be, "I'll meet you on Tuesday," or "It rained throughout the night," (Rice, et. al., 1999). The same prepositions also refer to concrete senses as well as more abstract senses, as in the sentence "I can depend on him". The researchers used a "transparency hypothesis" to test

whether speakers had intuitions about the underlying metaphoric motivations of the domains of the temporal senses. This hypothesis assumes that if speakers regard temporal senses as more similar to spatial senses than to abstract senses, then the speakers can be said to understand the metaphoric link between space and time.

Rice, Sandra and Vanrespaille conducted three tasks with adult native speakers: a sorting task asked them to organise into groups sentences of the three domains using the preposition *on*; a similarity decision task asked them to judge pairs of sentences for the similarity between the senses of a shared preposition; and a translation decision task asked participants to decide whether the sense of a given word would be maintained if the word were translated directly into a different language. Their results found that speakers were very consistent in their identification of the three domains of space, time and abstraction as distinct groups. However, the participants did not recognise more similarity between the domains of space and time than they did between space and abstraction. This led the researchers to conclude that awareness has been lost for the motivation behind the TIME IS SPACE metaphor.

Although adults may not be aware even unconsciously of the links between domains, such links may have still been part of their acquisitional development of prepositions as children. Rice (1999) looked at corpus data on children aged between 1;6 and 3;6 learning English as their first language. Specifically she looked to see if children acquired the different senses of *to* and *for* in the same order as the different senses developed diachronically, that is, the

hypothesis was that the language development of the child mirrored the diachronic development of the words in question. Nevertheless, a significant amount of the data went against the hypothesis; specifically, for the preposition *to*, spatial senses did not emerge in these children before non-spatial senses, nor did preposition use emerge before particle use; it was also left inconclusive whether concrete senses emerged before abstract ones. For the preposition *for*, the study was inconclusive as whether spatial senses emerged before the non-spatial. For both prepositions it was inconclusive whether the cognitively simple emerged before the cognitively complex. Other factors were shown to be far more of an influence on the order of acquisition. Specifically, the acquisition of different senses correlated strongly with frequency of use in the household and with experiential utility (importance within the child's daily routine). Abstract senses were often used in stock expressions. Thus, external and environmental factors were shown to be a far more significant influence on the acquisition of prepositions than internal or cognitive factors. Rice concluded by saying that, "ontogeny does not recapitulate phylogeny in the developing mental lexicon at least not across the board." (Rice, 1999, 275)

The research conducted by Rice and her associates indicates that the motivational links between senses of prepositions are not part of the competence of native speakers, neither in the intuitions of adult speakers in the sorting tasks nor in the acquisition of different senses by children acquiring their first language. The question pertinent to the present study is whether the conclusion of this research applies equally to second language learners. It seems likely that the

conclusions of this research would apply equally to second language learners; however, it is still a question whether the conclusions apply equally to the preposition *over* as they do to the three researched here, *for, to* and *on.*

The domains of these three prepositions are far more distinct than the sense of *over* discussed above. The connection between space and time is tenuous in these examples, "The shoes are on the mat" and "I'll meet you on Friday"; in comparison, the relation between these two senses of *over* is more apparent in this these examples, "The water overflowed" and "I overcooked the turkey." Furthermore, several of the senses of *to* and *for* carry only a grammatical significance, as in "I have to read tonight"; these senses do not signify anything outside of the linguistic context. In comparison, the senses of *over* are not used for solely grammatical significance.

Because the relationship between the senses of *over* are more easily traced than between the three prepositions in Rice's studies, the conclusions from these studies do not readily apply to the preposition *over.* It seems that *over* may be more comparable to other polysemous items which are not necessarily prepositions, but which have clear connections between their senses. Below, I will discuss a study by Vespoor and Lowie (2003) which shows how knowledge of a core sense of a polysemous item facilitates the acquisition of other senses by second language learners.

III. D. Second language learners' problems with polysemy

Polysemous items present to second language learners a distinct problem in the development of their target lexicon. Not only do learners face the normal challenge of learning new forms for new concepts, but they have to distinguish when there is more than one sense to this form. Bensoussan & Laufer (1984) show evidence that when learners misinterpret a word due to either polysemy or homonymy, they will maintain the misinterpretation despite contextual clues which indicate the error. This may be due to a limited language ability needed to understand the context. However, a longitudinal study by Schmitt (1998) showed that even advanced learners of English attending an English university will rarely know all the different senses of polysemous items, indicating the persistence of the problem which polysemy poses to learners. Levenston (1979) has proposed that learners show a reluctance to learn new meanings which appear to them to be unrelated. Citing Kantor (1978), Levenston reports that English speaking learners of Hebrew avoided using the word */lidxot/* to mean 'reject' despite their receptive understanding of the sense and their productive use of the word to mean 'postpone'. In a second observation, Levenston noted that in a Hebrew-English translation class, less competent speakers preferred to produce "when the party was in power", avoiding the polysemous term in "when the party was in office," which more competent speakers, including native speakers, preferred to produce. Ijaz (1986) corroborates this finding by noting that advanced second language learners overuse central spatial prepositions and avoid using variants that native speakers would opt for.

Nation (2001, pp. 49-51) has posited that learning a core concept as a catalyst would help learners master the different senses of a word with greater economy of time and memory. Learning the different senses through a catalyst would be superior to rote learning because it would use similarities between words and build upon prior knowledge in order to more strongly establish the word in the lexicon. Other researchers have looked to the models of polysemous items developed in cognitive semantics, of which Brugman and Lakoff's model of *over* is an example. They argue that because these models are all radially organised and derived from a central core concept, using that concept would facilitate the learning of other items. Such an approach has been advocated for the learning of prepositions (Lindstromberg, (1996, 2001); Boers & Demecheleer (1998)) and also for the learning of phrasal verbs (Kovecses & Szabo (1996); Boers (2000); Kurtyka (2001)).

To my knowledge, the most persuasive study to advocate the above use of a core concept was conducted by Verspoor & Lowie (2003). They noted that as one sense can be derived from another sense and so on in a chain-like fashion, the core sense of a word may share similarity with a second sense but not with a third sense derived from the second. In their study, they compared whether such a core sense would serve as a better clue for learners to guess the meaning of a second sense than the clue of a more abstracted third sense, unrelated to the core. The core sense can be identified in cognitive semantics as that sense which lends the most coherence to the concept in general (D. Geeraerts, personal communication cited by Vespoor & Lowie, 2003, p. 554).

They restricted their observation to items where the core sense referred to concrete, everyday concepts like 'rake', 'taut', 'nugget', and 'cog'. The core sense is not by definition the most concrete or literal sense, but it frequently happens to be so.

The participants in their study were 78 Dutch-speaking pre-university students with three years or more of English of study. They were split into two groups and given the following tests. In the first test, the participants were presented with pairs of English sentences using the same polysemous item in different senses. The sense of the item in the first sentence was translated into a Dutch equivalent. The participants were asked to guess the Dutch equivalent of the sense in the second sentence using the first translated sense as a clue. For both groups the target sense was the same but the translated sense, offered as a clue, was different. The first group was presented with a sentence using a core sense of the item, whereas, the second group was presented with a third more abstracted sense as a clue. After this test they were given the meanings of all three senses and given 15 minutes to study the vocabulary. Then, in the same class, they were given the second test, which presented sentences with words in the second sense. They were asked to translate these senses into Dutch. A third test was given 2-3 weeks later, identical to the first test.

All students performed relatively the same on the second test, but on the first and third tests the students in the first group, using the core sense, performed significantly better than the second group. In these cases, however, there was a large standard deviation in the scores, which led the researchers to

use a multivariate analysis of variance to measure the interaction of groups one and two as a between factor and tests one and three as a within factor. The interaction between the groups and the tests was far more significant than either of the tests individually. This result showed that providing the core sense was significant, because while the good guessers remained the same across both tests, the weaker guessers on the first test improved significantly on the third test. This was not the case with the second group, where the results between the two tests did not change to any great degree.

This study is significant because it uses strong measures to show that there is a relation between the theory of cognitive semantics and a way in which second language learners can effectively learn polysemous items. The models of polysemy proposed by cognitive semantics, like Brugman's model of *over*, are based on a theory of motivation and embodiment to explain how different senses are connected together in a radial structure extending from a proposed core sense. Some researchers (Tyler and Evans, 2003) have looked to both frequency and etymology to corroborate their models. But there is little empirical evidence for whether the theoretical model mirrors the synchronic state of the lexicon. Verspoor and Lowie show that learners will use a core sense to make a second sense understandable in the same way that models of cognitive semantics claim that a second sense is derivative of the core sense. In Vespoor and Lowie, the core sense was explicitly presented as a heuristic aid. The question the present study will address, is whether polysemous senses are learned from core to periphery when such explicit teaching tasks are not used.

IV. Lexical transfer

To ask whether second language learners learn the polysemous senses of a word in an order from core to periphery is to ask a question which counters one of the original hypotheses of the field of second language acquisition. Simply put, the early hypothesis stated that learners would initially learn a target word by mapping a first language concept to a second language word form, and where the first and second language concepts didn't match there would be learning difficulty. The research into lexical transfer which grew out of this hypothesis, developed methodologies and insights into lexical acquisition which can be applied to the question of how second language learners learn polysemous items. It is to this work that I will now turn.

IV. A. The contrastive analysis hypothesis

In the 1950's and 60's a contrastive analysis hypothesis was advocated as a method for identifying in a target language which aspects would be easy to learn for learners of a particular native language, and which aspects would be difficult. It was hypothesised that learners would find learning easy where the target and source languages were similar and difficult where the two were different (Lado, 1957); however, empirical evidence did not bear out this hypothesis. At times learners made errors when contrastive analysis predicted ease (Dulay and Burt, 1974), and found ease when it predicted difficulty (James, 1980). Attention turned from comparing languages in order to predict errors, and turned to analysing errors in order to identify their source (Corder, 1967; Ellis, 1994). The influences affecting the language of second language learners were

considered to be many, of which the influence of the L1 was considered just one (Selinker, 1972). Nevertheless, the contrastive analysis procedure didn't fall entirely out of favour in second language studies, but became used more as a post hoc tool for confirming hypotheses about the source of observed errors in learner language (Wardhaugh, 1970).

In addition to its failure to predict errors, the contrastive analysis procedure has other problems. James (1980), for example, points out a dilemma with the use of contrastive analysis. There are two steps to any contrastive analysis procedure: first, one must describe the two languages, and second, use the descriptions to compare the two languages. A linguistic model is needed to describe a language. James points out that different linguistic models are far from equal. A particular model may favour one aspect of language: phonetics, grammar, or semantics, or it may provide a better description of one language than another. A model developed in an English speaking country might be biased towards word order, whereas one developed in Russia might be biased towards morphological inflexion (pp 63-64). Thus a researcher must make a decision, choosing either the best model for description, or the best model for comparison. James proposes two solutions to the problem: 1. choose the best model for the target language and sacrifice descriptive clarity of the source language, or 2. use the best model for each language and then translate the descriptions into a model neutral meta-language for the purpose of comparison.

Krzeszowski (1990) proposes a third solution, to describe and compare the two languages using prototype theory and pattern matching. Unlike linguistic

theories which attempt to describe language, prototype theory does not attempt to make absolute pronouncements about what characterises a language. This is because the theory is characterised by family resemblances and "fuzzy borders" (Geeraerts, 1989), which means that there is no ideal representation for any one prototype, but degrees of similarity and difference. Krzeszowski refers to "pattern matching" as the comparison of groups of features between languages: the more two languages share the same features, the more prototypically similar they are. For post hoc explanations of learners' errors, Krzeszowski proposes that prototype theory should be applied as a gradient (1990), the upper bound of which will be marked by complete pattern matching of the respective features. However, the lower bound cannot be marked by pattern matching since there is no way of determining how a given learner will decide at what point similarity begins and ends: one learner may see similarity between two languages, whereas another learner may see none. Thus, the lower bound is restricted to the learners' own cognitive appraisal of congruence and equivalency between the compared forms.

In order to illustrate how prototype theory can provide a useful descriptive model for contrastive analysis, Krzeszowski describes his study involving 25 native Polish speakers, all fluent in English. Taking the 20 literal senses of *over* described by Brugman and Lakoff (1988), the participants were asked to translate these sentences into their native language. The data were then analysed as to how the participants described in Polish the concept referred to by *over* in the English sentences. The results showed that there was strong

consensus on the Polish terms used for the most prototypical senses of *over*, but much more variation in the terms as the senses of *over* became less prototypical in Polish. Furthermore, the most prototypical senses in English were also the most prototypical in Polish.

In this study, participants had difficulty translating the sentence "Harry jumped over the cliff." There was a lot of variation in the translation, and some of the participants misinterpreted the meaning, even though they were highly competent speakers. The reason proposed for the variation was that this sense was lesser in prototypicality in both languages; the reason proposed for learners making errors in translation was that in Polish the sense could only be described in a periphrastic, highly marked expression. In a complementary example, the participants translated with very high consensus one sense of *over*, the sense in the sentence "She spread the tablecloth over the table." It was hypothesised that in this sentence the sense of *over*, though not highly prototypical for English, is indeed highly prototypical for the Polish word *na*, the word all the participants choose. These two examples show how greater prototypicality makes for higher consensus in translation and lesser prototypicality leads to greater variation and a higher chance for misinterpretation. Ease and difficulty in translation can in turn be *hypothesised* to reflect ease and difficulty in acquisition.

The trend noted by Krzeszowski is that as the senses become less prototypical in the learners' L1, their translations of the senses tend to express more and more variation. This observation has some connection to the puzzle of native-like selection posed by Pawley and Syder in a 1983 article. They noted

that native speakers have a tendancy to choose certain words or expressions which sound more appropriate to them, despite the fact that other words in other structures would express the same idea equally well. The connection of this observation to that of Krzeszowski's is that both note that in certain cases native speakers will express the same idea with little variation in their expression. While Pawley and Snyder leave the observation as an open puzzle, Krzeszowski attributes the tendancy to prototypicality.

The Polish participants Krzeszowski's study were all fluent in English. If learners with less competency were to carry out the same translation task, it would be expected that some of the senses would be easy for them to translate, while other senses would present more difficulty. While contrastive analysis, as discussed above, has been rejected as a method of total prediction, using prototype theory may in fact offer certain predictive possibilities when restricted to polysemous, spatial prepositions. This is because prototype theory serves contrastive analysis as a *tertium comparationis*, grounded in theories of how all languages develop from certain prelinguistic experiences. Indeed, the senses which would be most easy for learners to learn would be those which are most prototypical in both languages (the high bound of Krzeszowski's gradient); the senses which are least prototypical in either language would be the most difficult to learn (the lower bound of the gradient). The acquisition of the different senses of spatial prepositions may thus offer a special case which can be predicted to some degree because these senses are derived from prelinguistic image schemas.

IV. B. Constraints on lexical transfer

After the contrastive analysis hypothesis fell out of favour as a method of prediction, researchers continued to investigate the influence of the first language on the target language, but now as a constraint on second language acquisition. Some of this research focused on lexical acquisition and prototypicality.

The influence of lexical prototypicality on second language acquisition is a complicated factor to observe. As a theory of cognitive organization, evidence for prototypicality in second language acquisition can only be arrived at indirectly, either through interpretations of large corpus data of learner language or through discrete elicitations of language production and language judgments by the learner. I will discuss several studies of lexical transfer from a known language to a target language which give evidence for the influence of prototypicality on second language acquisition.

Ringbom (1986) worked with Swedish and Finnish first language speakers to investigate the influences of their different first languages on their acquisition of English as a foreign language. The Swedish and Finnish languages are interesting in this regard because of their marked differences both historically and structurally. As a genetically similar West Germanic language, Swedish shares many lexical and syntactic similarities with English; on the other hand, Finnish, as an agglutinating, Uralic language, is markedly different in syntax, and, except for some shared Latin borrowings, is completely different in lexis as well.

Ringbom identified those errors which could be attributed to the influence of the first language, and categorised them as three different types of lexical

error: "false friends", "borrowing" and "lexical transfer". (The examples given below are taken from Ringbom, 1986, pp. 157-158.) Learners make "false friend" errors when they map an L1 concept to an L2 form because of this form's similarity to the L1 form. For example,

(1.1) * At the time he works at the fabric.
(Sw. *fabric* = 'factory')

(1.2) * If we can't lost the problem...
(Sw. *lösa* = 'solve')

A similar error, called "borrowing", occurs when the learner uses an L1 word for which the L2 has no comparable form.

(1.3) * I fick a job last week.
(Sw. *fick* = got)

(1.4) * Now I live with my parents but sometimes I must go bort.
(Sw. *bort* = 'away')

Learners only made "false friend" and "borrowing" errors by applying Swedish forms. Indeed, when native Finnish speakers made such errors, they too applied forms from their second language of Swedish and not the forms from their native tongue. From this evidence, Ringbom concluded that learners made these errors because the formal similarities between Swedish and English encouraged positive transfer between the languages. This formal similarity, which expresses itself by a large number of cognates, is due to the genetic similarity between the languages. Because Finnish and English are not genetically similarity, they do not share many cognates, and thus the learners do not confuse L1 forms for L2 concepts.

The case is quite different in Ringbom's third error type, "lexical transfer". Here there is no confusion over the formal similarities between words. Rather, the confusion arises when several concepts share a single form in the L1, while in the L2 each concept has a separate form. Knowing how one L2 form is mapped to one L2 concept, the learner assumes that this L2 form can be mapped to the same range of concepts as in the L1.

(1.5) *He bit himself in the language.
(Fi. *kieli* = both 'language' and 'tongue')

(1.6) *I decided to go swimming without swimming trousers.
(Fi. *housut* = both 'trousers', 'trunks' and 'pants')

Unlike the cases in the first two types, "false friends" and "borrowings", "lexical transfer" errors occur in learners' speech regardless of the genetic similarity between the first language and the second. This means that the distance between languages is not a significant factor in the cause of this error. In the first two error examples the formal similarities between Swedish and English promote the learner to make incorrect assumptions about the semantic similarity between languages. Finnish apparently does not promote learners to making these errors because there is a lack of formal similarity between it and English. The fact that errors of "lexical transfer" are made despite the lack of the formal similarity promotes the hypothesis that "lexical transfer" is based at the conceptual level. Along this line of argument, the learners make the assumption that the semantic categories used in the first language are the same in the target language. In this case extralinguistic knowledge, like cultural similarity, may play as great a role at the conceptual level as linguistic factors themselves.

Ringbom makes the point that the frequency of these errors develops in a continuum as learners' proficiency develops. Beginning learners make more "false friend" and "borrowing" errors, but these become less common with intermediate learners, when errors of "lexical transfer" become more frequent. This developmental continuum is similar to Taylor's observation about the development of errors in learners' syntax (Taylor, 1975). In a study of beginning and intermediate Spanish learners of English, Taylor noted that beginning learners used a strategy of transferring syntactic constructions from their L1 to the target language. Intermediate learners, however, employed a strategy of taking a rule learned in the target language and overgeneralising this rule to situations where it is not acceptable. In the case of both Taylor's study and Ringbom's, negative transfer from the L1 is strongest among beginning learners. Once proficiency increases, other factors become more influential.

Kellerman (1978, 1986) investigated constraints on lexical transfer. In Kellerman (1978), the polysemous Dutch word *breken* (meaning 'break' in English at its core sense) was investigated to see how the prototypicality of the word's senses correlated with their transferability to English. It was hypothesised that the meanings in closest semantic proximity to the proposed "core" meaning would be the most transferable. The core meaning was assumed to be both the most concrete and the one most intuitively fundamental of all the senses to native speakers. Fifty native speakers of Dutch, all learners of English, were presented with 17 sentences using *breken* in different senses. The learners were asked to arrange these sentences into groups of their own organisation

according to the similarity among senses. The results of this investigation were ordinally organised according to a dimension of "coreness". In a second investigation, 35 different native Dutch speakers, all ESL students, were presented with six sentences using different senses of *breken*. These senses were included among the 17 of the previous investigation and all could directly transfer into English using the word *break*. The subjects were asked to judge whether or not they felt they could use *break* in a translation of the sentence into English. The order of coreness established in the first investigation and the order of transferability established in the second correlated highly. Thus it was shown that as native Dutch speakers judged the sense of a Dutch word to be more prototypical, the more ready they were to transfer this sense to the equivalent English word.

While the above study considered prototypicality in terms of similarity to the core sense, in Kellerman (1986), frequency of different polysemous senses was considered a factor of prototypicality. In this study, the polysemous Dutch word *oog* ('eye') was considered in three tests given to Dutch learners of English. The senses of *oog* investigated were the eyes of a human, a potato, a peacock's tail, a needle, the eyes of gaming dice and an electronic eye. In all three tests the participants were presented with pairs of the above senses. A translation test asked which sense of the pair was more likely to use *eye* in English; a similarity test asked which of the pair was more like the sense of a human eye; and a frequency test asked which of the pair was more frequent in common language. It was hypothesised that the results of the similarity and frequency tests could be

calculated as a theoretical transferability measurement. If this theoretical measurement was equivalent to the results of the translation test then similarity and frequency could be considered as constraints on lexical transfer. The theoretical and observed transferability ratings of items correlated very strongly; however, frequency and similarity were not concluded to be adequate predictors of transfer in themselves because a more rigorous X^2 analysis did not show consistently significant results.

