1 Introduction

Several years ago I encountered the English metaphorical expression ‘He was roundly defeated’, and that was the start of this study of concept formation through iconicity using basic shapes.

Consider the English metaphorical expression ‘He was roundly defeated’. When I first heard the expression, I interpreted it as ‘He was defeated without frustration or strife’. In Japanese, ‘maruku’ (roundly) metaphorically means ‘peacefully’ or ‘amicably’ as in the metaphorical expression ‘Kanozyo wa sono ken o maruku osameta’ (She settled the matter roundly), and I applied this meaning to the English expression. When I learnt the meaning ‘He was completely defeated’, it was new to me but did not sound very strange. This is because, in Japanese, ‘maru’ (circle) has the meaning ‘a whole’ as a noun and ‘full’ and ‘whole’ as prefixes. The question is how a circle (or a round shape) leads to the meanings ‘completely’ in English (and Japanese) or ‘peacefully’ in Japanese. What makes this difference in metaphorical expressions?

It should be noted here that I am interested in the way native speakers of English or Japanese employ the metaphorical extension from ROUNDNESS to COMPLETENESS or PEACEFULNESS in a particular context, not in the reason they prefer particular metaphorical expressions. In the broad sense, the reason derives from native speakers’ cultural background and their involvement with the environment, though it is very difficult to identify specific reasons for particular metaphorical extensions.

In exploring the way native speakers use particular metaphorical extensions, this study partly attempts to reinterpret the Sapir-Whorf hypothesis. The idea that different speakers make sense of an object or event differently and that this is partly determined by the structure of speakers’ native languages has been argued by many researchers (e.g. Lakoff 1987, Lee 1996, Lucy 1992). I suggest that the relationship between the speaker’s thought and the structure of his or her native language involves the possible representation of an object or event by particular linguistic forms in individual languages. For example, English represents the concept COMPLETENESS through the linguistic form ‘roundly’ in the metaphorical expression ‘He was roundly defeated,’ and Japanese represents...
PEACEFULNESS through ‘maruku’ (roundly) in ‘Kanozyo wa sono ken o maruku osameta’ (She settled the matter roundly (She settled the matter peacefully)). Keeping this issue in mind, I discuss concept formation through iconicity.

There are various ways for the speaker to make sense of an object or event in the real world. One of the ways is to make use of iconicity between two things. Iconicity is an overall concept which entails similarity and analogy between two things. The speaker grasps an object or event by connecting it to something else through iconicity. The speaker takes in external objects or events directly through the five senses. This is a basic yet very important way of understanding the external world. The speaker deduces conclusions from other things which he or she already knows, and uses individual ideas or facts to form a general rule or conclusion. These are logical ways of understanding. Between these two ways of understanding there seem to be other ways. I suggest that one of the ways is to understand the object or event metaphorically. Metaphorical understanding is based on basic human perceptions, and, at the same time, is helpful to logical understanding.

The primary purpose of this study is to consider how the speaker forms concepts through iconic metaphorical extensions. Connecting metaphorical extensions and concept formation is an important issue and the relationship between them has been discussed by many researchers (e.g. Fauconnier 1985, Goatly 1997, Johnson 1987, Lakoff 1987, Steen 1994, Sweetser 1990, Turner 1987). I examine how the speaker metaphorically extends a concept to another concept, and I discuss dynamic and universal models of metaphorical extensions. I suggest that all speakers use the same ways of forming metaphorical extensions.

This is a linguistic study in which I discuss the linguistic aspects of metaphorical extensions. However, most linguistic activities are propped up by cognitive processes. In discussing metaphorical extensions as a way of making sense of an object or event in the real world, it is necessary to be aware of the underlying cognitive processes. In this sense, this is a cognitive linguistic study. I make use of philosophical (Black 1962, Johnson 1993, Kittay 1987), psychological (Gibbs 1994, Glucksberg and Keysar 1990, Ortony 1993b) and anthropological (Duranti 1997, Quinn 1991) aspects of metaphorical extensions in order to consider this cognitive linguistic study within the paradigm of cognitive science.

In this study, I discuss some problems about metaphorical expressions in English and
Japanese and their underlying metaphorical extensions. I here use basic and simple shapes (e.g. ○, △, □) and their related metaphorical expressions (e.g. ‘a circular argument’, ‘a love triangle’ and ‘a square meal’). Basic shapes are one- or two-dimensional.¹ They are simple in that they can very often be drawn in a single stroke.² Basic shapes are visible. Moreover, in different languages, geometric terms which correspond to a given basic shape may not represent completely identical basic shapes, but very similar shapes. That is the case at least between English and Japanese, because the geometric terms overlap considerably with respect to their definitions.