Kellerman (1986) reproduced this study with German and French learners of English, using different senses of the French and German equivalents of 'head'. In this study the correlation between the estimated and actual transferability, while significant, was less strong than in the "eye" study. Kellerman gives three reasons why the results of these studies were less robust than predicted. First, there were too few items to give confident indications; second, the chosen X^2 was a very rigorous test; and third, participants might have confused the lexical frequency of a word with the real world frequency of the word's referent (how common peacock tails are, for example).

Another point, which Kellerman does not comment on, is the difference in the results between the "eye" study and the "head" study. For the "eye" group, the observed and theoretical scores correlated more highly than for any of the "head" groups. This might be due to the fact that the senses of *eye* are more regularly extended than the senses of *head*. With the exception of an *electronic eye*, which is an active metaphor because it simulates the function of a human eye, all of the *eye* senses can be understood by a schema which says that an

'eye' is a round part of a larger whole. The senses of *head* are more complicated. The head of a poppy, a beer and a nail can all be described as the top round part. The heads of steam and boils are not round parts but round wholes. The head of paper is not round; it is at the top. The head of a club, if it's a golf club, is not the top part; and the head of a table is neither round nor at the top, it's at the front or at the most important position. The variation in the head senses is neatly explained by models of cognitive semantics as in the different senses of *over* above. But it is a question whether the similarity test that Kellerman conducted can accurately compare two senses to each other when they not are related to the core sense in the same way. This test is theoretically more valid when the items are all described by the same image schema, as in the "eye" study. I believe that the number of different schemas of a polysemous item affects any measurement of the core sense and thus affects how a learner perceives its transferability.

Kellerman (1978) proposed a transferability model which says that learners are less likely to transfer from their first language to languages which are genetically or historically distant. Ringbom has shown this to be true in his comparison of transfer from Swedish and Finnish to English. Ringbom makes a distinction between different kinds of transfer: "borrowing" , "false friends" and "lexical transfer". Only the close language of Swedish influenced the first two types of error. But lexical errors were made by learners of both the related first language, Swedish, and the unrelated one, Finnish. Thus, this type of error has less to do with the learners' first language and more to do with how they see the

world organised. This is not to say that the first language will not affect the speech the learners produce – far from it, since the way we organise the world is tied up with the languages we use to describe it. As the prototypical structures between two languages are more similar, transfer between the two languages will be more correct. Genetic and historical similarity between languages does not entail prototypical similarity. While genetic or historical similarity may encourage transfer, as shown in Ringbom's studies, prototypicality is a key factor in correct transfer, as shown in the studies of Kellerman.

IV. C. The role of consciousness and "noticing"

The assumption of lexical transfer is that learners will find learning a second language easier when it is similar to their first language. However, because this assumption does not have predictable merit (Dulay and Burt, 1974), many other factors which influence acquisition need to be considered in addition to similarity. Of those others, the factor of consciousness is to be singled out because it interacts directly with the factor of cross-linguistic similarity. Schmidt (1990) proposed the construct of "noticing" to characterise the factor of consciousness. By his characterisation, not all the second language input which the learner attends to will become intake, i.e. input which is useful to the learner's understanding. In order for input to become intake it has to be "noticed" by the learner. Schmidt lists five constraints on whether the learner notices the input or not: 1. the learner's expectations, 2. the frequency of the input, 3. the perceptual salience of the input, 4. the skill level of the learner, and 5. the task demands

when the input in presented. Of the five constraints, Schmidt singles out the learner's expectations as the constraint which applies to lexical transfer:

> For second language learning, innate universals and expectancies based on both the native and target language may all act as unconscious contextual constraints on what is noticed. (Schmidt, 1990, p 142)

Schmidt does not give a further account of cross-linguistic influence on "noticing". However, the construct "noticing" is important in connection to language transfer because by this construct we can revise the above assumption to say that learners are more likely to "notice" input which is similar in character to their first language.

IV. D. Prototypicality and L2 preposition acquisition

Several studies have used prototype theory to investigate how second language learners acquire English prepositions. Two studies, Ijaz (1986) and Willis (1998), compared native speakers to non-native speakers in their conceptions of semantic space as signified by spatial prepositions. To measure the differences between the conceptions of the two groups, these researchers used a method of multidimensional scaling (MDS). By this method, participants are asked to rank, on a scale, how similar pairs of English prepositions are to each other for an array of prepositions. This ranking provides a paired similarity measurement. The array Ijaz investigated consisted of *on*, *upon*, *onto*, *on top of*, *over* and *above*, and for Willis, *in*, *on*, *at*, *into*, *to*, *out of*, *from*, *through* and *across.* Each of these prepositions is described by a set of different dimensions. For example, in Ijaz's analysis, *over* is described by the following dimensions:

-contact, +verticality, +movement / +horizontal boundary traversal. For each preposition, the MDS analysis tool is able measure the saliency of a dimension by measuring how closely that preposition is ranked to other prepositions with the same dimension. Thus, if *over* is always ranked closely to other prepositions with the dimension of *+movement*, then that dimension will have high saliency.

Willis (1998) describes how learners develop their conception of semantic space as their general L2 proficiency develops from beginner to advanced. As beginners, their conceptions are based on their L1 norms and they develop towards L2 (native speaker) norms by way of an intermediate period where they show great variation between one another. One key problem with the MDS method of analysis as used in these studies is that it considers polysemous items as monosemous. The dimensions ascribed to these words are based on that sense of the word which is proposed to be the most prototypical. By itself, the MDS analysis compares the participants' conceptions of only the most prototypical sense of a preposition. To treat the word as validly polysemous, the MDS results need to be corroborated with another measurement, one which does reflect the words' polysemy. Without this measurement, Willis's conclusions do not tell us about the acquisition of the different senses of polysemous items.

Unlike Willis, Ijaz did corroborate her findings of the MDS analysis with a measurement of polysemy. She had her participants conduct a sentence completion task, which asked them to complete a sentence by filling in blanks requiring different prepositions in different senses. In her conclusion, she found

that participants would use a *semantic equivalence hypothesis* in their conceptualisation of semantic meanings. This hypothesis states that second language speakers will equate the prototypical example of a word in their L1 with the prototypical example of the equivalent word in their L2. This facilitates learning, but restricts the restructuring of the semantic space in the L2. Ijaz notes that exceptions to this hypothesis will occur when learners ascribe meaning to noncentral uses of an L2 word. Either they will ascribe an incorrect meaning to the L2 word because that meaning has saliency in their L1, or they will avoid ascribing the correct meaning to the L2 word because that meaning lacks saliency in their L1. By saliency, I take it that Ijaz means prototypicality. Ijaz limits her consideration of the L1 to the one or two words which are the direct equivalents of the L2 word in its most prototypical sense. For example, the direct equivalent of *over* in French might be *au dessus.* The drawback to this limitation is that it doesn't consider cases where senses in the L2 may have different equivalent words in the L1, words which might be more prototypical to that language. For example, the French equivalent of *overflow* is *déborder,* a word which does not use *au dessus.* Ijaz's analysis would only consider how *au dessus* is unprototypical as an equivalent of *overflow*; it would not consider how prototypical *déborder* might be. The interactions between the prototypical structures of the source language with the target language are more complex than this study presents.

Two other studies have investigated the role of prototype theory on L2 preposition acquisition. These studies used a method of error analysis in their

investigation. Tanaka & Abe (1984) proposed a hypothesis of semantic lexical transfer, whereby learners would learn new L2 vocabulary based upon an equivalent word in their L1. Prototypicality was seen as a constraint on this type of transfer. By the theory of prototypicality the researchers assumed that the most prototypical concept of an L2 word would be easily understood by the learners. Their assumption of prototypicality explained why learners translated a Japanese (L1) sentence correctly into English (L2) as "He lives *in* a house", when their hypothesis of semantic lexical transfer predicted the incorrect translation "He lives *at* a house." By their hypothesis of prototypicality, they explained that "in a house" is more prototypical to *in* in English than *at*. However, the learners generally translated incorrectly "The hole is *in* the wall", because this sense of *in* is aprototypical in English. Thus, when the L2 sense of the word was prototypical, the learners translated the preposition correctly, when it wasn't prototypical, they made a negative transfer error.

In a study of L2 English prepositions by native Spanish speakers, Correa-Beningfield (1988) measured the prototypicality for prepositions in both languages and investigated its influence on L2 production of sentences requiring L2 prepositions. To measure the prototypicality, she asked native English speakers for their simplest definitions of the prepositions *in, on, at* and *over*; and she asked native Spanish speakers for their definitions of *en* and *sobre*. She established "prototypes" for each preposition based on the frequency of common definitions. By "prototypes" she means the most prototypical sense of the different words. Her hypothesis was that learners will find and use an L2

preposition as an equivalent to an L1 preposition based on the equivalency of their "prototypes". An L1 to L2 translation task produced certain exceptions to the hypothesis. The Spanish examples of the following sentences used the preposition *en*: 'The diver is on the springboard' and 'Put that picture on that wall' (Correa-Beningfield, 1988, p. 8) The hypothesis predicted that participants would incorrectly use *in,* but instead, they correctly used *on.* Correa-Beningfield proposed that the learners learned the correct senses of *on* in these cases based on exemplary sentences, possibly learned in the classroom.

In the four studies discussed in this section, there is a common assumption that learners will first learn an L2 preposition by mapping its form to the most prototypical sense of an equivalent word in their L1. The studies have then considered how the learners adjust this initial mapping towards native speaker norms in the L2. In each of these four studies, prototype theory was used to explain why learners would make the initial mapping. In the case of Ijaz (1986) and Tanaka (1984), prototype theory was further used to explain why some senses of the L2 word might be more difficult than others. All four studies have considered the prototypical structure of the L1 only as far as it relates to the equivalent word used in the initial mapping. I believe that it is important to expand our consideration of the L1's influence beyond that of the initial one-to-one equivalence; this is because, for as many different senses as there are for the L2 word, there could be an equal number of equivalent words in L1. Each of these different L1 words will themselves have senses of varying degrees of prototypicality. Thus, the interaction between the prototypical structures in the L1

and the L2 is more complicated than these four studies have considered and its investigation needs to be expanded. These studies leave unanswered the question of how the prototypicality of a category in the L2 interacts with the corresponding concepts in the L1. The present study will explore this question through an investigation of how L2 learners come to learn an L2 category as defined by the senses of a polysemous word.

V. Frequency

The final factor affecting the learners' acquisition of polysemous senses is frequency. The question of frequency ties into the debate over whether second language vocabulary acquisition is better served through indirect learning through context or through direct teaching. The studies of indirect learning have largely focused on incidental learning through reading. Saragi, Nation and Meister (1978) report that, to be learned incidentally, a word needs to be encountered six or more times for L2 learners. This is in contrast to the figure presented by Herman, Anderson, Pearson, and Nagy (1987) who, working with L1 learners, found that a word needs to be encountered 20 times to be learned. Despite the inconsistent results, both claims show that words will be learned faster with greater frequency. This is corroborated by Horst, Cobb and Meara (1998), who found a .49 correlation between frequency and acquisition. Furthermore, Horst (personal communication) found that with a greater vocabulary, lower frequency is needed for acquisition of additional new words.

Outside of reading studies, Milton and Meara (1995) estimated that in a second language environment learners could acquire 2500 words per year, of which a large percentage would be learned incidentally. I know of no work which has looked at the more restricted question of the relationship between the acquisition of polysemous senses in relation to frequency. Of the three proposed factors affecting the acquisition of polysemous senses, frequency seems like the most straightforward explanation: the more learners are exposed to the sense of a word, the more they are likely to learn it. Thus the question is whether frequency is an adequate indicator of the acquisition of polysemous items. This question is important because it should be answered prior to considering other factors of prototypicality and transfer which involve more complicated explanations and which should only be resorted to if the simpler explanation of frequency in itself proves inadequate.

Chapter 2

RESEARCH HYPOTHESES AND METHODOLOGY

I. Hypothesis of frequency: Corpora analysis

The first hypothesis proposed by the study was that contrary findings to the prototypicality hypothesis could be explained by frequency. It is proposed that words which are very frequent in the target language will be more easily learned than words which are less frequent. Likewise, words which are less frequent in the target language will be more difficult to acquire.

It is proposed that corpora analysis will provide evidence for frequency in the language. Two corpora were used to measure the overall frequency of the different senses: one for written language and one for spoken language. The Brown University Corpus consists of 1,000,000 words compiled from a variety of texts published in 1961. The British National Corpus: Spoken consists of 965,000 words transcribed from 863 spoken conversations from a wide range of volunteers in a wide range of contexts. It may be an impossibility to determine the frequency with which an individual, or even participants a single language as a group, may have been exposed to certain words; however, if participants in all three language groups correctly translate a frequent but aprototypical item, then an explanation of frequency is taken to be justified.

II. Hypothesis of prototypicality

The second hypothesis posited was that ESL learners would master those senses of a word which are more prototypical in their L1 earlier than they would those that are less prototypical. It was assumed that prototypicality could occur either across languages or within a specific language. Across languages, those senses that refer to more simple spatial situations were assumed to be more prototypical. Within a specific language, some senses may be more prototypical to one language in particular. These senses can be identified by comparing the translations of the given senses between languages. Where one language group, in comparison to the other groups, finds the translation easier and translates the sense with greater consistency, then we can assume that that sense is more prototypical to that language in particular. I defend the theoretical validity these arguments in Chapter 5 below.

II. A. Assumption of prototypicality across languages

The first assumption is that the senses of *over* can be ranked by prototypicality to indicate a predicted order of difficulty. As discussed in the previous chapter, Brugman and Lakoff (1988) describe the senses of *over* according to general senses of the word. The most central sense, according to their description, is the Across sense, which can be exemplified by the sentence "The plane flew over the town". Brugman and Lakoff derive the other general senses of the word from this sense: such senses are the Above sense, the Covering sense, the Reflexive sense and the Excess sense. Also discussed in

the previous chapter was the contention of Tyler and Evans (2003), who felt that the Above sense was more prototypical than the Across sense. Despite this contention, they did agree with Brugman and Lakoff that the other general senses were more extended. From the two descriptions provided by these researchers I hypothesised that *the participants will translate the Above sense and the Across sense more correctly than the Covering, Reflexive and Excess senses.*

In addition to the order of prototypicality of the categories of general senses, there is also an order of prototypicality within each general sense. For example, in the Across sense, the sentence "The plane flew over the town" uses a more prototypical image schema of *over* than the sentence "He jumped over the cliff", where the image schema is less prototypical and more extended. It is hypothesised that, *within a general sense, learners will learn the more prototypical senses before the less prototypical senses.*

In Table 2.1 below, those sentences from the instrument are listed which refer to spatial senses. The items are first categorised by general sense and then ranked by their order of prototypicality. The items ranked first are considered to be both the simplest and the closest to the core sense of Across or Above. As the rank increases so too does the items' extension away from the core sense. The schema for each item is described according to the system designed by Brugman and Lakoff. A key has been included at the base of the table to explain this system. I have also included in the table the items used in the instrument, they are numbered as they appeared there.

Chart 2.1 : Image schemas of the different senses of *over* organised by general sense and ranked by prototypicality (adapted from Brugman and Lakoff, 1988).

SENSE	RANK	SCHEMA	ITEM
ACROSS	1	ACR.X.NC	17. The plane flew over the town
		ACR.X.C	8. He drove over the bridge
	2	ACR.VX.NC	6. The plane flew over the hill
		ACR.VX.C	2. He is walking over the hill
		ACR.V.NC	13. The plane flew over the wall
		ACR.V.NC	15. Harry jumped over the wall
	3	ACR.C.E	5. He is over the finish line!
		ACR.VX.C.E	4. Sam lives over the hill
	4	ACR.NC.E	20. Harry jumped over the cliff
ABOVE	1	ABV	1. The helicopter is hovering over the town
		ABV.VX	12. The helicopter is hovering over the hill
	2	ABV.1DTR	18. The power line stretches over my yard
COVER	1	COV.P.E	19. She spread the tablecloth over the table
		COV.MX	9. The guards were posted all over the hill
		COV.RO	3. She held a veil over her face
	2	COV.MX.P	11. He walked all over the hill
REFLEXIVE	1	RFX	7. Sam rolled the log over
	2	RFX.RFP	14. Sam turned the page over
		RFX.RFP	16. The wall fell over

Key to schema description		
X – extended landmark	E – end point focus	1DTR – one dimensional trajectory
V – vertical landmark	P – path	
C – contact	RO – rotated	MX – multi-plex (many positions)
NC – no contact	RFP – reflexive path	

II. B. Assumption of prototypicality within a language

Prototypicality can be considered within a language as well as across languages. As discussed above, across languages certain senses of a word can be assumed more prototypical due to their cognitive primacy. However, each

language has its own unique characteristics, so that certain concepts or certain senses of a word might be more prototypical in one language than in another (Krzeszowski, 1990).

This characteristic is illustrated when one finds that different languages categorise concepts differently. As an example, in Japanese the morpheme *mama* is used to describe situations where something goes "against expectation". It is used well in the sentence, 'Surprisingly, he left his shoes on when he entered the room',

(2.1) kare wa kutsu wo haita mama heya ni haitte kimashita
'he'-TOP 'shoes'-OBJ 'wore' 'against expectation' 'room'-LOC 'entered'

And it is used equally well when telling a store clerk you don't need a bag.

(2.2) sono mama de ii desu
'that' 'as it is'-INST 'good' BE
'No, it's fine just like that'

In Japanese, both examples would use *mama* to signify that the situation is against expectation; however, in English, as we can see by the different language used in the above sentences, the concept defined by the Japanese morpheme doesn't have an easy equivalent. This is a case where we can see that the conceptual structure of one language is in some way different from that of another. It is my contention that linguistic concepts like these have prototypical structures. These linguistic concepts are different from the situations described by spatial prepositions, which are assumed to be similar across languages because of their cognitive primacy. These concepts, like "against expectation", are more specific to individual languages. Thus while the description of a situation may be very prototypical in one language, in another

language the description of the same situation may not have a prototypical expression.

Krzeszowski maintains that when the sense of a word is more prototypical in a language, speakers of that language will describe that situation with more consistent language than when the sense of the word is less prototypical. Thus, even though a given sense of *over* may be quite extended from the core sense in English, it may translate into another language using a word in a highly prototypical sense. When the sense of a word is highly prototypical in their own first language, the participants will show greater consistency in their translation.

II. C. Assumption about the interpretation of metaphor

I assume that it is more complex and thus more difficult for learners to learn a metaphoric use of a polysemous item than it is for them to learn a literal sense. This assumption is corroborated by the findings of Leventson (1978) who found that learners showed a reflectance to using senses of a polysemous item which they felt were unrelated to the sense they already knew. It seems likely that a learner will first learn the literal meaning, and only later learn the metaphoric meaning of the item. To understand a literal sense, the learners are assumed to associate the word with an image schema which can be applied to a specific situation. In all examples of *over* we have talked about so far, the situations have been spatial in character. However, *over* can also be used metaphorically to describe non-spatial situations. For example, item 21 of the instrument presents the sentence "She has a strange power over me." In this

sentence, there is no spatial situation being described. In this sentence, the situation is described both by an image schema, as in the spatial situations, and also by a metaphor. The metaphor operative in this sentence is that CONTROL IS UP. This means that a controlling agent is described figuratively as being higher vertically. For example, in English the meanings of the following sentences are easily understood, "The orders came from above", "I'm on top of the situation", and "I'm going to override the main processor". The meaning of *over* in the sentence "She has a strange power over me" is derived from applying both the image schema which says that *over* means "above", and the metaphor which says that CONTROL IS UP. For learners to accurately understand the meaning of this sentence, they have to know both the appropriate image schema *and* the appropriate metaphor, and then select both of these factors as correctly applicable to the sense of the word. Items 21-29 of the instrument use metaphoric senses of the word *over.* In table 2.2, below, these items are listed along with their respective image schemas and metaphors.

It is a question beyond the scope of this study whether there are equivalent metaphors in the languages of the participants to those presented in items 21-29 of the instrument. However, for learners to make a correct interpretation of a metaphoric sense of the word, they will first need to recognise that a metaphor is being used, then recognise what that metaphor is, and finally apply the most appropriate image schema to that metaphor. It is in this last step that the theory of prototypicality is significant. It is assumed that *the learners will*

Chart 2.2: Image schemas and metaphors of the metaphoric senses of *over* (adapted from Brugman and Lakoff, 1988).

SENSE	SCHEMA	ITEM	METAPHOR
ACROSS	ACR.NC	22. He was passed over for promotion	CONTROL IS UP CHOOSING IS TOUCHING
	ACR.VX.C	25. She soon got over her divorce	LIFE IS A JOURNEY
	ACR.VX.C.E	26. The company president is over the hill	MODEL OF A CAREER
	ACR.X.C.E	29. The play is over	ACTIVITY HAS A PATH
ABOVE	ABV	21. She has a strange power over me	CONTROL IS UP
	ABV	24. Who will oversee this project?	CONTROL IS UP SEEING = RESPONSIBILITY
	ABV.1DTR	23.You've overlooked his accomplishments	SEEING IS BELIEVING LOOKING AT = CONSIDERING
REFLEXIVE	RFX	28. He turned the question over in his mind	THINKING IS EXAMINING
	RFX.RFP	27. The men overthrew the government	CONTROL IS UP

Key to schema description		
X – extended landmark	E – end point focus	1DTR – one dimensional trajectory
V – vertical landmark	P – path	
C – contact	RO – rotated	MX – multi-plex (many positions)
NC – no contact	RFP – reflexive path	

use the most prototypical schema of the word which makes the most plausible interpretation of the sentence.

III. Participants

Three groups of participants took part in the study, each group having a different first language: Japanese, Chinese, and French. All the participants were studying English as a second language in Montreal, but they represented a wide range of proficiency, as indicated by the different lengths of time they had spent studying English and, in the case of the Japanese and Chinese participants, by the lengths of time they had lived in Canada. No proficiency test was given to the participants because the research question did not ask about the correlation between a measure of knowledge of polysemy and a measure of other types of language knowledge. The range of the participants' backgrounds, in itself, was felt to provide a sample population with an adequate range of different proficiencies. Their level of proficiency was considered to be from intermediate to advanced.

Fifteen Japanese and fifteen Chinese learners of English were solicited through a number of methods: by an advertisement on a webpage for Japanese speakers living in Montreal, by former students of the researcher, and by referrals of other participants. All the Japanese and Chinese participants were either studying English or, in the case of the participants with a higher level of proficiency, were studying other subjects with English as the language of instruction.

Students from a French language secondary school were solicited through their English language teacher. The students were all in Secondary IV (16-17 years old). Of all the classes the teacher taught, she felt that this class provided

the widest range of language ability. This was an important consideration because I felt a wide range of ability would result in more variation in the responses.

IV. Instrument

The instrument used in the study was a replication of one used in a study by Krzeszowski (1990). Krzeszowski investigated to what degree equivalent forms between languages exhibit pattern matching: that is to say, how similar the semantic and syntactic properties are between equivalent utterances in two languages. In his study, he asked 25 bilingual Polish speakers of English to translate sentences from English into their native Polish. The sentences were taken from Brugman and Lakoff (1988), who had constructed them to describe the different senses of the word *over* (see appendix A, below.) In the present study, as in Krzeszowski's, participants were asked to translate the given English sentences into their own language. Twenty of the senses were literal, in that the meaning of their sentences could be described in a simple diagram; for these senses, participants were asked to draw a picture of the sentence to help make their meaning clear in case there was confusion in their translation. The other nine senses were non-spatial extended uses of the spatial meanings and no drawing could easily represent their meaning. For these sentences only a translation was requested.

A pilot study was conducted with a Japanese L1 participant at a level of proficiency considered lower than that of most of the other participants. Based

on the results of the pilot study, several words from the items were selected to be included in a gloss providing a translation into the speakers' first language of Chinese or Japanese. These words were *post* (v), *log* (n), *cliff, promotion, stretch* (v), and *accomplishment*. For the French-speaking participants, their English language teacher recommended that the words *hill* and *log* be translated, that *power line* be changed to *electrical line*, and that *veil* be expanded to *wedding veil*. These changes were made to facilitate understanding. Apart from these words, it was felt that the language of the items did not pose difficulty for the participants. I felt that the changes did not affect the meaning of the target word *over*, and as a result the sentences were essentially the same as those Krzeszowski used.

V. Procedure

The participants were given as much time as they needed to complete the test. The Chinese and French participants conducted the study individually or in small groups in private meetings. The French participants conducted the study during their regular class time. No dictionaries were allowed and the participants were strongly encouraged to guess if they did not understand the sense of the target word, *over*. In the Chapter 5, I discuss how this methodology could be changed given certain findings in the results.

For the French participants, the results of a given test were only used if two criteria were met. The first criterion was whether French was the student's dominant language: French had to be both the first language of the student and

the main language of the student's home. Each student provided this information in a questionnaire. A second criterion was completeness. Despite being given as much time as they needed, many of the students did not complete the study (most likely due to a lack of motivation). Only those tests with four or fewer incomplete answers were used in the analysis. In total, 18 tests met these two factors of French as the dominant language and completion.

Chapter 3

DATA CODING

I. Correctness of response for the spatial items

In this section I will briefly explain how the participants' translations for the spatial items were marked as correct or incorrect, giving the criteria for the decisions and listing those translations which were marked as incorrect.

Items 1 and 12 are, respectively, "The helicopter hovered over the town" and "The helicopter hovered over the hill". The target schema in both these senses was ABOVE, that is to say, the target is not moving and is superior to, but not touching, the landmark. In item 12 the landmark is vertical. A problem arose because *hover* is a hyponym of *fly* and many participants chose to translate it as such. *Fly* was accepted as a translation so long as motion was *not* marked in the translation. There were cases in all language groups where such motion was indicated by verbs, and in French also by a picture and by the preposition *par-dessus*. Item 18, "The power line stretches over my yard", was the other item representing the Above sense. The target schema for this item is described as ABOVE 1DTR, or above with a one dimensional trajectory, that is to say the target is motionless but extended over the landmark, with which it makes no contact. In this case the translations were marked as errors when contact was indicated in the picture, or when the participants translated *over my yard* as 'up to my yard' or 'around my yard'.

The Across sense comprised 9 items. In general, the sense requires the target to move across an extended landmark. There is no contact between the

target object and the landmark in items 6 "The plane flew over the hill", 13 "The plane flew over the wall", 15 "Harry jumped over the wall" and 17 "The plane flew over the town". In items 17 and 6 the landmark is an extended area; in items 6, 13 and 15 the landmark is vertical. For these items, errors were made when there was contact between the object and the landmark, and when the movement was different from the target idea of 'crossing'. For item 15 some participants translated the sense of 'over the wall' as 'up to the wall'; participant F02 translated *jump over* in item 15 as *sauta en bas de*, 'jumped down from'.

Continuing with the Above sense, there is contact implied with the landmark in items 2 "He is walking over the hill" and 8 "He drove over the bridge". The translation of item 2 by participant F03 was marked as an error because *over* was translated as *sur le haut* or 'on the top'. The last schemas for this sense involve the End Point feature, where *over* indicates a point on the other side of the landmark: included are items 4 "Sam lives over the hill", 5 "He is over the finish line!" and 20 "Harry jumped over the cliff". Whereas 20 has no contact, items 4 and 5 have contact between the object and the landmark, and for item 4 the landmark is vertical. In item 4, the majority of the participants translated the sense of *over the hill* incorrectly as 'on the hill'. For item 5, those translations marked incorrect translated the sense of *over the finish line* as 'close to', 'above' or 'on/at', and some translated 'finish' not as an adjective but as a verb, to say that 'He finished something'. For item 20, errors were made because *jump over the cliff* was translated as 'jump across the cliffs'. In Japanese this distinction was marked by the verb *koeru*, 'to cross', as opposed to the verb *oriru*, 'to go

down'. For this item in particular, where there was ambiguity as to the sense of the translation, the picture provided important evidence.

Four items investigated the Cover sense. For item 3 "She held the veil over her face", six Chinese participants translated the target sense incorrectly as 'revealed her face' and one as 'wear on her head'. Three French participants translated the target sense of *over* incorrectly as 'raise over'. The Japanese translations were all correct. In item 19, "She spread the tablecloth over the table", there was some confusion over the vocabulary; C13 translated the tablecloth as 'napkin' and F05 as 'clothes', and, in turn, they translated the sense as 'put on' not as 'cover'. Participant F06 translated the item using *enlever*, 'to take off'.

The other two schemas for the Cover sense involved the multiplex feature, which refers to many positions over a surface. The items investigated were 9 "The guards were posted all over the hill" and 11 "He walked all over the hill". For the Japanese translations of item 9, the word *zentai* was identified as the equivalent of 'all over'; where this key word was not used, I resorted to the pictures to interpret whether the target sense was translated as 'all over' or as 'all along'. It was concluded that two participants translated the sense incorrectly as 'all along': J10 and J13. One Chinese participant translated the sense as 'walk across' and three as 'surround'. One French participant each translated the sense incorrectly as 'surround', 'along', 'watch' and 'at'.

For item 11, the target sense for *walk all over the hill* was translated incorrectly as 'across' by seven of the Japanese participants, four of the Chinese

and three of the French. The French participants also translated the sense incorrectly as 'walk upon the top', 'walk around', 'walk along' and 'work'. Two of the French participants translated the sense as simply 'sur', *on,* which was judged too general. Here, I again resorted to the pictures to resolve the ambiguity of the translation.

The Reflexive sense was investigated through three items: item 7 "Sam rolled the log over", item 14 "Sam turned the page over", and item 16 "The wall fell over". In this sense the trajectory of the object is turned in upon itself. This sense was translated incorrectly with the idea of 'stacking' by one Japanese and one French participant and by two Chinese participants. Japanese participants also translated the sense as 'fall' and 'climb', and the Chinese and French participants also as 'push'. Three French participants also translated the sentence to include a path for the log to roll upon; such translations were marked as incorrect because it was decided that these participants interpreted *over* not to refer to the trajectory within the object itself, but to a trajectory across an extended landmark, as in 'walk over the lawn', for example. For item 14, two participants translated the sense of *turn the page over* as 'finished', two as 'closed', one as 'repeat', one as 'change', and one construed *over* with the Above sense. For item 16, participants from each of the three language groups translated the sense of *the wall fell over* as 'the wall crumbled'; this was marked as incorrect because 'crumbled' was not felt to involve the target Reflexive sense. However, if the pictures expressed the Reflexive sense, the 'crumbled' was marked correct.

Item 10, "The water overflowed" was the only item used to investigate the Excess sense. The key to correct translation in this sense was to express the idea of water exceeding its boundaries. In the Japanese and French responses there was very high conformity of response. Only one response was marked incorrect here, because the Japanese participant translated the sense of *overflow* as 'rose'. In the Chinese responses there was much higher variation in response, and for this language group the pictures were frequently resorted to, to confirm whether the idea of 'exceeding boundaries' was implied or not. Three of the responses were marked incorrect because *the water overflowed* was translated as 'there is a flood', which does not refer to the water exceeding its boundaries. Another response was marked incorrect because the sense was translated as 'splash'. Two participants translated the sense as 'full'. These responses were marked as correct because the Chinese translator said that pragmatically the translations refer to the sense of 'overflow'; this interpretation was confirmed by the pictures, which showed water exceeding its boundaries.

II. Correctness of response for the non-spatial items

Marking the non-spatial responses differs from marking the spatial responses because for the non-spatial responses a literal translation will often be an incorrect translation of the true meaning of the sentence. For reliability in coding, a key idea was used to discern whether the participant understood the sense or not. The non-spatial items and their corresponding key ideas are listed in Table 3.1 below.

Table 3.1. Non-spatial items and their key ideas for coding.

ITEM	SOURCE SENTENCE	KEY IDEA
21	She has a strange power over me	CONTROL
22	Sam was passed over for promotion	NOT PROMOTED
23	You've overlooked his accomplishments	IGNORE
24	Who will oversee this project?	MANAGE
25	She soon got over her divorce	RECOVER
26	People were saying that the company president is over the hill.	PAST HIS PRIME
27	Those are the men who overthrew the government	OVERTHROW
28	He turned the question over in his mind.	THINK REPEATEDLY
29	The play is over.	FINISH

For item 21, "She has a strange power over me", items were marked correct if the response expressed the idea of a controlling power. The following items were marked incorrect. In the Japanese responses, one participant translated the sense as 'directed at me', three participants translated it as 'she gives me power', and two participants translated the sense as a comparison between the power of one person and the other, i.e. 'more than'. Six of the Chinese participants also translated the sense as a comparison, and two of them interpreted *over me* as a topicalisation marker, roughly 'from my point of view'. A literal translation into French was acceptable using *sur*, and, not surprisingly, the French responses showed a high degree of conformity. Only one French response was marked incorrect, where the sense was translated as 'around me'.

For item 22, "Sam was passed over for promotion", many of the participants - thirteen Japanese, twelve Chinese and thirteen French - translated the sense incorrectly as 'Sam was promoted' or 'Sam passed his promotion'. Other incorrect responses were one Japanese translation as 'passed up', one Chinese and one French translation as 'transferred', and in the French responses, a literal translation and a translation as 'tired'.

The sentence for item 23 was "You have overlooked his accomplishments". The responses were marked as correct if they expressed the idea of 'ignoring his accomplishments' or 'not noticing his accomplishments'. Nine of the Japanese responses translated the sense incorrectly as 'over evaluated', two as 'oversaw' and one as 'played down'. Ten of the Chinese responses translated it incorrectly as 'overestimated', one as 'satisfied with', one as 'finished', one as 'recalled' and one as 'surpassed'. Two of the French responses were also incorrect in translating the sense as 'surpassed', one as 'oversaw', one as 'checked', four as 'over estimated', one as 'anticipated', one as 'exceeded' and two as 'looked at'.

Item 24, "Who will oversee this project?" was marked correct if the response expressed the idea of 'manage' or 'supervise'. Two Japanese responses were marked incorrect for translating the sense as 'overlook' and two for 'predict'; there was also an incorrect Japanese response with each of the following: 'plan', 'see', 'examine', 'do', 'take over', and 'check'. Three Chinese responses translated the sense incorrectly as 'examine' and one response each

used 'ignore', 'look', 'notice', 'check', 'surpass', and 'predict'. Six French responses translated the sense as 'revise', five as 'see' and two as 'overestimate'.

The Japanese participants translated item 25, "She soon got over her divorce" with high consistency: eleven translated the item correctly as 'recovered'; four translated the sense incorrectly, three as 'soon divorced' and one as 'cancelled the divorce'. Only four of the Chinese participants translated the sense correctly as 'recovered'; the other eleven responses were incorrect, translating the sense as 'completed the divorce'. Nine of the French participants translated the sense correctly; the other eight responses translated the sense incorrectly as 'soon divorced'.

Item 26 "People were saying that the company president is over the hill" was an idiom and for none of the three languages was a literal translation correct: five Japanese, seven Chinese and eleven French responses were incorrect, literal translations. Japanese responses were also incorrect, once for translating the sense as 'over controlling', twice for 'the company president is out of reach' and three times for 'the president crossed a hardship'. Two Chinese participants translated the item incorrectly as 'successful', two as 'excessive', and one translation each as the company president is 'untouchable', 'unreliable', and 'everywhere'. The French participants interpreted the sense incorrectly once as 'The president is successful' and once as 'The president guesses a lot'. Two French participants also translated the sense curiously as 'The president is the hill' and 'The president is the moon'.

Item 27, "Those are the men who overthrew the government" was translated correctly by only two Japanese, three Chinese and five French participants. Japanese participants translated the senses incorrectly as 'threatened', 'threw away', 'related to', 'don't support', 'control', 'know well', 'betray', 'look down on' and 'criticise'. Chinese responses were incorrect for translating the sense as 'control', 'work for', 'attack', and 'support'. French responses were incorrect for translating the sense as 'push to action', 'oppose', 'watch over', 'upset (emotionally)', 'ridiculed', 'maltreated', and 'disobeyed'.

For item 28, "He turned the question over in his mind", a correct translation involved the idea of thinking repeatedly. Two Japanese participants each translated the sense incorrectly as 'asked himself', 'brought to mind' and 'changed emotion' and one incorrectly as 'changed the question'. Two Chinese participants each translated the item incorrectly as 'finished thinking about' and 'remembered' and one each as 'put to the back of his mind', 'has many things inside his mind', 'thought closely about' and 'changed the question'. Of the French responses, six were considered too general in simply translating the sense as 'thinks about the question' and two incorrectly translated the sense as 'changed the sense'.

The target sense of Finished in item 29, "The play is over" was very well translated, despite the fact that many participants translated *the play* as 'the game'. So long as the sense was translated as 'finished' the item was marked correct. Thus the two Japanese responses which translated the sense as 'game over' were marked correct because the responses do express the idea of

'finished'. For this sense, only one response, from the French group, was incorrect, for a literal translation of *over* as *au dessus*.

III. Coding of the non-spatial responses marked incorrect

One hypothesis was that when participants guessed at the meaning for a metaphoric use of *over* which they didn't know, they would use the more prototypical sense rather than a less prototypical sense. The first step to test this hypothesis is to take the incorrect responses of the non-spatial items, and interpret what sense of *over* the participants used to guess at the meaning.

Five Japanese, eight Chinese participants and one French participant translated incorrectly item 21, "She has a strange power over me". Seven participants (J07, J09, C05, C06, C11, C14 and C15) translated the item as a comparison, as in 'She has more power than me', and one participant, C12, as a superlative, as in 'She has very strong power.' In my interpretation, these participants used the Excess sense, which defines the object as exceeding certain boundaries. J06, J12 and J13 translated the sense of *over* as 'directed at' and 'gives influence to'. In my interpretation, these participants used the ACR.C.E schema to translate the item. This schema contains the End Point feature, which means the object has a destination point, as in item 5 "He's over the finish line!". Participants C04 and C10 translated the prepositional phrase *over me* as a topicalisation: 'as for me'. I believe they construed this meaning by using the End Point feature. The one French participant, F06, who translated the

item incorrectly, translated *over* as 'around'. Using the senses of *over*, I can see no easy interpretation for this guess and leave its interpretation as a question.

Of the 44 participants who translated incorrectly item 22 "Sam was passed over promotion", 34 of them translated it using the End Point feature, to say 'Sam was promoted.' By this interpretation, the End Point is the goal of promotion. C07 and F01 translated *passed over for promotion* as 'transferred for promotion'; their translation also employs the End Point feature, but in a literal sense of transferring from one place over to another. F04, F11, F16 and F18 also translated the sense literally as *au dessus*, using the more protoypical Above sense. J12 translated *passed over* as 'passed up'. J03, J06 and F03 translated the sense as 'tired' and 'postponed', for which I could make no interpretation.

33 participants incorrectly translated item 23 "You've overlooked his accomplishments". 17 of those translated the meaning as 'You've overestimated his accomplishments' or as 'You have exceeded his accomplishments'. In both cases, I believe the participants were using the Excess sense to interpret the meaning. Two participants, C03 and F05, also seem to have used the End Point feature to make their translation, the first to say 'You have achieved his accomplishments' and the second to say 'You have anticipated his accomplishments'. C05 might have used the Reflexive sense to make his translation, 'You have remembered his accomplishments', because the Reflexive sense involves rotation and thus repetition, and repetition can become remembering when applied to the metaphor LOOKING=KNOWING . Some

participants (J04, J06, J12, C02, F01, F03, and F06) translated *overlook* to mean 'make sure of', 'play down', 'satisfied with', 'guided', 'revised', and 'verified'. In these cases I believe the participants interpreted *over* using the Above sense and applied the UP=CONTROLING metaphor. Those participants (F11, F15 and F18) who translated the sense of *overlook* as simply 'looked at' did not attempt to interpret the meaning of *over*.

Item 24 is "Who will oversee this project". Here the meaning of *oversee* is 'manage' or 'be responsible for'. This meaning is derived from the Above sense of over, mapped to the metaphor of CONTROL IS UP. There were many different interpretations for this item. J10 translated the sense of *oversee* as 'take over' and J13 interpreted the sense as 'revise'. These participants seem to have interpreted both the correct sense and the correct metaphor and yet they have still come to the wrong translation. Some participants (J02, J06, C02, C13, C15, F03, F05, F06, F10, F12 and F17) translated the sense of *oversee the project* as 'check over the project'. This interpretation applies the SEEING IS TOUCHING metaphor to the Cover sense, whereby "the subject's gaze traces a path that 'covers' the direct object" (Lakoff, 1987, p 437). In this case the direct object is "the project". J05, J12 and C01 all interpreted *oversee* as 'overlook', as in item 23 above. C06 translated the sense as 'look at the project many times', which either uses the Cover sense as described above, or the Reflexive sense to derive the idea of repetition. J09, J15 and C12 all interpreted the item as 'predict'. This interpretation seems to derive from the SEEING IS KNOWING metaphor applied to the End Point feature, whereby the End Point is something in advance,

and thus *oversee* is construed as 'knowing something in advance'. F12 translated *oversee* literally as 'come to see', and C14 and F08 applied the Excess sense to make the meanings 'exceed' and 'overestimate' respectively.

Of the participants who translated incorrectly item 25, "She soon got over her divorce", all but one translated it to mean 'She soon divorced.' In this case, I believe the participants applied the End Point feature to the meaning of *over*, so as to make *over* mean the completion of the direct object, *her divorce*. J01 translated the sense as 'cancelled', and might have done so because she applied the Above sense and the metaphor UP IS CONTROLING.

For item 26 "People were saying that the company president is over the hill", many of the participants who answered it incorrectly translated the sense literally, both as 'the president is on the other side of the hill' and as 'the president is on the hill', and even as 'the president is all over the hill'. Those participants who saw that there was an idiomatic meaning to the sentence, most often translated it using the Above sense, to mean 'inaccessible' (J08, J15 and C10) or as 'successful' (C04 and C08), the first using the metaphor UP IS BEYOND REACH and the second the metaphor UP IS SUCCESS. Some participants (J03, C06 and C12) translated the sense of *over* using the Excess sense as 'overcontrolling' or 'excessive'. Three participants (J10, J12 and J14) correctly applied the Across sense to their interpretation of *over*, but they applied a different metaphor and translated the item as 'The president crossed a hardship'. For a few responses I could not interpret how the participant arrived at their translation of *over*: C11 'unreliable', F01 'guesses', and F11 'in the moon'.

Item 27 "Those are the men who overthrew the government" is understood to use the same schema in the Reflexive sense as in 'fall over' and the metaphor CONTROL IS UP, LACK OF CONTROL IS DOWN: an overthrown government has metaphorically fallen and lost control. Many of the participants applied the Above sense and translated the sense as 'control' and as 'criticise' : for 'control' the metaphor would be CONTROL IS UP; for 'criticise', the metaphors might be UP IS GOOD and DOWN IS BAD. Other participants translated the sense as 'attack', for which the word *throw* probably took greater saliency than *over*. For some translations I couldn't see an easy interpretation of how the participants came to their meaning: 'related to', 'enter government work', 'betray', 'support', 'pushed to action' and 'disobeyed'. One participant, F11, correctly applied the Reflexive sense, but translated the sense as 'emotionally upset the government'.

Item 28, "He turned the question over in his mind", uses the Reflex sense and the metaphor THINKING ABOUT SOMETHING IS EXAMINING IT to create the idea of thinking about a problem from all sides. In this case, the translation would be correct if it expressed the idea of thinking about the question many times. Most of the participants correctly applied the Reflexive sense; however, many translated the sense as 'he changed the question', probably using the image of turning something over to its other, different, side. Several participants (C01 and C06) applied the End Point feature to say 'He stopped thinking about the problem'. C13 translated the sense as 'look closely at', where the correct metaphor was applied, but without the idea of repetition, the Reflexive sense is not expressed but the Above sense is. Several participants simply translated the

item as 'reflected upon' which seems to be a translation of the function of the mind and not specifically of the what *over* is signifying.

IV. Coding for the variation in translation

The hypothesis of prototypicality within a language proposed that participants will translate an item more correctly and with less variation in expression when the sense they are translating is more prototypical in their first language. In this section I will present a system to identify by language group the variation with which the participants translated the target meaning of *over*. To achieve construct validity, the system should aim for consistency and simplicity. By consistency I mean that the system will make fine category distinctions in a regular manner, and by simplicity I mean that its distinctions will be both acceptable and easily understood.

We have already coded the translations as correct or incorrect. In this section we will only consider that group of translations coded correct because this group represents participants who had the same idea in mind. Despite having the same idea, it is very rare that two participants will translate a sentence in exactly the same way. Nevertheless, some translations will be more similar to each other than others, and it is the task of the system to group together just those translations which are more similar to one another. If a language group translates an item with less variation, there will be less groups; if it translates the item with more variation there will be more groups.

IV. A. Variation in translation among the spatial items

Since we are only interested in how the target meaning of *over* is translated, we need only to identify in each translation those keywords which translate the target meaning. If we were to identify the meanings by the different schemas, we would be left with nearly one schema per item, which would make the identification process far too complicated. To identify the meanings by sense would also be too complicated due to the variation expressed within the senses. For example, the Cover Sense contains the following items:

3	She held the veil over her face
11	He walked all over the hill

These items were translated correctly by the participant F01 as follows:

3-F01	Elle tient le voile devant son visage
11-F01	Il a marché dans toute le colline

In these sentences the covering idea is expressed by *devant* and *marché dans toute* respectively. These words have very little semantic relationship in French and thus if we were to identify the meaning of *over* by sense, we would be left with a large list of words which have little relationship to each other.

There is a better way to identify the keywords which translate the sense of *over*. In the first 20 items of the test, *over* refers only to spatial situations, usually functioning as an adposition. In the participants' translations, we can also expect that the sense of *over* will usually be an signified by an equivalent adposition. Thus, as a first step, we can group together all the translations which use the same adposition. However, there will be some translations which don't use an adposition. In these cases the main verb will often carry the spatial information

which is signified by *over* in the source sentence. Thus, as a second step, when no adposition signifies position, but the main verb does, then we can group together those translations which use the same main verb. Because time is not a factor, we won't worry about the tense of the verb, but simply what verb is used.

There is yet a third way to classify the translations. The target sense of *over* is sometimes not signified by individual elements in the sentence, but by the pragmatic force of the sentence as a whole. For example, participant J01 translated item 17 "The plane flew over the town" as 'The plane didn't land at that town'. The idea of movement but no contact is expressed by the sentence as a whole, but not by its parts. Thus translations with the same pragmatic force can be classified in the same group when their elements don't signify the spatial position separately.

To give an example for how the grouping system works, I will explain how I grouped the translations for item 1 for each of the three language groups. For this item, "The helicopter is hovering over the town", the Japanese participants used two postpositional phrases to translate *over*: *ue wo* ('above'-OBJ) and *joukuu wo* ('in-the-sky'- OBJ). I identified the whole phrase because the postposition *wo* carries no spatial information. One participant didn't use a postposition, but simply marked the spatial position with the verb *tonde* ('fly'-GER). Thus, the Japanese translations for this item can be organised into three groups. For the same item, the translations into French were grouped four ways: by *au-dessus, en-haut de,* and *par-dessus* (all meaning 'above') and, when no prepositional phrase was used, by the verb *survole* ('fly above'). I decided to

distinguish *au-dessus* from *par-dessus* despite the repetition of word *dessus* because the different combination of words provides a nuance, which in English would be distinguished by near synonyms, like *above* and *over.* This type of distinction between word combinations was made for all three language groups, and frequently in the Chinese example.

The Chinese translations for item 1 were grouped 3 ways: by *shang* ('above'), by *shang kong* ('up-in-the-sky') and by *zai ten kong* (LOC-sky). As with the French, and again for reasons of semantic nuance, I again formed different groups despite the repetition of words between groups. The group marked by the phrase *zai ten kong,* is interesting for its use of the adposition *zai,* which might be translated as 'at' in English. The adposition simply marks location, it doesn't elaborate on other spatial considerations, like contact, height, or movement. In Japanese the postposition *ni* functions in the same way. As keywords, these adpositions will always be part of a larger phrase, because without more information they cannot describe the target senses of *over.*

The above coding for item 1 provides a model example for how I coded the rest of the spatial items, 2-20. I will now point out certain points in the coding process where I had to make irregular decisions. For item 5, "He's over the finish line!" the Chinese groups were organised by the key words *guo* ('to cross'), *pao guo* ('to run across'), *ue guo* ('to pass through'), and *chao guo* ('to exceed'). I felt that these verb phrases were distinct from one another to form separate groups despite the repetition of the word *guo.*

For item 7 "Sam rolled the log over", the Japanese translations did not use adpositional phrases, but left the signification of *over* entirely to the verb. Most of those who answered the item correctly used the verb *korogashita* ('roll-did'). One participant translated the item as *korogashite hakonde kita* ('roll-did' 'move-about'- GEN 'came'). Japanese allows for verbs to be conjoined together. In this case the verb *hokonde* provides a key word distinct from the key word *korogashita,* which formed the other group.

The Chinese translations for item 10 "The water overflowed" were organised into five groups, identified by the keywords *guo* ('across'), *man chu* and *man shie* (both 'overflow') and by two pragmatic groups, *yo hon shui* ('there is a flood') and *shui man le* ('the water is full'). I felt that the pragmatic groups were sufficiently different from one another to form separate groups.

In my discussion of item 1, I mentioned that the preposition *ni* in Japanese did not carry enough spatial information to constitute a separate group. In the Japanese translations item 19, "She spread the table cloth over the table" the following two translations were grouped together: *te-burukurosu wo te-buru ni hirogeta* ('table cloth'-OBJ 'table'- LOC 'spread') and *te-burukurosu wo hiita* ('table cloth'-OBJ spread'). The postposition *ni* in the first translation did not mark a separate group. Its function in the sentence is not to describe semantic space, but to mark the indirect object. In English such a function is marked by word order. Thus the two translations were grouped together because they use the same verb (albeit in different tenses).

The French translations for item 20 "Harry jumped over the cliff" were organised into three groups by the key words *par dessus* ('over'), *en bas de la* ('down from') and *de la* ('from'). I felt that *en bas de la* was sufficiently different from *de la* to form a separate group.

IV. B. Coding for variation among the non-spatial items

Items 21 – 29 are the instrument's non-spatial items. To code for variation in these translations, I used the same key idea used to mark the non-spatial translations as correct or incorrect. (See Section II and Table 3.1 above for the key ideas). Variation groups were formed by grouping together those key words or key phrases which signified the key idea in the same way.

The coding for item 29 can serve as an example for the rest of the non-spatial items. The idea of FINISH was translated by the Japanese participants in four different ways and each way was used to define a different group. The first group was defined by a form of the verb *owari* ('to finish'), the second group by the expression *kore made da* ('up to this point'), the third by the expression *ge-mu o-ba- desu* ('game over' + BE), and the fourth by *shuryou* ('the end'). The coding of the other non-spatial items often showed a similar range of different types of expression, which were used to simply and consistently organise the translations into groups.

Chapter 4
RESULTS

I. Frequency

A corpus analysis was conducted to see whether the frequency of the different senses of *over* could account for the learners' acquisition of those senses. The data was not organised by language group because each group was assumed to be equally exposed to the frequency of senses as the other language groups. The data for the spatial items compared to the non-spatial items do not confirm the first hypothesis that frequency can explain the overall results of correctness-of-translation. In Table 4.1, the ratio of correctness from the test results is compared to the ratio of frequency from the spoken and written corpus results. The ratio of correctness was calculated by taking the numbers of

Table 4.1. Comparison between frequency and test results
The test results of correctness are compared to the corpus results by a ratio of spatial to non-spatial items. The corpus results represent the frequency of token instances of *over*.

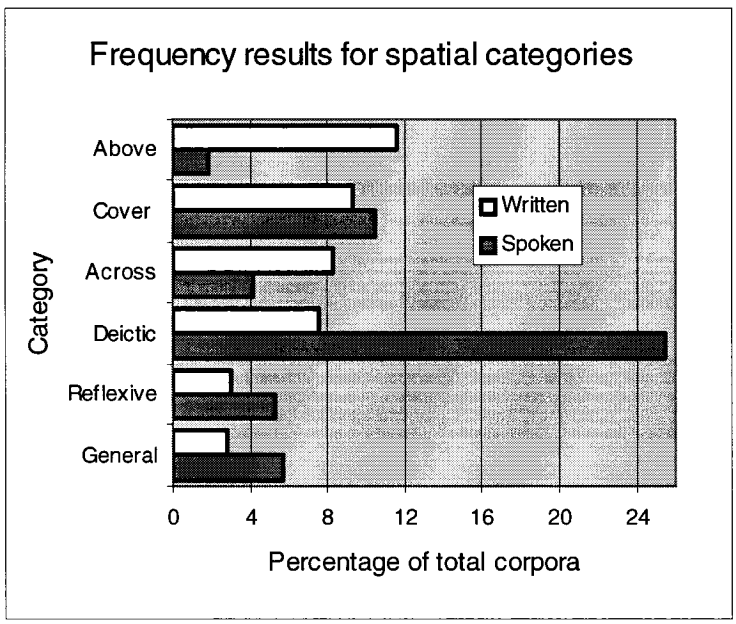
		Spatial : Non-spatial
Correctness	Test	65.5 : 35.5
Frequency	Spoken	52 : 48
	Written	43 : 57

total correct translations for the spatial and non-spatial items respectively, and dividing them each by the cumulative total of the correct translations. The ratios for the written and spoken corpus results represent percentages of the total tokens of *over* from the two corpora analysed. The ratio of 52:48 for the spoken corpus and 43:57 for the written lead to the prediction that the participants would answer correctly the spatial and non-spatial items approximately equally.

However, this is not the case. The correctness ratio of 64.5:34.5 shows that the participants performed 90% better on the spatial items than on the non-spatial items.

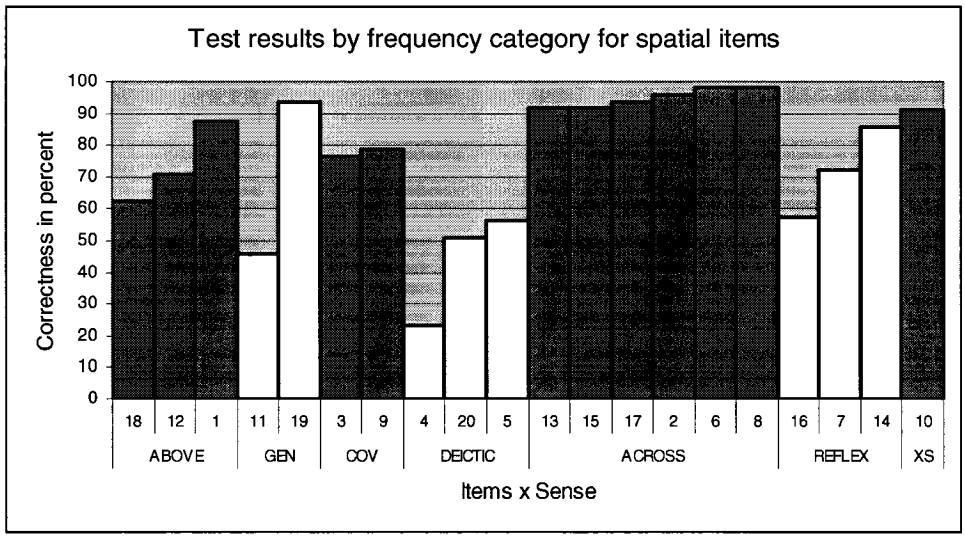
Just as the frequency hypothesis is rejected to explain the overall difference between the results of the spatial and non-spatial categories, so it also

Figure 4.1. Frequency results for the spatial categories from the written and spoken corpora.



is rejected to explain the difference between the items within the spatial category itself. In Figure 4.1, the frequency results for the spatial category from the written and spoken corpora are presented. These results are organised by frequency within the written corpus. Figure 4.2, below, shows the test results for correctness-of-translation for the spatial items. The results are categorised according to those used in the frequency results and are likewise organised in the same order as in Figure 4.1. A comparison of the data presented in these

Figure 4.2. Test results of the items by frequency category.
The test results from the spatial items are categorised and ordered according to those in 4.1 above. The greyscale is used to separate one category from another.



two graphs will explain why the frequency hypothesis should be rejected as an explanation for the correctness-of-translation for the spatial category.

The overall progression of the frequency results from the written corpus does not correspond with the progression of the results from the test results. Specifically, the Reflexive category was comparatively infrequent in the corpora at 3%, but in the test results, items from that category were answered correctly at a rate between 72% and 98%. Furthermore, the Deictic and Across categories were similarly frequent in the corpora at 7.7% and 8.5%, yet in the test results these were respectively the least and best answered categories (23%-53% for the Deictic category and 92%-98% for the Across category).

The frequency results from the spoken corpus correspond even less well with the test results. The most frequent category from the spoken corpus, the Deictic at 24.9%, was the least correctly answered category in the test results;

the least frequent category, the Above at 1.9%, was translated well, between 63% and 90% correct.

In consideration of the non-spatial results, the case for the frequency hypothesis is more complicated than for consideration of the spatial items. For certain items the frequency hypothesis is maintained, for others it is rejected. This assessment will be explained below with reference to Figures 4.3 and 4.4.

Figure 4.3. Frequency results for non-spatial categories.
The chart compares the frequency results for the non-spatial categories from the written and spoken corpuses: the bottom 6 items correspond to items from the test.

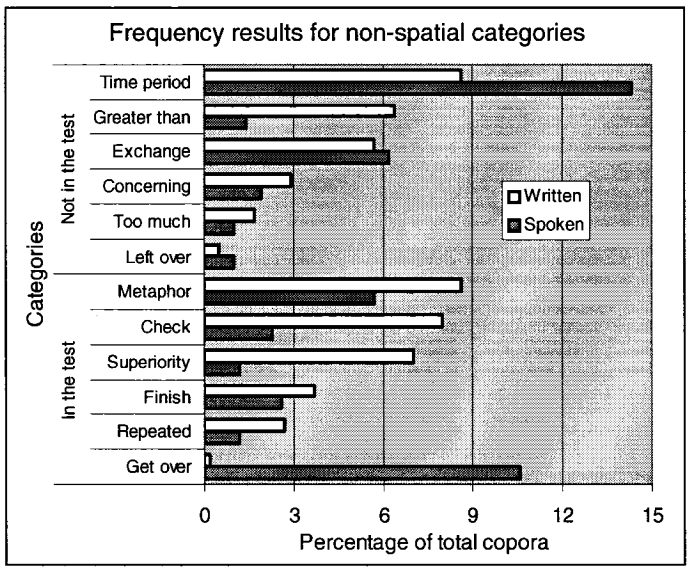
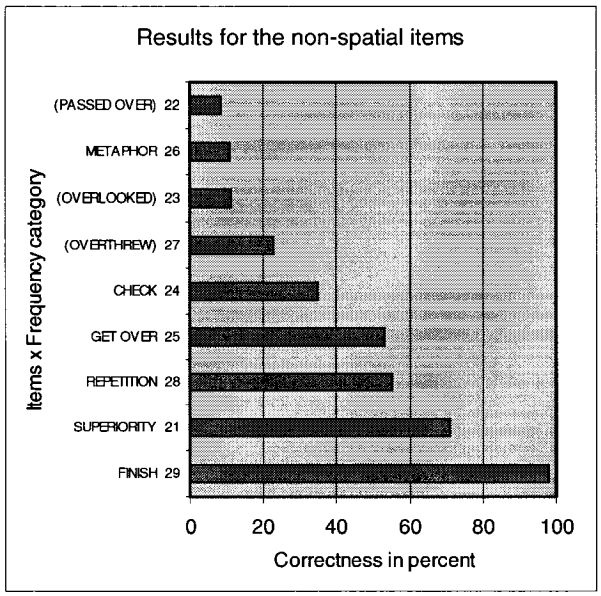


Figure 4.3 shows the frequency results for those corpus items categorised as non-spatial. These items were further categorised to facilitate comparison with the test results. The six categories in the upper half of the *graph* have no corresponding items in the test. The six categories in the lower half of the *graph* correspond by name to items listed in Figure 4.4, below. In this *graph*, the numbers refer to the item number from the test. Items 22, 23, and 27 do not

Figure 4.4. Results for the non-spatial items.
The results for the correctness of response for the non-spatial items are titled according to their corresponding frequency category. Those titles in brackets do not have a corresponding category.



have a corresponding category in the frequency results. Item 26 (The company president is over the hill) is equally infrequent, because the metaphor category, where it was classified, includes a disparate group of senses, any one of which is unlikely to occur more than once in the corpus. The low correctness-of-translation for these four items corresponds with their infrequency in the corpus; thus, for these infrequent items, the frequency hypothesis is maintained.

The results of the other items do not strongly support the frequency hypothesis. Item 25 (She soon got over her divorce) and item 28 (He turned the question over in his mind) are comparable in correctness-of-translation at 53% and 55% respectively; however, in the frequency results, the two corresponding categories are quite distinct. The Get Over category, corresponding to item 25, is comparably frequent in both corpora, at 6.5% in the written corpus and 10.3%

in the spoken; however, the Repetition category, corresponding to item 28, is much less frequent, at 2.7% in the written and 1.2% spoken corpus. Likewise, for the rest of the non-spatial items no general correlation can be made with the corresponding categories in the frequency results. Thus, the frequency hypothesis is rejected for all but the most infrequent of non-spatial senses.

II. Analysis of variance

In Table 4.2 the means results for each item from the study are presented by language group and are organised by sense. The hypothesis of

Table 4.2. Means results for each item by language group.

		LANGUAGE					LANGUAGE		
SENSE	ITEM	Ch.	Fr.	Ja.	SENSE	ITEM	Ch.	Fr.	Ja.
ACROSS	4	27	6	40	COVER	11	47	39	53
	20	53	59	40		3	53	76	100
	5	60	50	60		9	73	76	87
	13	93	100	80		19	93	88	100
	15	93	94	87	EXCESS	10	79	100	93
	17	93	100	87	NON-	22	13	6	7
	2	100	89	100	SPATIAL	26	0	6	27
	6	100	94	100		23	7	7	20
	8	100	94	100		27	20	36	13
ABOVE	18	67	67	53		24	36	40	29
	12	60	67	87		28	47	53	53
	1	87	83	93		25	33	53	73
REFLEX	16	47	59	67		21	47	94	67
	7	80	65	73		29	100	94	100
	14	80	83	93					

prototypicality predicts that the participants' first language will be a factor in their acquisition of the different senses. In order to analyse the results for this factor of first language, the factor of English-language proficiency must be equal

between language groups. In this study, the participants did not write a proficiency test. As a precondition to analysing the data for prototypicality across languages, it must first be established that there is no significant difference between the languages groups. In this way, we can assume that the language groups are comparable in their overall proficiency. An analysis of variance was conducted with the correctness-of-translation as the dependent variable and language as the independent variable. There was no significant difference between language groups ($F(2,1363) = 2.10$; n.s.). This indicates that no one language group found the test significantly more or less difficult than the others and it warrants the decision to group the data by the different senses regardless of language.

Prototypicality was hypothesised to be expressed in two ways: between senses, and within senses. A factorial analysis of variance was conducted to investigate these hypotheses. In the analysis, correctness-of-translation was set as the dependent variable, and language and item were set as independent variables. I will present below the results for the hypothesis of prototypicality within senses and will here attend to the results of the hypothesis of prototypicality between senses.

II. A. Analysis of variance between senses

Table 4.3 shows the average correctness for each sense overall. A one-

Table 4.3. Average correct response by overall sense.

	SPATIAL SENSES						
SENSE	ACROSS	ABOVE	COVER	REFLEX	EXCESS	NON-SPA	TOTAL
ANSWERs	77%	74%	73%	85%	91%	41%	67%
n	431	144	188	142	45	416	1366

way analysis of variance was conducted to compare the different senses to one another. Figure 4.5 below shows the average correctness of the different items

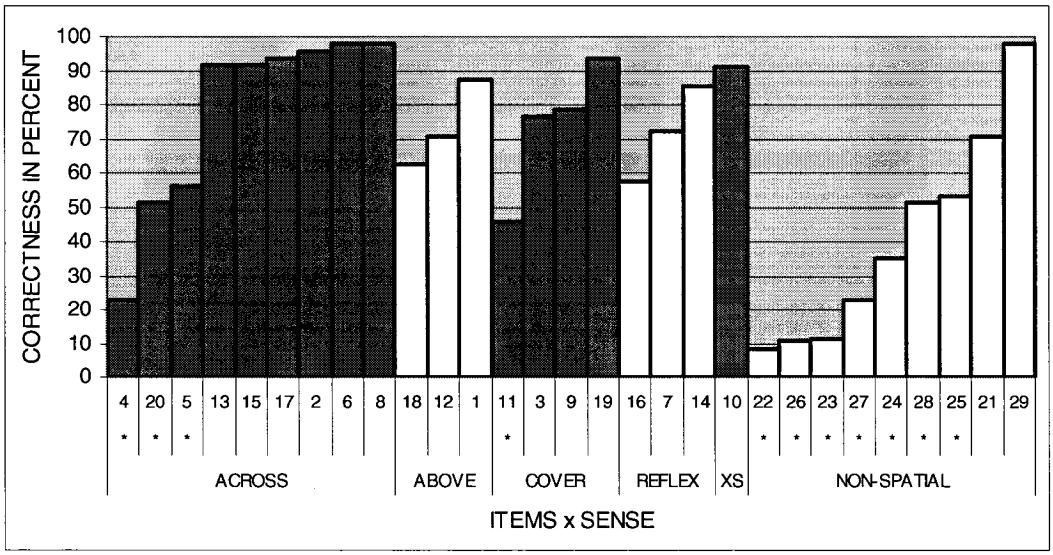


Figure 4.5. Averages for correctness of translations.
The average number of correct translations for each item is arranged in ascending order and grouped according to general sense. The asterisks indicate items significantly lower than other items within that sense. The differences in greyscale were made to visually separate the groups from each other.

grouped by sense. The different proposed senses were set as the independent variable: Across, Above, Cover, Reflexive, Excess, and Non-spatial. Overall, there was a significant difference between the items ($F(5,1360) = 37.81$, $p<.05$).

While the non-spatial senses as a group are significantly different from each of the spatial senses ($F(1,1364) = 180.48$, $p<.05$), there was no significant difference among the spatial senses themselves. Thus, upon this initial analysis, the hypothesis that the different senses are more difficult according to their prototypicality is maintained between the non-spatial senses and the spatial senses as a whole.

II. B. Analysis of variance within senses

To test for prototypicality within senses, a factorial analysis of variance was conducted with the correctness-of-translation as the dependent variable and independent variables of language and item. In Figure 4.5, above, the asterisks mark items with a significantly lower average of correct translation within the given sense. Thus within the Across sense, items 4, 20, and 5 are significantly different from items 13, 15, 17, 2, 6 and 8. Table 4.4, below, gives the average correct translations for each item overall. The results show that for the Across sense, item 4 is significantly different from items 5 and up, and items 20 and 5 significantly different from items 13 and up; for the Cover sense, item 11 is significantly different from the rest of the sense's items; and for the Non-spatial senses, items 22, 26 and 23 are significantly different from items 25 and over, and item 24, significantly different from items 21 and 29. While not significantly different, there is a strong, 27% difference between item 18 and item 1 in the Above sense. (This can be compared to the significant difference of 31% between items 11 and 3 in the Cover sense).

Table 4.4. Average correct response of each item.
Grouped by overall sense, with significantly lower items marked by an asterix.

SENSE	ACROSS								
ITEM NUMBER	4	20	5	13	15	17	2	6	8
AVERAGE	0.23	0.51	0.56	0.92	0.92	0.94	0.96	0.98	0.98
SIGNIFICANT	*	*	*						

SENSE	ABOVE			COVER				REFLEXIVE			XS
ITEM NUMBER	18	12	1	11	3	9	19	16	7	14	10
AVERAGE	0.63	0.71	0.88	0.46	0.77	0.79	0.93	0.57	0.72	0.85	0.91
SIGNIFICANT				*							

SENSE	FIGURATIVE								
ITEM NUMBER	22	26	23	27	24	28	25	21	29
AVERAGE	0.08	0.11	0.11	0.23	0.35	0.51	0.53	0.71	0.98
SIGNIFICANT	*	*	*	*	*	*	*		

Within the spatial senses, those items which were significantly lower in correctness were also those which were analysed as less prototypical. In the Across sense, those items are 4. ACR.VX.C.E (He lives over the hill), 20. ACR.NC.E (Harry jumped over the cliff), 5. ACR.C.E (He's over the finish line!); in the Above sense, 18. ABV.1DTR (The power line stretches over my yard); and in the Cover sense, 11. COV.MX.P (He walked all over the hill). Thus, for the spatial senses, the results support the hypothesis that within a given sense, the less prototypical items will be more difficult than the more prototypical items. The Non-spatial senses are more complex because they involve the use of metaphor. The results of further analysis will be considered for the non-spatial items below.

II. C. Analysis of variance between the revised senses

The results from the above analyses of variance showed that while there was a significant difference between the items within certain spatial senses, there was no significant difference between the spatial senses themselves. It may be the case that the variance of prototypicality within the senses has affected that variance between the senses. To test whether this is so, new groups will be formed using those items which showed a significant difference from the other items within their allotted sense. Those items were 4, 20, and 5 from the Across sense and item 11 from the Cover sense. I will group 4, 20 and 5 together and name their group the Deictic sense because they all exhibit the End Point feature which defined the Deictic category in the frequency analysis above. Item 11 is defined in part by the Multiplex feature. This feature was used to define the General category in the above frequency analysis. However, if this feature were to define a new sense, then item 9 would also have to be included in the sense, since it too expresses the Multiplex feature. I will discuss the validity of this decision in the Discussion chapter below.

To compare the revised senses to each other, another one-way analysis of variance was conducted. Correctness-of-translation was again set as the dependent variable, with the revised senses as the independent variable. The revised senses showed a significant difference to one another ($F(7,1358)=16.69$, $p<.05$). Using Tukey's Studentized Range (HSD) Test the following senses showed significance from one another. The Excess, Reflexive and Cover senses a showed significant difference from General, Deictic and Non-spatial senses,

the Across sense was significant from Above, General, Deictic and Non-spatial senses, and the Above from the Deictic and Non-spatial senses as well as from the Across sense.

III. Correlation between correctness-of-translation and variation-in-translation

I have proposed that prototypicality can be expressed either across languages or within languages. An analysis of variance was proposed above to show that in general no one language group will find the test more or less difficult than either of the other language groups. However, within a language, specific senses may be more prototypical due to that language's individual semantic organisation. To confirm this assumption the following procedure will be conducted.

Within a language group, the consistency with which the participants translate a given item can be measured by calculating the following measure of variation. The correct translations make up the data set for this procedure. Each item is analysed for the different key words the participants use to translate the target sense of the word *over*. The translations can be grouped together by those which use the same key word. To get a measure of variation, the number of key word groups (or "actual" number of ways of translation) is divided by the "potential" number of ways of translation. The potential number of ways is the total number of correct answers for that item, which is also the total number of items considered. For example, if there are 15 correct translations which were translated in 15 different ways, then the measure of variation would be 100%;

likewise, if there were 12 correct translations which were translated in 5 different ways, then the measure of variation would be 42%.

By taking the measurements for variation and the data for correctness-of-translation, we can confirm that the more prototypical words will be translated more correctly and with less variation. The assumption predicts a strong negative correlation of correctness-of-translation by variation-in-translation for the items grouped by language. The results of this analysis will be further used to confirm the contingent assumption that when the sense of a word is highly prototypical in their language, the participants will show greater consistency in their translation.

While we assume that the two criteria of correctness and variation can identify prototypicality in general, these criteria cannot distinguish whether a sense is prototypical across languages or within a specific language. We can only determine that the sense is prototypical within a specific language by comparison to other languages. If the sense expresses prototypicality in one language, but doesn't express it in other languages, then we can conclude that the sense is prototypical within that language and not across languages.

Thus, we can identify those items which are prototypical within a given language by comparing the same items across languages by the criteria of correctness and variation. We will nominate as candidates for prototypicality within a language those items which in one language show high correctness-of-translation in contrast to the other languages where the same item shows low correctness-of-translation. These items can be confirmed as prototypical if the

variation of the items across the languages is consistent with the general trend of variation: for those items translated more correctly there will be low variation-in-translation, and for those items translated less correctly there will be high variation-in-translation.

In Appendix C, Tables C.1, C.2 and C.3 present the data for variation-in-translation and correctness-of-translation for each language by item. Using this data a test of correlation was conducted to investigate the assumption that those items which are more prototypical in the source language will be more easily learned in the target language. It was assumed that if an item was more prototypical within a specific language, it would show a lower degree of variation-in-translation (i.e. lower in the number of different translation strategies). A measurement of variation was calculated by taking the actual number of different ways an item was translated and dividing this number by the potential ways the item could have been translated; the potential number of translations was set at the number of correct translations given for the item. A correlation analysis was conducted by measuring the test items' average of correct translation against the items' measure of variation. The translations of each item were organised by language because this analysis investigated a question of prototypicality within a given language rather than across languages.

Each point in the correlation analysis represents the translation results of a language group for a specific item. As a method of referring quickly to these points, I will use the following coding scheme of first presenting the item as a number and then presenting the language group by its first letter and separating

the two with a hyphen. Thus, the set of translations for item 01 by the Japanese language group would be represented as 01-J. At other places in the study, I have had need to refer to specific participants. At those times the participants were referred to by the first letter of their language group, then a specific number for each participant. Thus, J01 represents Japanese participant #1. I draw the reader's attention to this distinction here with the hope of avoiding confusion.

For several translation sets, there were either no correct translations or only one correct translation. Such sets show no variation-in-translation and they were therefore removed from the analysis. These sets were 23-C, 26-C, 04-F, 23-F, 22-F, 26-F, and 22-J. The analysis showed a strong negative correlation of r =.-0.77 for the combined data sets of all three languages, and individually of r = -0.80, -0.80, and -0.70 for Japanese, French and Chinese respectively. The results of the individual languages confirm that the strength of the overall result was not due to the strength of any one particular language.

Figure 4.6 shows a scatterplot graph of the correlation between the average of correctness for translations and the measure of variation between translations. Each point on the graph represents a different set of translations for each item by language group. Certain outliers show exceptions to the general trend of the correlation. The outliers are those sets which show much more or much less variation than predicted by the average of correctness. Using the formula for the y-intercept, y = -08056x+0.998, we can calculate the predicted value of variation is within 16% above or below the trendline. We set y to the values for the actual correctness-of-translation data, and solve for x, to give us

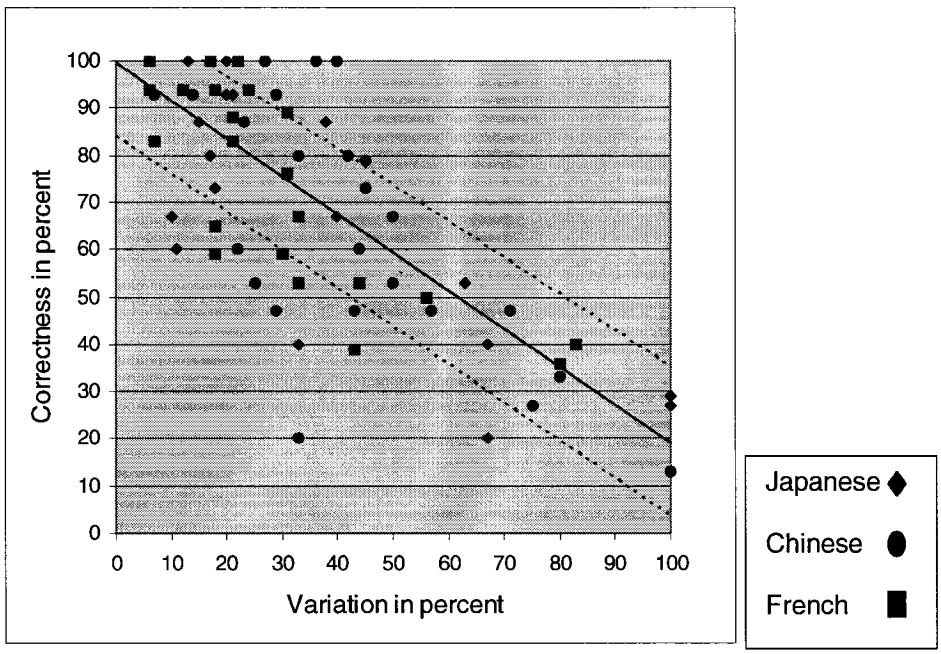


Figure 4.6. Correlation of correctness-of-translation to variation-in-translation. The average of correct response for each item by language is correlated against the measure of variation within each item. The data sets correlated at r =-0.77. A regression line has been added to facilitate analysis. The dotted lines mark the average variation of 16% above and below the solid line of regression.

the predicted variation. By calculating difference between the actual variation and the predicted variation, we can identify those sets which were translated with much more and much less variation than predicted. Sets 27-C, 04-J and 05-J showed the least variation for the amount predicted by how correctly they were translated: set 27-C was translated with 64% less variation than predicted, set J-04, with 41% less than predicted and set 05-J, with 39% less than predicted. sets 02-C, 06-C and 02-J showed the most variation for the amount predicted by how correctly they were translated: set 02-C was translated with 37% more variation than predicted, set 06-C, with 33% more than predicted and set 02-J, with 30% more than predicted.

These outlying sets are exceptions to the general trend and do not seriously question the validity of the results to support the hypothesis that less

prototypical sets are more difficult for second language learners; however, these sets are noted will be discussed in the following chapter.

Prototypicality was hypothesised to be expressed either across languages or within a specific language. For both expressions, prototypicality is assumed to be marked by high correctness-of-translation and low variation in type of translation. Prototypicality within a specific language is indicated when one language shows high correctness-of-translation with low variation in contrast to other languages which show the opposite.

For certain items, there was a great variation in correct translation between languages. These items are potentially interesting, because we can use the hypothesis of prototypicality within languages to explain the reason why the same item can be translated correctly by many participants in one language, while in another language, translated correctly by only a few participants. The items which showed the greatest variation in correctness of translation were 3 (She held the veil over her face), 21 (She has a strange power over me), and 25 (She soon got over her divorce). Table 4.5. shows the averages of these items

Table 4.5. Items with the greatest difference in means
The three items compared here are those with the greatest difference in correctness of response between languages. The top part of the table shows the average correctness of response for each item by language. The bottom part of the table shows the differences between those averages.

		ITEM (in percent)		
		3	**21**	**25**
AVERAGE CORRECTNESS	JAPANESE (J.AV.)	100	67	73
	FRENCH (F.AV.)	76	94	53
	CHINESE (C.AV.)	53	47	33
DIFFERENCE BETWEEN AVERAGES	J.AV. & F.AV.	24	28	20
	J.AV. & C.AV.	47	20	40
	F.AV. & C.AV.	23	48	20

by language group and the differences between those averages. Between the Japanese and Chinese averages for item 3, there is a 47% difference, and for item 25, a 40% difference; between the French and Chinese averages for item 21, there is again a 47% difference.

To confirm the hypothesis of prototypicality within a language using these three items, the items must also show a measure of variation-in-translation consistent with the general trend of the data. The average variation from the regression line was calculated at +/- 16% using the data points from the correlation analysis graphed in figure 4.6 above, where the average variation above and below the regression line is marked by dotted lines. In table 4.6, below, for items 3, 21, and 22, the differences between the actual and predicted variation are calculated by language. The predicted variation was calculated

Table 4.6. Predicted variation in translation for items with the greatest difference in correctness of translation.

The table lists by language the three items which show the greatest variation in correctness of response: 3, 21, and 25. The actual variation of each item is compared to the predicted variation, which was calculated using the formula for the y-intercept from the above correlation analysis: y = -0.8056x + 0.998. The difference between the actual and predicted values is listed in the final column; those differences marked with an asterisk are above the average variance of +/- 16% from the regression line.

		Lan-guage	Correct-ness	Variation		Difference
				Actual	Predicted	
ITEM	3	J	100	20	0	* + 21
		F	76	31	28	+ 2
		C	53	25	57	* - 32
	21	J	67	40	41	- 1
		F	94	6	6	0
		C	47	71	66	6
	25	J	73	18	32	- 14
		F	53	44	58	- 13
		C	33	80	82	- 2

using the formula for the y-intercept, from the above correlation analysis. Those differences marked by an asterisk are those which are outside the average variation from the regression line. Set 03-J is outside the average variation of +/-16% by 5% and 03-C by 16%. Whether or not these differences refute the hypothesis for prototypicality within a language will be considered in the discussion below.

IV. Error analysis of the non-spatial items

The non-spatial items were assumed to be more difficult for the participants to interpret than the spatial items. This is because, to interpret a non-spatial sense correctly, it was assumed that the participants would have to choose both the correct image schema for *over* and the correct metaphor for the sentence in question. Once they had made these choices correctly they would then have to construe the correct meaning of the sentence as a whole. The assumption of difficulty for the non-spatial items was corroborated by the fact that their frequency of correctness-of-translation was much lower than it was for the spatial items. These results were presented in this chapter above.

It was hypothesised that when translating the meaning of a non-spatial sense of *over*, the participants would attempt to construe the meaning of the sentence using a sense that was more prototypical than one that was less prototypical. The sense could be either prototypical in the L2 (English) or in the L1 (French, Chinese, or Japanese). To confirm this hypothesis we need to identify that, when translating incorrectly, there was a strong trend for the

participants to use more prototypical senses of *over* in the L2; if there wasn't, then to see if these senses were more prototypical in the L1. In this section, I will identify which senses the participants choose most dominantly. In the next chapter, I will consider whether these senses were the most prototypical choice.

Above, in Chapter 3 on coding, the incorrect translations of the non-spatial items 21 to 28 were coded according to what sense of *over* was used in each sentence. (Item 29 was not considered because it was translated correctly by most of the participants.) For each item from 21 to 28, the incorrect translations were counted by sense; these totals were then divided by the total number of incorrect translations for each respective item. By this calculation a list of percentages was produced which represented for each item how often the participants used the different senses when they translated the item incorrectly. For example, item 21 was translated incorrectly by 14 of the participants; 8 of these 14 used the Excess sense in their translation. This means that the Excess sense represents 57% of the total incorrect translations for this item.

It is difficult to determine just how representative of the ESL learners these percentages are. This is because the total number of incorrect translations for each item was both small, and, between items, unequal. For these reasons, I calculated for each item the probability that the percentages were due to chance; that is to ask, what is the probability that it was due to individual differences that the participants would mistranslate the same item, using the same sense, for the number of times they did. To answer this question, a calculation of binomial probability was used. This calculation requires a finite set of possible incorrect

Table 4.7. Most common errors for each non-spatial item.
The table shows the sense most commonly used in mistranslation, by item. To calculate the probability that it was due to chance that this sense would be used for number of times it was, binomial probability was used. *B(n, p)*, where *p = 1/7.*

Item	Sense most commonly used in mistranslation	Count of the most common mistranslation (*X*)	Total mis-translations for this item (*n*)	Percentage (%) of total translations	Probability that the number was due to chance (*P*)
21	EXCESS	8	14	57.1	.02
22	END POINT	36	44	81.8	<.0001
23	EXCESS	26	40	65.0	<.0001
24	COVER	11	28	39.3	.0001
25	END POINT	20	21	95.2	<.0001
26	LITERAL	24	40	60.0	<.0001
27	*OVER* IGNORED	19	33	57.6	<.0001
28	*OVER* IGNORED	13	23	56.5	.0002

translations. This set comprised six senses used in the interpretation of the translations: the Above, Across, Covering, Reflexive, Excess, and End Point senses and by two other types of translation, by a literal sense of *over* or by disregarding *over* altogether. For each of the possible translations, one of the senses would have been the correct choice. Leaving out the correct sense, we are left with a set of 7 possible of mistranslations. This means that for any given mistranslation, there was a 1/7 chance that the participants would commit any one of the 7 possible mistranslations.

The variable of probability per mistranslation will remain the same for each calculation at $p = 1 / 7$. By the binomial distribution, the count of X is $B(n, p)$. X is the count of mistranslations by item, where one particular sense was used. B is the binomial distribution with parameters n and p: n is the total number mistranslations for one item, and p is the fixed variable of probability (1/7). Referring to table 4.7 below, for item 21, the Excess sense was used in

mistranslation a total of 8 times out of a possible total of 14 mistranslations. The question is, what is the probability that the Excess sense would be mistranslated at least 8 times out of a possible 14 mistranslations. The notation for this problem is $P(X \geq 8)$ if X is $B(n,p)$, or $P(X \geq 8)$ if X is $B(14, 1/7)$. In this case there was only a 2% chance ($P=.02$) that item 21 would be mistranslated by the Excess sense 8 times for the total 14 mistranslations.

Since only one item had a relatively equal number of competing translations, we are only interested in the most common way an item was incorrectly translated. I am presenting those results in Table 4.6 above. The results show a distinct tendency for the participants to interpret the sentence using a specific sense of *over.* The strength of the results leads us to believe that their choice is not due to chance, which is to say, not due to reasons unique to the individual participant. Some items do not maintain the tendency to opt for one specific sense. For items 27 and 28, the participants usually ignored *over* altogether and there can be little discussion of how these items relate to the question of what sense was used when the meaning was unknown by the participants. Nor can there be much discussion for item 26, because for this item the participants usually interpreted the sense literally, not figuratively. Despite these exceptions, the other items will be discussed in the next chapter because their results show a strong tendency for the participants to choose one sense over the others.

Chapter 5
DISCUSSION

I. Frequency

This study investigated the order in which second language learners of English learn the different senses of the polysemous item *over*. At its outset, this study proposed two main hypotheses to explain this order of acquisition: one hypothesis stated that learners would learn the senses according to their frequency in the language; the other stated that learners would learn the senses according to their degree of prototypicality. The hypothesis of frequency is common to learning in general: that some action or knowledge will be better remembered with more repetition. Because this hypothesis was the more general, the influence of frequency was investigated first; however, the expectation was that frequency would prove unsatisfactory and thus require another hypothesis to explain the order of acquisition, namely the hypothesis of prototypicality.

Frequency was measured using corpus data, both spoken and written. The assumption was that the frequency of the senses in these corpora would reflect the frequency of the senses in the experience of the learners. The assumption is admittedly crude, and while it was not felt that corpus frequency could precisely reflect the experience of the participants, it was felt that with enough participants the corpus frequency would reflect at least the general trend of experience of the participants as a whole.

As it turned out, frequency did not in fact reflect the general trend of which items the participants found difficult and which they found easy. The results showed that the participants correctly translated the spatial items more frequently than they correctly translated the non-spatial items at a ratio of 65.5 : 35.5. The frequency of the spatial senses to non-spatial senses in the corpora was 52:48 in the spoken corpus and 43:57 in the written corpus. The frequency hypothesis thus predicted that the spatial and non-spatial items would be learned at about equal rates, but the results of the study show that the learners generally learned the spatial items before they learned the non-spatial ones.

Nor did the frequency of the individual spatial senses correspond to how well or how poorly the participants translated the corresponding spatial items. The spatial items were categorised according to the different senses of the target word of *over*. This was done so that the test results could be compared to the frequency results, which were categorised in the same way. As discussed above in Chapter 5, the general trend of corpus frequency did not correspond to the general trend of how correctly the participants translated the different senses. The example of the Deictic and Across senses neatly illustrates this point. These senses were comparably frequent in written corpus at 7.7% for the Deictic and 8.5% for the Across; in addition, the Deictic sense was the most frequent in the spoken corpus at 24.9%. The frequency hypothesis predicts that the Deictic sense would be learned at the same time as the Across sense, if not before. However, of all the senses, the participants translated the Across sense the most correctly and the Deictic the least. These results indicate that the participants

have a far clearer idea of the Across sense than the Deictic sense despite the reverse frequencies with which these senses occur in the language. As I will discuss below, the hypothesis of prototypicality is much more satisfactory in explaining the results of the spatial items.

In contrast to the results for the spatial items, the frequency results for the non-spatial items do correspond, at least in part, with the translation results. The highest correspondence is between the most infrequent senses in the corpus and the least correctly translated items in the test. For items 22 "Sam was passed over for promotion", 23 "You've overlooked his accomplishments", and 27 "Those are the men who overthrew the government", the sense of *over* in these items did not once appear in the corpora. Furthermore, while many examples of metaphor appear in the corpus, the precise metaphor in item 26 "People were saying that the company president is over the hill" did not appear. The frequency hypothesis would posit that these items were incorrectly translated because their senses are infrequent. However, the frequency hypothesis does not adequately explain the results of any of the other senses, either spatial or non-spatial, nor does it explain why the non-spatial items were more difficult than the spatial items in general. Thus, I believe that the difficulty of these items can also be explained by factors other than their infrequency.

As an exception, I believe that frequency can explain the results for one item. For Item 29 "The play is over", the category of Finished represented 2.6% of the spoken corpus and 3.7% of the written. These frequencies seem too low to predict that 98% of the participants would translate the item correctly.

However, I believe that in this case, it is reasonable to expect that the frequency of the sense in the participants' experience is more frequent than its frequency in the corpora. The participants, as students who spend a lot of time in language classrooms, would often hear the teacher say 'Class is over', and furthermore an expression like *Game Over* is now so ubiquitous that it has entered other languages, like Japanese. Thus, in this one case, I believe the frequency hypothesis adequately explains the translation results. This one example also points to the importance of individual differences between participants in their specific familiarity with different senses. For this reason, it is important to have a substantial number of participants when looking at questions of language transfer, and it's hoped that such a number has been achieved in this study.

II. A. The hypothesis of prototypicality: Across languages

The hypothesis of prototypicality predicted that learners would learn the different senses of *over* in a similar order despite their first language, an order which could be explained by prototypicality. An analysis of variance showed that when the translation results were organised by the participants' first language, no one language group translated the items better or worse. This result warranted the decision to exclude first language as a general factor and to analyse the translation results as a single group. I organised the items according to the senses devised by Brugman and Lakoff (1988). Each item represented a different schema, or spatial configuration. Similar schemas were categorised by specific senses of the target word *over*, which were distinct in meaning from

other senses. I hypothesised that prototypicality would express itself in two ways, both between the different senses and between the different schemas within each sense. Analyses of variance were conducted to test both these hypotheses.

Against my expectation, the first analysis showed that there was no significant difference between the spatial senses; however, a second analysis showed that there was a significant difference (α=.05) between some of the items within the Across sense and the Cover sense. Prompted by the results of this second analysis, I created two new groups for those items whose results were significantly lower than other items within their sense. In the first new group, I included items 9 "The guards were posted all over the hill" and 11 "He walked all over the hill". The schemas for both of these items include the Multiplex feature, which signifies that the trajector (the subject in the case of both sentences) is positioned at many points over the landmark (the hill in both cases). I called this sense the General sense, because it refers to the general area of the landmark. In the second new sense, I included items 4 "Sam lives over the hill", 5 "He's over the finish line" and 20 "He jumped over the cliff". The schema for each of these items contains the End Point feature. In Brugman and Lakoff's analysis, the End Point feature indicates a terminal point for the trajector. They also state that an end point is present in item 19 "She spread the tablecloth over the table." However, in item 19, the end point is the landmark itself, whereas in items 4, 5 and 20 the end point is a point on the other side of the landmark. It is this idea of on-the-other-side-of that makes 4, 5 and 20 difficult for second language learners.

For this reason I didn't include 19 in the new sense, which I called the Deictic sense because it points to a place outside the schema. I have used the term "Deictic" before, to name a category in the frequency analysis. The sense in question here matches the definition I used for the frequency category, and so I've used the name again for this new sense.

A further analysis of variance showed a significant difference between the new senses, the Deictic and Across, and the original ones. These results indicate that learners find less prototypical senses more difficult; however, in order to justify this claim, I need to show that these new senses represent distinct meanings in the minds of speakers. To do this, I will first assess how Lakoff (1988) defines one distinct sense from another, and whether this definition can explain the senses of *over* as I have configured them in this last analysis.

Lakoff defines a distinct sense of *over* as a distinct relationship between a trajector and a landmark. For example, in the Above-Across sense the trajector is superior to the landmark and describes a path across the landmark. Examples of this sense are items 17 "The plane flew over the town" and 2 "He is walking over the hill". While included in the same sense, items 17 and 2 represent different schemas; specifically, while the schema for item 2 specifies contact between the trajector and landmark, the schema for item 17 specifies no contact. Nonetheless, despite the differences between their schemas, these items are considered to be part of the same sense because they both describe a path and they both signify that the trajector is superior to the landmark.

Lakoff describes a large number of different schemas for each of the senses of *over*. The results of the present study pose the problem that some features between the landmark and trajector seem to constitute a new sense. Specifically, in item 5 "He's over the finish line", Lakoff categorises the schema in the Across sense because, in the schema, the trajector describes a path across the landmark. However, the schema also signifies the End Point feature. In the results of this study, the End Point feature indicates a different sense. Furthermore, the schema for item 8 "He drove over the bridge" also signifies superiority, a trajectory, and an end point. The problem is that despite their similar schemas, in item 5 *over* means 'on the other side of' while in item 8 *over* means 'across'. Thus they should not be considered as having the same sense. The question is, how in theory can we justify similar schemas, such as 5 and 8, as distinct senses.

Tyler and Evans (2003) find that Lakoff's descriptions of image schemas are too fine-grained, and that they represent too much of what is actually inferential in the meaning of the sentence. As an alternative to Lakoff's description, they argue that specific spatial features, like the End Point feature, can constitute distinct senses. They propose two criteria for determining whether a particular feature constitutes a distinct sense: 1. that it expresses a configuration of the trajector and landmark not apparent in any of the other senses, and 2. that there must be instances of the sense which are context independent. To illustrate this methodology, they state how the idea of 'covering' is distinct from the idea of 'above'. They say that in the Covering idea, the

trajector obscures the landmark from view, while in the Above idea, the trajector is in a superior position to the landmark. This fulfils their first criterion. They illustrate their second criterion with the following sentence:

(5.1) Joan nailed a board over the hole in the wall
(Tyler and Evans, 2003, p. 43)

If the meaning of this sentence was construed using the Above sense, they say the board would be put *next to* the hole. Because the sentence puts the board *on top of* the hole, the sense in this sentence is distinct from the Above sense.

Tyler and Evan's first criterion is in fact the same criterion Lakoff uses to distinguish distinct senses. Their second criterion is an improvement on Lakoff, because it acts as a proof to the hypothesis established by the first criterion. I believe that the second criterion is best met when a sentence can be shown to express ambiguity due to two or more distinct senses of the target word. For example, in the sentence,

(5.2) Ted hung a sign over the door

the sentence could be construed to mean that the sign is above the door, or that the sign covers the door. This ambiguity can only be due to the word *over*, and therefore there must be two meanings to the word. I believe that the two criteria proposed by Tyler and Evans can be used to establish the Deictic and the General senses as distinct from other senses.

Indeed, unlike Lakoff, Tyler and Evans define On-the-other-side-of as a distinct sense. To explain how they determine this sense as distinct, I will explain a few points where they diverge in theory from Lakoff. Tyler and Evans propose

that the meanings of words can only offer a minimal specification of the real world; in this way, they are able to achieve maximum application for describing real world events. The less specific the meaning of a word, the more it can be applied to any given situation; the more specific the meaning of a word, the less applicable it is. Spatial prepositions, due to their wide applicability, should be strongly constrained by minimal specification. However, in order for language to accurately represent our experienced reality, real-world knowledge is used to flesh out the minimal specifications of language. Their argument is quite similar to Lakoff's rationale (presented in Chapter 2 above); however, Tyler and Evans are much more strict in their application of minimal specification. This can be seen through their description of the following sentence:

(5.3) The cat jumped over the wall

The cat's jump describes an arc over the wall which can be specified by three points: it begins at point A, reaches an apex above the wall at point B, and lands on the other side at point C. By the constraint of minimal specification, *over* only specifies point B, while points A and C are specified by *jump.* They leave the specification of the actual trajectory (or path as Lakoff calls it) to the real-world knowledge of the listener; Tyler and Evans do this because the shape of the arc would be different depending on the type of wall being jumped and on the type of animal jumping it.

In order for new senses to develop, Tyler and Evans posit that when events, like the A-B-C trajectory, co-occur regularly in people's experience, these events become associated as a single holistic scene. By a process of

metonymic extension, the speaker can then refer to any one part of the scene by the spatial preposition or particle. In this way, the On-the-other-side-of sense (referred to as the Deictic sense in this study) has become associated with point C in the trajectory, as in the sentence,

(5.4) The cat is over the wall.

Sentence 5.4, proves Tyler and Evans' first criterion for distinguishing a distinct sense, because no other sense apparently refers to this configuration. There second criterion can be established using this sentence,

(5.5) The kite is over the river

There are two interpretations of this sentence depending on one's interpretation of *over*. If *over* is construed by the Above sense then the kite is above the river, if construed by the Deictic sense, then the kite is on or above the opposing bank from the viewer. In this way, the Deictic sense is context independent.

Tyler and Evans (2003) have considerably revised Brugman and Lakoff's (1988) senses of *over*. It might be asked, whether all the data for the present study shouldn't be revised according to their specifications. However, such an action would not be prudent. Our use of descriptive theory is not to provide an exact order of acquisition, but to identify generally which senses are more likely prototypical and which less prototypical. The theory also gives some justification to the idea that those senses more prototypical in English may also be more prototypical in the learners' L1's, because the theory is grounded in ideas of pre-linguistic experience. The data has shown that some senses, the Across and

Cover senses, should be each divided, to create two new senses, the Deictic and General. The theory provided here is used to justify the decision to form those new senses which were indicated by the data. If we were to revise all the senses, we would also have to revise the test questions as well. Such a revision may prove a more exact order, but I believe the present test is still adequate for proving the hypothesis that learners learn polysemous senses from the more prototypical to the less prototypical.

Now that we've considered the Deictic sense, we'll look to the General sense. This sense is easy to identify, because the sentence always marks the General sense by words which signify the entirety of an extended landmark, by words such *all* or *the whole* or *the entire*, as in sentence 5.6,

(5.6) The guards were posted all over the hill
(5.7) The guards were posted over the hill

In sentence 5.7 *all* is removed and the meaning of *over* is construed by the Deictic sense. The difference in meaning between 5.6 and 5.7 establishes the second criterion of context independence for the General sense.

In conclusion, this analysis has shown that prototypicality is a factor in the order that second language learners learn the spatial senses of the word *over*. From this conclusion it is likely that prototypicality could explain the order in which learners generally learn the senses of other polysemous words describing space. Before extending my conclusion of the role of prototypicality any further, I will first discuss the results of the analyses which investigated the role of prototypicality within languages and its role in the non-spatial senses.

II. B. The hypothesis of prototypicality: Within languages

The hypothesis for prototypicality within languages states that when schemas in the target language are more prototypical in the first language, those target schemas will be more easily learned. A correlation was conducted to test this hypothesis, the results of which I presented in the previous chapter. The variables in the correlation were correctness-of-translation and variation-in-translation. The variable of correctness was felt to signify how easily an item was learned and the variable of variation was felt to signify the prototypicality of an item in the participant's first language. These two variables of correctness and variation are considered to be independent from one another. As proof of their independence, I assert that two translations of the same sentence may be equally correct even though the words used in their utterances may be very different from one another.

I would like to clarify one potentially confusing point which distinguishes the hypothesis of prototypicality within languages from the hypothesis of prototypicality across languages. The potential for confusion is that in the hypothesis across languages the variable of correctness-of-translation signifies prototypicality, whereas in the hypothesis within languages the same variable is said to be independent from prototypicality. This apparent contradiction can be resolved when we consider the theoretical background of the two hypotheses. In the hypothesis across languages, the senses which were answered more correctly were taken to be more prototypical. We are able to make this assertion because it is argued that in terms of cognition certain spatial senses are more

primary and prototypical, and are consequently more easily learned. Thus within this hypothesis the variable of correctness-of-translation confirms a theoretical prediction. However, in the hypothesis of prototypicality within languages, we make no theoretical prediction about which senses will be more easily learned for a speaker of a certain first language. We *do not predict,* for example, that French and English will have similar linguistic structures because they share genetic and historical similarities; we *simply assert* that more prototypical items will be more easily learned. (In fact, the items themselves do not represent distinct senses, but different image schemas.) Since we make no prediction about what will be more or less prototypical, we have to measure prototypicality with an independent variable, which we can then use to confirm the ease of learning. That independent variable is taken to be variation-in-translation.

The variables of variation-in-translation and correctness-of-translation correlated strongly at r=-.77, indicating that our hypothesis is true, that more prototypical items within a language will be more easily learned. Before we confirm the hypothesis, however, the results need to be questioned for reliability and validity. To check the results for reliability, we will look at those outlying translation sets which do not conform to the rest of the data and we will see if they point to any methodological problems. We will then address the more complicated question of validity. To check for validity, we will make a close analysis of the translations of those items which show the greatest difference in correctness-of-translation across the three languages.

Reliability of the results

In total we identified six outliers in the data: three which showed too much variation for how correctly they were answered, and three which showed too little variation. The three translation sets with high variation were 06-C (the Chinese translations of item 06), "The plane flew over the hill" , and 02-C and 02-J, "He is walking over the hill". Both items 06 and 02 were considered highly prototypical and as expected they were all translated with high correctness. The question to ask for these three sets is why they expressed so much variation. I believe that if the translations of 06-C were looked at independent of the coding system, an independent observation would have found less variation. For example, if the variation had been identified by the choice of main verb, then the variation would have been within the average of the data as a whole. However, to change the coding to fit the needs of each set would be highly unreliable; it is better to have a reliable system which creates a few questionable outliers, than to have an unreliable system which creates no outliers.

Sets 02-J and 02-C are interesting as outliers because they represent translations of the same source sentence, "He is walking over the hill". For both the Japanese and Chinese translations, most participants signified the sense of *over* by the same adposition, respective to their languages. When participants didn't use the key adposition, they signified the sense by different verbs. In the Japanese case, we have the verbs 'walking',.'climbing', 'crossing' and 'descending'. What is interesting about these verbs is that 'climbing', 'crossing' and 'descending' divide up the path of the person walking over the hill. Such

variation indicates that the learners are making overly fine distinctions to the meaning of *over*. However, I think this type of overextension is an exceptional case. The high variation expressed by these sets would more usually indicate less prototypicality.

We have considered here specific sets of translations which show more variation than expected. If we look at the correlation graph, Figure 4.6, in the previous chapter, we see that the fourteen sets with 100% correctness-of-translation are all greater in variation than predicted by the trendline. By looking at how their variation was measured, we can explain why these sets are so great in variation. Initially, we measured variation by organising the translations into different 'groups-of-variation' categorised by different keywords. These sets with 100% correctness-of-translation varied between three and six groups-of-variation. The trendline predicts that when an item is translated 100% correctly, there should be no variation (i.e. only one group-of-variation). A closer look at the groups-of-variation here shows that, for each set, one group is dominant. For these fourteen sets, on average 63% of all the translations conformed to a single group-of-variation. The remaining 46% of the translations were divided up into the remaining groups. Thus, while the results predict fewer groups-of-variation, upon closer analysis one group represents the dominant way of translation. This exception to the reliability of the coding system is only expected for the most correctly translated items, and doesn't represent a problem for the system across the rest of the sets of translations.

The other group of outliers are those sets which showed less variation than expected. After analysing these sets it seems that their low variation does indeed reflect their prototypicality within the participants' first language. The problem is not their variation, but their correctness: why were these items not more often translated correctly? In the translations of set 27-C, "Those are the men who overthrew the government", three participants translated the item correctly, and surprisingly they all translated *overthrow* in the same way as *twe fan*. In this case I believe that the vocabulary item *overthrow* is quite advanced for second language learners and that only the more advanced students can be expected to know it. This is corroborated by the fact that these three participants all performed above average on the test. However, the low variation-in-translation for this set indicates that *twe fan* is prototypical in Chinese. Thus, because the sense is prototypical in that language, I believe that once the other Chinese participants noticed the correct meaning of *over* in *overthrow*, they would also translate *overthrow* as *twe fan,* in the same way as three participants here did.

Sets 04-J and 05-J can be considered together, because together they represent the difficulty the Japanese group had with Deictic sense. The items in question are 04 "Sam lives over the hill" and 05 "He is walking over the hill". In this case, I believe that the Deictic sense, represents *both* a less prototypical sense of *over* in English *and* a more prototypical sense in the participants' first language. The sense is difficult because it is a less prototypical sense of the word *over*, an explanation which conforms to the hypothesis of prototypicality

across languages. However, the low variance among the participants' translations indicates that the sense is prototypical within their language. Because the sense of the word is less prototypical to *over*, the participants had difficulty noticing its true meaning as 'on-the-other-side' and *not* as 'on-top-of'; however, because the sense is prototypical within their first language, once the correct meaning was noticed the participants easily made it a part of their productive vocabulary. This is similar to the situation described above for the Chinese translations of *overthrow.*

Our consideration of the outliers identifies two trends represented in the scatterplot graph, Figure 4.6: the data at about 50% correctness-of-translation shows less variation than predicted and the data at 100% correctness-of-translation shows more variation than predicted. Based on the examples of sets 27-C, 04-J and 05-J, the deviation at 50% correctness represents how other factors can make a sense difficult despite its prototypicality within the learners' first language. This trend does not question the reliability of the methodology. The trend of greater variation at 100% was discussed above, where the dominance of one type of translation was *not* reflected by the measure of variation. This consideration points to a place where the methodology could be improved. However, the problem only affects the most correctly answered translations and not across all the translations as a whole.

Validity of the results

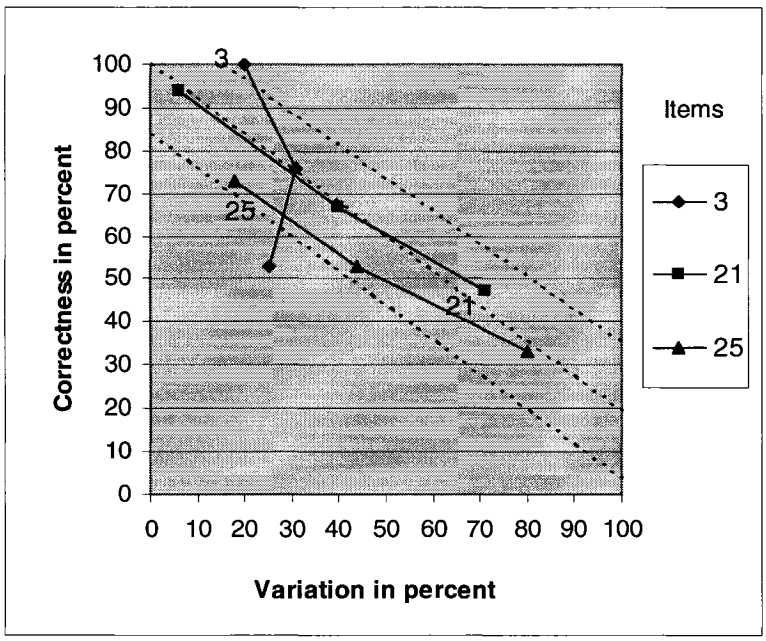
Prototypicality is a theory of how the mind is organised and since we cannot observe that organisation directly, we have to observe it by indirect means. However, by being indirect, each observation we make is limited in how valid it is as a representation of the mind's actual organisation. The only way we can strengthen our hypotheses about prototypicality is by showing how different methods of observation each point to the same conclusion. As mentioned at the beginning of the section, the hypothesis we are investigating at this point is that the prototypicality of an item in the participants' first language facilitates their translation of the item from the second language. Our observation was that as items were answered more correctly, they were translated with less variation. We can now corroborate this negative correlation of the data as a whole by a close observation of the negative correlation between a few specific items.

For the data as a whole there is a negative correlation between correctness-of-translation and variation-in-translation. We wish now to corroborate the implication of this negative correlation, the implication that items which are less prototypical in the participants' first language are more difficult to learn in their second language. It would be too confusing to corroborate this implication by analysing the data as a whole, because when comparing *item X* to *item Y* we would have no common ground upon which to base our comparison. A common ground for comparison can be found when analyse how *language A* translated *item X* in comparison to how a different language, *language B,* translated the same *item X*. In this way, we can compare how the three

language groups translated *the same item* differently. But since our objective is to corroborate the negative correlation of the data, the items we choose for this purpose will have to represent in themselves the same negative correlation of the data as a whole: of the three languages groups, the data of one language group will have to have low variation-in-translation and high correctness-of-translation; the data of another language group will have to have high variation-in-translation and low correctness-of-translation; and the data of the third language group will have to be in between. If we can find items which meet these criteria, then an analysis of the data of these items will be able to stand in for an analysis of the data as a whole.

In Chapter 4, we identified items 3, 21 and 25 as the three items with the largest difference in correctness-of-translation between languages. These three items were identified because it was hoped that they each represented the negative correlation of the data as a whole. That is to say, it was hoped that their measures of variation would be within the average variation for their corresponding measure of correctness. The set of translations 3-J was 5% above the average variation and the set 3-C, 16% below the average variation. To judge the importance of these differences, I have graphed the results in Figure 5.1 below. In the graph, set 3-C is considerably below the average variation, and item 3, between the language groups, does not maintain the general negative correlation. I believe that items 21 and 25 are good candidates for exemplars, which is to say that I believe a discussion of the data in these two items will corroborate the results of the data as a whole.

Figure 5.1 Items with the greatest difference in average of correctness.



Before moving on to this discussion, I will first consider item 3, whose data indicate a situation which seems to contradict the implications of the data as a whole. Item 3, "She held the veil over her face" was answered correctly by 8 participants in the Chinese group, whose translations were organised into only two groups-of-variation. The question here is why there was not more variation in the results, expressed by four or five groups-of-variation, as the general trend would predict. In the case of this item the errors are revealing. In six of the seven errors, the Chinese participants translated *over* as 'raise' or 'lift'. This error was also made by three of the French participants. However, the Japanese participants all correctly translated *over* as 'cover'. Why did so many Chinese participants make this error, while none of the Japanese participants did? I believe that there are two possibilities. The first is that in a vertical position as marked by this image schema, the Chinese participants expect *over* to signify

'rise up' while the Japanese expect 'cover'. The other possibility is that the idea of 'hold' in Chinese is more strongly associated with movement, while in Japanese it is more associated with stillness. To prove these hypotheses would involve considerable analysis of the different languages. Suffice it to say here that it seems likely that the Chinese language is structured in such a way as to encourage the 'rise up' guess, and the Japanese language to encourage the 'cover' guess. What I do believe is that if participants from each of the three languages had to guess at the meaning, most of the Japanese would probably guess correctly and many Chinese would probably guess incorrectly.

To explain the low rate of variation in the Chinese translations, I believe we can apply the same argument we made in the reliability section above to explain the outliers which expressed too little variation. In that case we made the argument that the low correctness-of-translation was due to the aprototypical place of an item in a semantic organisation. By this argument the structure of 'above' = *over* = 'vertical covering' is not prototypical to the Chinese and thus difficult for them to guess. Once these participants noticed that *over* could mean 'vertical covering', the idea did not prove in itself difficult for the participants, who were able to translate the idea with little variation. Thus while the results of item 3 seem to contradict the general trend of the data, upon closer analysis the results actually confirm our hypotheses. There is an intricate interaction between the level of prototypicality in the first language and that in the second language. I will discuss this interaction further in the following section on "Prototytpicality and Language Transfer".

The general trend of the data as a whole is better exemplified by items 21 and 25, which *do* show a consistent negative correlation. This negative correlation indicates that lower prototypicality *does* result in higher variation. A closer look at these items will confirm this indication. Item 21, "She has a strange power over me", was translated correctly by 17 of the 18 French participants, who all translated it in the same way. All correct translations were similar to the following:

21-F Elle a un étrange pouvoir sur moi
'She has a strange power over me'

Item 25 "She soon got over her divorce", was answered by 11 of the 15 Japanese participants; ten of these translations were organised into the same group of variation. An example of this dominant type of translation is as follows:

25-J Kanojo wa sugu ni rikon kara tachi naota.
'She'-SUB. 'quick'-ADV 'divorce'-'from' 'standing' 'recovered'
'She quickly recovered from her divorce'

I maintain that these items represent a highly prototypical sense in the respective first languages of the participants, and that this prototypicality encouraged the low variation-in-translation. At first glance, the translation of 21-F would associate high prototypicality with strong positive transfer because each word in the original English sentence is translated by an equivalent into French. However, the high prototypicality also expressed in 25-J refutes that claim; this is because *got over*, in English, does not directly translate into *tachi naoru* 'standing-recovered', in Japanese. This is the type of problem which advocates

of the contrastive analysis hypothesis were faced with: some acquisition does conform to predictions of positive transfer, but other acquisition does not.

For us, the question we are faced with is not one of prediction but of explanation. The task is to explain what informs the prototypicality expressed across both items 21 and 25, because while positive transfer can explain set 21-F, it cannot explain 25-J. I will first describe item 25 across all three language groups to see if any explanation of prototypicality can describe the item as a whole. I will then see if the same method of explanation can better explain item 21 across the language groups than the explanation of positive transfer can.

Because of the high variation-in-translation, we claim that item 25 was not prototypical for the French participants and especially not for the Chinese participants. To explain why it was not prototypical it can be helpful to look at the errors the participants made, because they may have mistaken the meaning of the sentence for a meaning which is more prototypical in their first language. For item 25 most of the errors made by the Chinese and French participants form a group which interprets the sentence as 'She soon finished her divorce'. In this case divorce is seen as a process-in-time with an end point which can be signified by *over*='finished'. In this case we can ask why the idea of divorce was thought of as a process-in-time and not as an emotional experience. If we then turn to the correct translations of the item by the Chinese participants, we can see, as in this example, that 'divorce' is marked for its emotional connotation:

25-C05 i wan ji le ta li huen de shang shi
'already' 'forget-COMPL.' 'she' 'divorce-ADJ' 'sad-NOM'
She already forgot the sadness of the divorce.

Of the five correct translations, four of the participants marked divorce for its emotional connotation, which was not marked in the original sentence. The reason why divorce as an emotional event might be marked in one language but not in another could be influenced by sociolinguistic factors. For example, if in a particular culture people tend not to talk about the emotions of others going through a divorce, but simply that the divorce has occurred, then divorce as an emotional event would be marked. If, however, talk of divorce always involves talk of peoples' emotions, then divorce as an emotional event would be unmarked. To confirm that these are valid interpretations for Chinese and Japanese cultures would require more evidence. For our purposes, however, we can see that some sociolinguistic factor could plausibly affect how the word was interpreted.

Is it possible that the same combination of sociolinguistics and markedness expressed in item 25 could be expressed in item 21 as well? We can again look at the Chinese translations of the item, because they again showed the most variation-in-translation. The main error in these translations was that *over* was interpreted as 'more than' to create the sentence 'She has more power than me'. In this translation 'power' was construed as a possession of quantity. In the original sentence 'power' is a force which is directed against another person. In the correct translations of this item we find a similar case of marking as we found in the discussion of item 25-C above. Again in the following example, we find that 'power' is marked when it is correctly understood:

21-C01 ta duai wo yo shen chi de ying shan li
'she to me' 'has' 'magic'-ADJ 'influence' 'power'
'She uses a magical power of influence against me'

In this case power is marked for its influential nature. Similar marking was present in three of the seven correct translationsand in two of the seven, power was not even directly translated. In these two cases a more pragmatic translation was made of 'She controls me'. By contrast, in the incorrect translations, where it expressed a comparable quantity, 'power' was unmarked. Again, we might be able to explain why this markedness occurs through a sociolinguistic investigation of 'power' across languages, a concept which is very likely to change from language to language, culture to culture.

Returning to the example of 21-F, which expressed such strong positive transfer, we can now elaborate our interpretation. It's true that positive transfer promoted the low variation in the translations. But in order for this positive transfer to occur, certain constraints first had to be satisfied. The constraint we have discussed here is that of markedness of certain key concepts. In order for *power over me* to be directly translated into French as *pouvoir sur moi,* the idea of 'power' as something used against another person had to be unmarked in the first language. If this had not been the case, I doubt that such strong positive transfer would have occurred.

In this discussion, we have seen that the senses are marked in those sets of translations with high variation-in-translation; by contrast, the senses are unmarked in those sets with low variation-in-translation. Kellerman (1978, 1986) identified markedness as a sign of prototypicality. Thus, the fact that the

measure of variation-in-translation correlates with markedness is a further corroboration to the assumption that low and high variation is a valid indication of high and low prototypicality.

II. C. Hypothesis of prototypicality: In the non-spatial senses

The results from the error analysis for the non-spatial items show a tendency for the participants to interpret the meaning of the sentence using one sense of *over* rather than others, a tendency which was very strong in the case of several of the items. The hypothesis of prototypicality would predict that the participants would use a sense of *over* more prototypical in English (their L2) rather than a less prototypical sense when guessing at the meaning of the sentence.

To test this hypothesis we can compare the dominant sense for the incorrect translations to the target sense for the correct translations. The hypothesis would predict that the sense used in the incorrect translations would be more prototypical than the target sense. However, against prediction, when the *target sense* is *more* prototypical in the L2, the participants often opt for a *less* prototypical L2 sense. Based on the results from the spatial items, the Across sense can be considered the most prototypical. This sense was the target sense for the non-spatial items of 22, 23 and 25. For each of these items, the participants opted for a sense that was less prototypical than the target Across sense. This leads us to believe that something other than L2 prototypicality must have caused so many participants to choose the same sense

incorrectly. It is possible that prototypicality in their L1 influenced their choice. A closer analysis of these sentences may prove helpful in deciding why the participants translated the items as they did, and whether L1 prototypicality was an influence.

Most of the incorrect translations for item 22, "He was passed over for promotion", interpreted the sentence as 'He achieved the promotion'. I believe that the participants saw "promotion" and "passed" as the most salient words in the sentence and that they interpreted *promotion* as something to be achieved and *pass* as signifying that achievement. Based on this understanding, the participants then choose the End Point sense of *over* because it validated their first interpretation. This is because the End Point sense can be construed to mean 'finished'. The case would be different if a different word was used which could not be construed to mean 'finished', like *up* for example; if the source sentence had been "He was passed *up* for promotion", there may have been more variation in the incorrect answers. Thus the sense of *over* in this case was chosen because it could validate a previous interpretation of the sentence.

The same method of interpretation can be seen in item 25, "She soon got over her divorce." An interpretation of this item was discussed above, in this chapter. Again, in this sentence the most salient words were not "over" but "divorce" and "got". The sentence was most incorrectly translated as 'She soon got divorced.' By this translation *got* signifies the completion of a process which is signified by *divorce*. The End Point sense was again chosen because it validated the previously made interpretation.

Item 23 "You've overlooked his accomplishments" is different from the previous two examples because in this case I believe that *over* is the more salient part of the sentence. In this case the participants construed the sentence using the Excess sense to mean 'You've considered his accomplishments *too highly*'. Their choice of this sense was probably prompted by the use of *over* as prefix. In such uses, *over* is usually marked for the Excess sense, as in *overdo, overwork, overeat,* etc. Thus, in this sentence the participants interpreted *over* to mean 'excess' and were able to maintain this interpretation because nothing refuted it in the rest of the sentence.

In the process of interpretation outlined above, the participants make a first interpretation based on the most salient words or salient parts of the sentence. Sometimes *over* is the most salient word but often it is not. Indeed the polysemy of *over* may inhibit its overall saliency because it may inhibit the quick association of the word with a precise meaning. When *over* is not salient and not used in the first interpretation, the participants will choose the sense of *over* which best confirms their first interpretation. They will maintain their chosen sense so long as nothing in the sentence contradicts it.

This process of interpretation can be applied to items 22 and 24. Item 22, "She has a strange power over me", was discussed above in this chapter. There I presented the idea that when the sentence was translated incorrectly, the participants construed 'power' as a variable quantity rather than as a directable force. If power is considered the most salient word in the sentence, then the participants chose the Excess sense because that sense best agrees with the

way 'power' was construed. The resulting interpretation of 'She has *more* power *than* me' is not contradicted by any other part of the sentence.

The incorrect translations for item 24, "Who will oversee this project?", mainly interpret the sentence as 'Who will examine the project?'; this is close to the target sense of 'Who will supervise the project?', but still incorrect. I believe that in this case the most salient words were "see" and "project". In the incorrect interpretation, *project* is construed as an object which can be *seen*. In this case, the Cover sense is combined with *see* to produce the meaning of 'examine'. (Lakoff, 1987) Given the use of *over* as a prefix in *oversee,* it is somewhat surprising that the Excess sense was not chosen. However, the resulting interpretation would be 'Who will look too much at this project?', which seems quite strange in meaning. Nevertheless, 11 of the 28 participants did in fact translate the sentence by the Excess sense and furthermore, the incorrect translations for this item expressed more variation than in any of the other examples discussed here. This variation may have been due to the fact that "see", "project" and "over" (as Excess) were all salient to the participants; however, with the way they interpreted the meanings of these words, they could make no consistent interpretation of the sentence. This made the translation more difficult for them.

In this discussion, I've presented the case that the participants are less influenced by the L2 prototypicality of *over,* than they are by the saliency of different words in the sentence, when making their translations. Earlier, the question was raised of whether L1 prototypicality was an influence in their errors.

I believe it may have been. The participants found the Excess and End Point senses more comprehensible than other senses in figurative contexts. First of all, these senses are more comprehensible because a fixed semantic meaning can be applied to them: for the Excess sense *over* means 'too much' and for the End Point sense *over* means 'finished'. But if a semantic meaning is strong and clear to the learners of a language group, then that meaning must be prototypical to them. If it were not, then the meaning would be weak and show variation between members of the group, and the learners would not consistently choose that meaning to interpret the same sentence. These senses, the Excess and End Point, were shown to be more prototypical in their L1 by the measure of variation in the translation of other items. All groups showed low variation-in-translation both for item 10 "The water overflowed" (the Excess sense) and for item 29 "The play is over" (the End Point sense). Thus, although the learners' did not choose a sense which was prototypical in their L2, they did interpret the non-spatial senses with meanings which were prototypical in their L1.

III. Prototypicality and language transfer

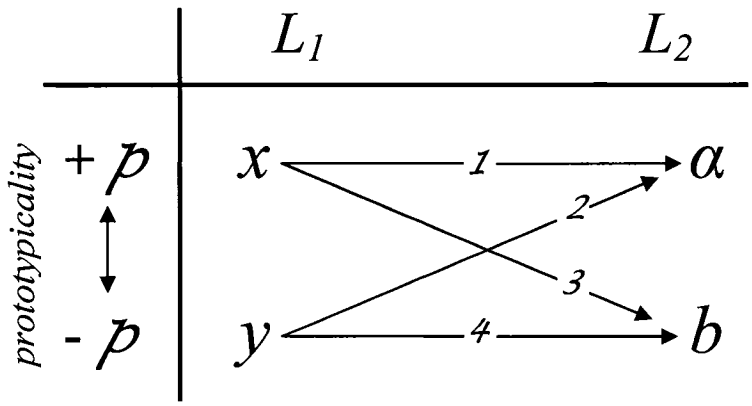
In this study, the data was analysed for prototypicality by three methods, by an analysis of variance, by a correlation analysis and, for the translations of non-spatial senses, by an error analysis. In this section I would like to bring together the results of all three analyses to discuss how prototypicality can be used in the study of language transfer.

In the literature review, I presented Krzeszowski's argument (1990) that prototype theory offers a better way of comparing languages than the methods used in to investigate the Contrastive Analysis Hypothesis (C.A.H.). While the C.A.H. was rejected in favour of error analysis, one key assumption from the C.A.H was retained, which is that when learners transfer knowledge from their L1 to their L2, they will transfer it because of perceived similarities between the two languages (Ringbom, 1986). I believe that a large problem with the C.A.H. was the way the methodology compared the languages. Consider how learners compare their first language to their second. Unlike the linguist, they do not have an equal knowledge of both languages, but a native knowledge of one and a growing knowledge of the other. Because of this unequal knowledge, their comparison is much different. I believe that as the learners' knowledge of their L2 grows, they notice similarities to their L1 and, based on those noticed similarities, they make assumptions about what the L2 is like; they "notice" similarities in the L2 in the sense defined by Schmidt (1990), as the way some L2 input is more important to the learners than other input.

Following Krzeszowski (1990), I believe that we can better compare languages through prototype theory, because prototype theory offers a way of describing the L1 and L2 so as to note where learners are more likely to notice the similarities which encourage transfer. Learners will notice language which is more prototypical because prototypical examples of a category are more salient in people's minds (Rosch, 1978), and furthermore, prototypicality has been shown to facilitate transfer (Kellerman, 1978, 1986). In Figure 5.2, below, a

model is presented to describe the possible ways in which prototypicality can interact between the L1 and the L2.

Figure 5.2. Interaction of prototypicality with language transfer.
The diagram describes four possible ways in which language of both high and low prototypicality can interact cross-linguistically. Below the diagram, a legend is included which provides examples of the different types of transfer with commentary.



Transfer type	Example item and commentary
1. $x \rightarrow a$ $+p.L_1 \rightarrow +p.L_2$	13. The plane flew over the wall. (All languages) *This sense is prototypical in each participant's language, and each translated it easily.*
2. $y \rightarrow a$ $-p.L_1 \rightarrow +p.L_2$	21. She has a strange power over me. (Chinese) *This metaphor is aprototypical for the Chinese group and they showed great resistance to metaphoric interpretation, especially compared to the French, for whom the metaphor was prototypical.*
3. $x \rightarrow b$ $+p.L_1 \rightarrow -p.L_2$	3. She held the veil over her face. (Chinese) *The Chinese found this sense difficult to "notice"; but once noticed, they translated it with low variation because the sense is prototypical in their L1.*
4. $y \rightarrow b$ $-p.L_1 \rightarrow -p.L_2$	26. The company president is over the hill. (Japanese) *The Japanese have the same metaphor; directly translated it's 'He's crossed the mountain peak'. But the metaphor is aprototypical in both their L1 and L2 and so only one learner made the exact transfer.*

In the model, *x* and *y* are components of the learners' first language and *a* and *b* are components of their second language. In this study, the component investigated was the word *over* and its senses; however, the model is presented as open to the application of other linguistic components, just as the component of metaphor was applied to some of *over*'s senses. *x* and *a* represent highly prototypical components in their respective languages, and *y* and *b*, components which are low in prototypicality. Prototypicality is of course a gradient, and the four points have been imposed on this gradient to facilitate discussion. Between these four points, we can propose four different types of transfer: Types 1, 2, 3, and 4. Below, I will discuss each type of transfer using examples from the analyses done in this study.

Before discussing the four types, I would like to note one point of possible confusion, which is that this study used a methodology involving translation in the reverse direction from language transfer. The direction in language transfer is from the L1 to the L2, but in this study the participants translated words from their L2 to their L1. The arrows in the diagram indicate the direction of language transfer and should not be mistaken for the direction of translation conducted in the study.

The first type of transfer is Type 1, $x \rightarrow a$, which means that the sense of *over* was both prototypical in the participants' L1 (French, Japanese or Chinese) and also in their L2 (English). For all three language groups, a good example of this type was item 13, "The plane flew over the wall". The sense was translated with very low variation by all three language groups, indicating that it was prototypical

in each L1 (*x*). The sense was also hypothesised to be highly prototypical within English (L2=*a*) on the basis of the polysemous structure put forward by Brugman and Lakoff (1988) and confirmed by Tyler and Evans (2003). There were only four incorrect translations for this item out of the total 48 analysed, indicating that this type of transfer is very easy for learners.

Item 21 is interesting because it can be used to describe two types of transfer, Type 1, *x*→*a*, and Type 2, *y*→*a*. The item reads "She has a strange power over me". The sense of *over* in this item is considered to be one of the most prototypical of those which use metaphor. While not as prototypical as the sense in item 13 above, it still uses the Above sense, and its metaphor, ABOVE=CONTROL is in general use in English (L2=*a*). The metaphor can also be considered prototypical in French, due to the very low variation with which the participants translated the item (L1=*x*). The correctness-of-translation of the item for the French participants confirms that Type 1 transfer facilitates easy comprehension for learners.

The same metaphor can be considered very unprototypical for the Chinese learners, for whom it represents Type 2 transfer (*y*→*a*). In their translations of the item, this language group showed very high variation (71%) (L1=*y*) and low correctness (47%). This example indicates the difficulty of the Type 2 transfer for learners, and a case where they need to be quite periphrastic in their expression.

Type 3 transfer, $x \rightarrow b$, presents a category for several of the most interesting items discussed in this study. The situation is where the sense is very prototypical in the L1 but not prototypical in the L2. This study relied on a measure of variation to indicate what was prototypical in the participants' L1. In this case, for the Chinese group, the senses of the two items, 3 "She held the veil over her face" and 27 "Those are the men who overthrew the government", were both considered prototypical based on their low measures of variation (L1=*X*). In contrast, these senses are less prototypical in English (L2=*b*); the non-spatial use in item 27 of *overthrow* is obviously so. Item 3 can also be considered less prototypical, despite being a spatial sense. Its vertical rotation makes it exceptional for the senses of *over.* Consider these three ways to describe the situation:

(5.13) The veil covers / is in front of/ is over her face.

Of the three ways to describe the situation, *over* seems the most peripheral.

The results of the Chinese language group for items 3 and 27 show lower variation, but also lower correctness of translation. These examples indicate that in Type 3 transfer, the participants have difficulty *noticing* the meaning of the sense because it is less prototypical in the L2; but because the sense is more prototypical in their L1, once noticed the participants translate the senses with lower variation. In fact, I believe that once noticed, the participants could quickly make the sense part of their productive vocabulary. This is an interesting point for further research.

Type 4 transfer, *y→b,* is probably the most difficult type of transfer for learners. It involves transferring something which is peripheral in the L1 to something which also peripheral in the L2. An example of this type of transfer is the Japanese translations for item 26, "The company president is over the hill". From the L2 point of view, the sense of *over* here involves both an uncommon metaphor and the Deictic sense, the least prototypical spatial sense (L2=*b*). From the L1 point of view, what is notable about this example is that a literal translation of the item into Japanese would carry *the same metaphoric meaning.* Kellerman (1978) noted the reluctance of learners to transfer metaphors to their L2 which they considered aprototypical. Here, we have a perfect example of this reluctance because only one participant made the direct translation, even though most of them recognised that the meaning was not literal. Of the other three participants who translated it correctly, each translated the sense in different ways (L1=*y*). This example attests to the strong difficulty involved in Type 4 transfer.

The transfer types presented in the model of Figure 5.2 can also help us to describe an example of negative transfer, where participants incorrectly transfer something from their L1 to their L2. The error analysis of the non-spatial translations shows that when the participants misinterpret non-spatial senses, they very often misinterpret them in the same way. This in itself indicates a prototype effect. The language groups were combined in this analysis, so we cannot talk about a specific L1. Nevertheless, the chief error the participants made in their translations of item 23, "You've overlooked his accomplishments",

offers an interesting example. The participants mistook the sense of *over* in this item for one prototypical in both their L1 and L2, i.e. Type 1 transfer $x \rightarrow a$. They thought *over* meant 'too much' because, as discussed in section II C above, *over* as a prefix is marked for the Excess sense (L2=a). The Excess sense was investigated in item 10 where each language group showed low variation, indicating prototypicality (L1=x). However, for the few who translated item 23 correctly, the item represents a Type 4 transfer, $y \rightarrow b$, (if we accept that *overlook* represents both an aprototypical sense and metaphor in each language, L1=y and L2=b). This example shows us the situation when learners are more likely to make a negative transfer error: when the relation between the L1 and L2 is very low in prototypicality ($y \rightarrow b$), learners are more likely to confuse the situation for a one that is more prototypical ($x \rightarrow a$), and thus make a negative transfer error.

The model of transfer presented in Figure 5.2 above has proven very explanatory. This study has relied on a measure of variation-in-translation to indicate those meanings which are more prototypical in the participants' L1. Using the model, we have been able to characterise how this prototypicality in the participants' L1 (of French, Japanese or Chinese) may have influenced their understanding of the L2 (in this study, English). In order to confirm whether this influence is truly due to the prototypicality of their L1, we would also require an analysis of those components in the participants' L1 which were identified as influential, similar to that done in English for *over*. Thus, using the transfer model,

we could identify possible places of influence in the learners' L1, whose influence could then be confirmed by a subsequent investigation of that language.

Chapter 6
CONCLUSION

I. Review of hypotheses

This study investigated how second language learners of English understood different senses of the polysemous item *over.* The participants in the study were 48 second language learners from three first language groups (French, Chinese and English). The participants translated into their first language English sentences using the word *over* in a variety of different senses. The data were coded according to whether or not the participants correctly translated the sense of *over.* Two main hypotheses were posed to explain the learners' order of acquisition of these senses. The first hypothesis was that learners would learn the senses according to their frequency in the target language. As expected, this hypothesis proved unsatisfactory to explain the results of the study for all but a few exceptionally frequent senses. The second hypothesis, of prototypicality, was then investigated. This second hypothesis was divided into two parts. The first stated that learners would learn the senses according to how prototypical the senses were in English. This hypothesis accounted for the general trend of the data across the language groups. The second hypothesis of prototypicality said that the prototypicality of the senses in the learners' first language would also influence their acquisition. This hypothesis of prototypicality within languages did indeed account for the deviations in the data from the general trend which were not accounted for by the hypothesis of prototypicality across languages.

II. A. Limitations of the study and implications for further research

In this section I would like to discuss three limitations of the study: that the study investigated only one word; that there were some difficulties with the choice of vocabulary in the test items; and that the study only investigated comprehension of the keyword, not production. Furthermore, I will discuss how each of these limitations could be resolved and, in connection with these resolutions, I will discuss the implications of the study for further research.

The first limitation is that the study investigated just a single word, *over.* What is the relevance of a study of just this single word to the larger study of second language lexical acquisition? I will address this question first by looking at words most similar to *over* and then by looking at lexical acquisition more generally. The present study could easily be extended to other spatial prepositions, such as *in, on*, and *under.* However, these other spatial prepositions may not express the same diversity of different senses that *over* does, a word which seems somewhat exceptional in this regard. Outside of spatial prepositions, the study could also be extended to other polysemous words, such as an investigation of the different senses of *eye* or *head.* In the present study pictures were very helpful for interpreting some of the translations. In the study of other polysemous items it remains to be seen whether pictures would be as helpful or not.

The wider implication of this study lies in its connection to the more general field of second language lexical acquisition. One question which concerns this field as a whole is the question of how learners develop their

knowledge of different lexical items. For example, take the word *evidence:* I can use this word in the context of 'judicial evidence', of courts and lawyers and so on, or I can use it in the context of 'research evidence', when proving a hypothesis in an academic paper. These two uses do not seem to constitute different senses, as senses were defined for polysemous words. However, many learners may know to use the word in one context but not the other. When learners come to learn the second use of the word, do they base their new knowledge on their old knowledge, or do they learn the new use of the word as separate from the old use? I believe that the study of polysemy provides the best material for investigating this question, because polysemous words provide, at once, senses of a word which are very distinct from one another, and also, uses of a word which differ only in terms of context.

The second limitation I am concerned with is with the choice of vocabulary in the test items. After completing the study, it became apparent that certain words distracted the learners from the keyword of *over.* The most apparent example was that of *hover.* This word does not have a direct equivalent in any of the first languages of the three groups investigated in this study. For this reason the participants may have made errors not because they misinterpreted *over,* but because they misinterpreted *hover.* Another problem is that certain words can also be problematic when they contain too much semantic information, and as a result reduce the importance of the keyword. For example, the words *plane* and *flew* both contain the idea of 'movement without contact'. In response to these problems, the study could be designed to use words which are more semantically

general so that the keyword becomes more salient. For example, in the sentence "The light is over the table", only *over* carries the semantic information which says *the light* is not in contact with *the table*. However, there are certain limitations to this type of expression. For example, in the sentence "The ball went over the field", it is somewhat ambiguous whether or not there was contact between *the ball* and *the field*. In this case the results of a native speaker control test would be required to qualify the translations of the second language participants.

The third limitation of the study was that it only looked at learners' comprehension of the keyword and not their production of it. The study could be extended to investigate production by using pictures to elicit the target sense from the participants. To elicit "The wall fell over", for example, the participants would be presented with the picture of a wall falling over. I think this study would be best conducted by first having the participants describe the pictures in any way they wanted (the first time they might say "the wall fell down"), then showing them the same pictures again and requiring them to use they keyword *over* in their responses. Their two sets of responses could be compared to those of native speakers completing the same two part test. This comparison would show not only the learners' productive ability of the keyword, but also how comparable their use of the word is to that of native speakers. In some cases the learners may use the keyword less frequently than the native speakers and in some cases they may use it more.

II. B. Implications for vocabulary teaching and learning

This study has shown that learners will learn more prototypical senses of polysemous items before less prototypical senses; and furthermore, that when they encounter a less prototypical sense, they are more likely to misinterpret its meaning for one more prototypical. These findings can have implications for classroom teaching depending on the type of texts a teacher uses. In texts graded to the level of the learners, there is less of a problem that the learners will run into confusion over unfamiliar senses of polysemous words. However, in the communicative approach to language teaching, authentic texts are often used and these texts may often contain senses of polysemous words which are unfamiliar to the students. What the students need is a comprehension strategy to deal with these unfamiliar senses. The findings of this study form the basis for just such a comprehension strategy, which can be taught to the students in a communicative second language classroom.

The comprehension strategy I have in mind can be taught either in a planned lesson or, as the occasion arises, in a general lesson of listening or reading comprehension. I will describe the teaching process of the planned lesson, because this description will give a clear account of the strategy. For this lesson the teacher can provide the students with a text containing polysemous items whose senses the students can be expected to find difficult. The teacher can check their comprehension of these senses and if the students don't understand them then the teacher can see if textual cues in the larger context can help the students discern the meaning. If the students cannot fix the error

themselves then the teacher can intervene by using actions or pictures to explain the sense, or by providing extra-textual information to help with explanation. If the sense in question was 'overthrow the government' then extra-textual information might be a discussion of the power of governments and the strength and force involved in the idea of *throw.*

By intervening, the teacher's purpose is to provide the students with enough information to disambiguate the meaning of the sense. If the polysemous word in question was *over,* then some students may benefit from a description of the different senses and how they relate to one another. Other students may find such a description confusing and may prefer pictures to describe the different senses, much as Lindstromberg (1996, 2001) has advocated for teaching spatial prepositions. Furthermore, pictures can also be used for checking whether the students have understood the meaning of not.

If the teacher is aware of the possible difficulty polysemous items pose for students, the above strategy can also be taught in a general comprehension lesson. As in the planned lesson, the teacher would check for comprehension of a polysemous sense. If they don't understand the meaning then the students are encouraged to fix the error themselves using cues from the larger textual context. If they still cannot understand the meaning then the teacher can intervene with actions or drawing pictures, or by providing extra-textual information. This strategy is efficiently taught using polysemous words, but once learned, the students will be able to use the strategy to help them in their general comprehension of unfamiliar language.

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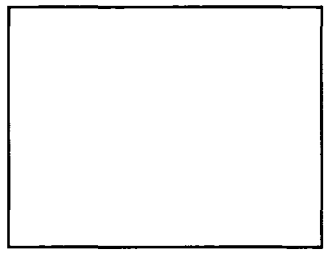
Appendix A

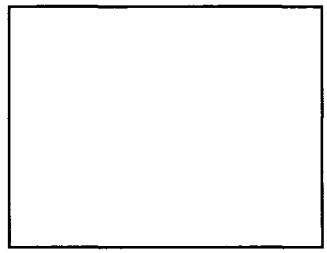
QUESTIONS 1-20

Please translate the following sentences 1 to 20 into your first language and then draw a small picture in the box of what the sentence means.

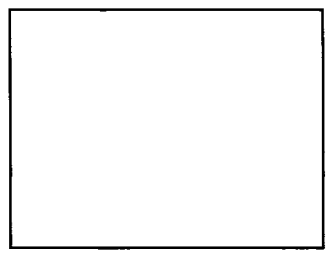
1. The helicopter is hovering over the town.



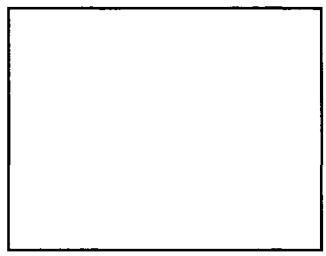
2. He is walking over the hill.



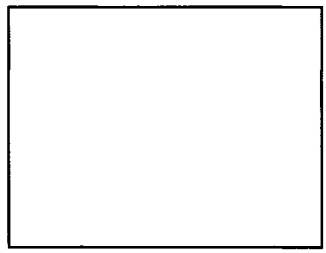
3. She held the veil over her face.



4. Sam lives over the hill.

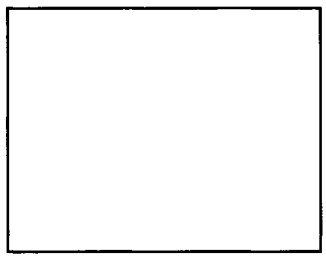


5. He's over the finish line!

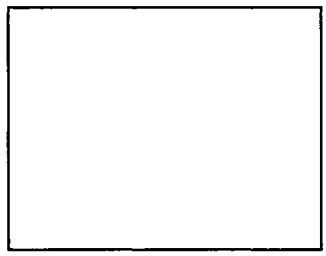


6. The plane flew over the hill.

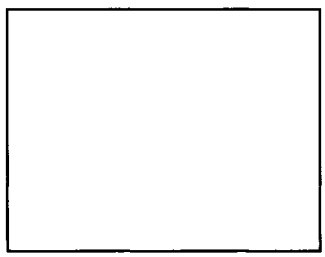
7. Sam rolled the log over.



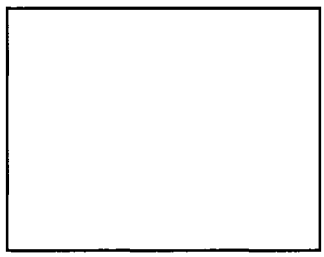
8. He drove over the bridge.



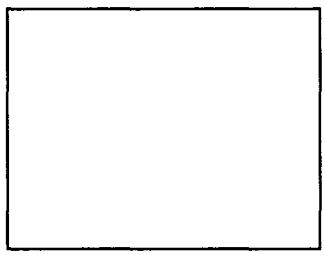
9. The guards were posted all over the hill.



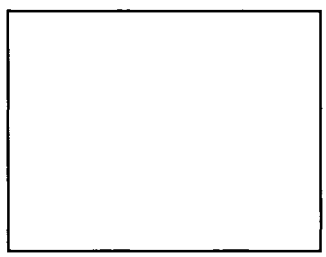
10. The water overflowed.



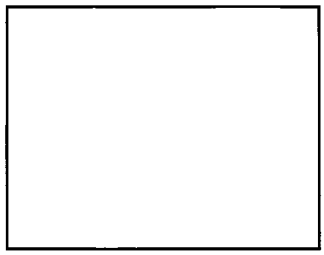
11. He walked all over the hill.



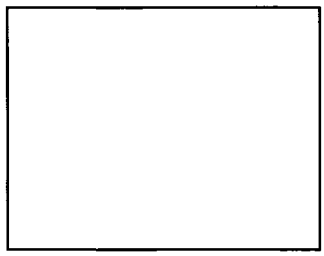
12. The helicopter is hovering over the hill.



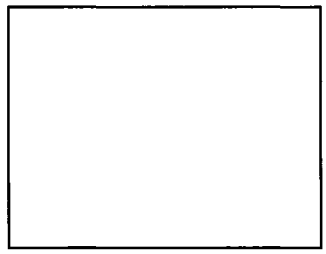
13. The airplane flew over the wall.



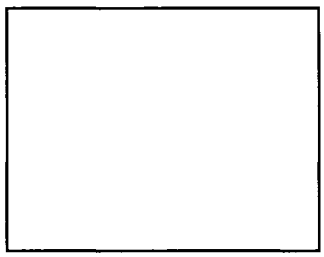
14. Sam turned the page over.



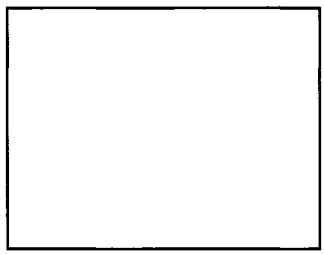
15. Harry jumped over the wall.



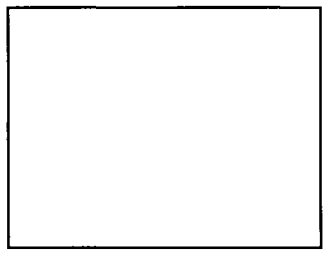
16. The wall fell over.



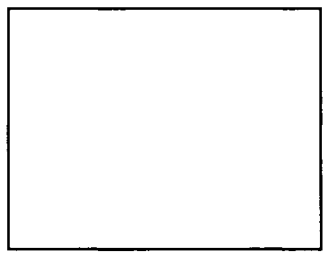
17. The plane flew over the town.



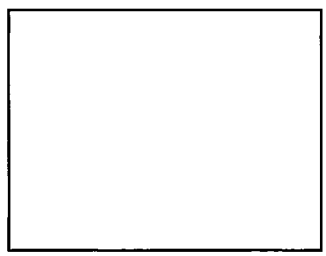
18. The power line stretches over my yard.



19. She spread the tablecloth over the table.



20. Harry jumped over the cliff.



QUESTION 21-29

Please translate these sentences into your first language.

21. She has a strange power over me.

_____

22. Sam was passed over for promotion.

_____

23. You've overlooked his accomplishments.

_____

24. Who will oversee this project?

_____

25. She soon got over her divorce.

_____

26. People were saying that the company president is over the hill.

_____

27. Those are the men who overthrew the government.

_____

28. He turned the question over in his mind.

_____

29. The play is over.

_____

Appendix C
Results for the correlation analysis

Table C.1 Chinese results by item

Item Set	Ways of translation			Percent Correct
	Actual	Potential	Variation	
01-C	3	13	23	87
02-C	6	15	40	100
03-C	2	8	25	53
04-C	3	4	75	27
05-C	4	9	44	60
06-C	5	14	36	100
07-C	4	12	33	80
08-C	4	15	27	100
09-C	5	11	45	73
10-C	5	11	45	79
11-C	2	7	29	47
12-C	2	9	22	60
13-C	2	14	14	93
14-C	5	12	42	80
15-C	1	14	7	93
16-C	3	7	43	47
17-C	4	14	29	93
18-C	5	10	50	67
19-C	4	14	29	93
20-C	4	8	50	53
21-C	5	7	71	47
22-C	2	2	100	13
*23-C	1	1	*	7
24-C	4	5	80	36
25-C	4	5	80	33
*26-C	0	0	*	0
27-C	1	3	33	20
28-C	4	7	57	47
29-C	4	15	27	100

Table C.2 French results by item

[illegible]	Ways of translation			Percent [illegible]
	Actual	Potential	Variation	
01-F	3	14	21	83
02-F	5	16	31	89
03-F	4	13	31	76
*04-F	1	1	*	6
05-F	5	9	56	50
06-F	2	17	12	94
07-F	2	11	18	65
08-F	4	17	24	94
09-F	4	13	31	76
10-F	1	16	6	100
11-F	3	7	43	39
12-F	4	12	33	67
13-F	3	18	17	100
14-F	1	15	7	83
15-F	3	17	18	94
16-F	3	17	18	59
17-F	4	18	22	100
18-F	4	12	33	67
19-F	3	14	21	88
20-F	3	10	30	59
21-F	1	17	6	94
*22-F	1	1	*	6
*23-F	1	1	*	0
24-F	5	6	83	40
25-F	4	9	44	53
*26-F	1	1	*	6
27-F	4	5	80	36
28-F	3	9	33	53
29-F	2	17	12	94

* Indicates items which were excluded from the analysis

Table C.3 Japanese results by item

Item Set	Ways of translation			Percent Correct
	Actual	Potential	Variation	
01-J	3	14	21	93
02-J	6	15	40	100
03-J	3	15	20	100
04-J	2	6	33	40
05-J	1	9	11	60
06-J	2	15	13	100
07-J	2	11	18	73
08-J	3	15	20	100
09-J	5	13	38	87
10-J	3	15	20	93
11-J	5	8	63	53
12-J	2	13	15	87
13-J	2	12	17	80
14-J	1	14	7	93
15-J	3	13	23	87
16-J	1	10	10	67
17-J	5	13	38	87
18-J	5	8	63	53
19-J	3	15	20	100
20-J	4	6	67	40
21-J	4	10	40	67
*22-J	1	1	*	7
23-J	2	3	67	20
24-J	4	4	100	29
25-J	2	11	18	73
26-J	4	4	100	27
27-J	2	2	100	13
28-J	4	8	50	53
29-J	4	15	27	100

* Indicates items which were excluded from the analysis