In order to answer the question of what creates differences in metaphorical extensions (e.g. from ROUNDNESS to COMPLETENESS or PEACEFULNESS), I need to interrelate several theoretical perspectives in relation to cognitive processes in the mental space.³ One of them is understanding through iconicity between two things. When the speaker attempts to understand an object or event in the real world, iconicity plays an important role. In general, iconicity is the relationship between two things in which one thing represents the other. In addition, we propose that iconicity is the relationship between a certain object or event in the external world and its real world representation, between the object or event and its conceptual representation, and between conceptual representations.⁴ The fact that one icon can represent more than one object (e.g. ○ represents the sun, the moon and a ball) and more than one concept (e.g. ○ represents COMPLETENESS and PEACEFULNESS) is very important in the speaker’s understanding of the real world. Metaphorical understanding is experiential (Johnson 1987, Lakoff and Turner 1989, Sweetser 1990) and culture-specific (Grady 1997, Lakoff and Johnson 1980, Quinn and Holland 1987, Ross 1993). Metaphorical understanding is useful in dealing with innumerable objects or events in the real world with a limited number of words (Goatly 1997, Lyons 1995).

Another important perspective is the relationship between concept and language. Concepts are based on the speaker’s everyday life and are supported by the speaker’s everyday language. Concepts are the mental representation of an object or event in the real

---

¹ In this study, a straight line, which is one-dimensional, is treated as a basic shape (see 2.1.3.1).
² In this study, X is treated as a basic shape and cannot be drawn in a single stroke (see 2.1.3.1).
³ In this study, the mental space is a kind of cognitive space which is larger than the “mental space” of Fauconnier (1985) (see 3.1.1.1).
world (Bartsch 1998) and are experiential and metaphorical (Howard 1992, Lakoff and Johnson 1980). A piece of linguistic information which is attached to a concept can be regarded as a name (or a label). Naming is a way of understanding (Yamadori 1998). The relationship between concepts and their names is arbitrary. Although naming helps the speaker create and retain concepts, he or she uses a name to evoke part of a concept represented by the name (e.g. The name ‘square’ represents a shape with four sides and four corners, a flat open space, and the length of each side of something that is square in shape (used after units of length)). I call concepts with related linguistic forms “labelled concepts.” A labelled concept consists of one linguistic form and one mental picture, where the linguistic form is connected to the mental picture within a particular time and place.⁵

A final perspective concerns metaphorical extensions as tools of concept formation. Metaphorical extensions allow the speaker to connect existing concepts and to form new concepts. The similarities or differences between existing concepts are important in connecting them (Bartsch 1998). I suggest that the above mentioned “iconicity,” which consists of similarity and analogy, plays a crucial role in connecting existing concepts. For example, the concept A LOVE TRIANGLE is composed of two metaphorical extensions, i.e. an extension between mental pictures (e.g. [an isosceles triangle] of the source and [She is in love with two men and cannot decide which one to choose] of the target) and an extension between two groups of related mental pictures of the source and of the target.⁶ The former is based on similarity between particular mental pictures and the latter is based on analogy between whole groups. In iconic metaphorical extensions, a particular linguistic form (e.g. ‘triangle’) indicates a particular mental picture in the source which extends to another mental picture in the target, and at the same time, a group of related mental pictures of the source extends to another group of related mental pictures of the target. Moreover, metaphorical extensions as tools of concept formation lead us to consider polysemy, which is assumed to be a way of holding a concept effectively in the mental space.

Using the above perspectives, I conducted two kinds of investigations, descriptive

---

⁴ For a discussion of iconicity, see 2.1.4.
⁵ For a discussion of labelled concepts, see 3.1.3.
⁶ In metaphorical extensions, the source is one of the basic senses of a form and the source is used to grasp or explain a sense in a different domain which is called the target (see 2.3.1).
investigations using dictionaries and experimental investigations with native speakers of English and Japanese. First, in order to consider polysemy in relation to basic shapes, I examined the entries for lexical items denoting basic shapes in dictionaries. The linguistic forms which are connected to a particular basic shape represent various things, from concrete objects to abstract notions. If a linguistic form (e.g. ‘round’ (n)) has more than one sense (e.g. ‘a circular shape’ and ‘a series of related events’) we assume that the relationship between the senses is not arbitrary, but motivated by principled extensions (e.g. from ROUNDNESS to CONTINUITY).

Next, I conducted several experimental investigations in terms of iconic metaphorical extensions, using questionnaires, interviews and tasks. The preliminary objectives were to investigate the existence of labelled concepts, to look into both the process and the structure of metaphorical extensions, and to consider the degree of iconicity between two existing concepts in metaphorical extensions. Each survey was a comparative survey between English and Japanese. Both common and specific data to each language were dealt with because one of the main purposes was to build up models which can account for both common and specific phenomena in metaphorical expressions between different languages.

Combining the theoretical perspectives and the surveys, I discuss models which are both dynamic and universal in concept formation through iconicity. Concepts, which seem to be stored in the mental space, are freshly activated every time they are evoked. Concept formation through iconic metaphorical extensions must be dynamic because it is based on “extensions” of existing concepts, and must be universal to all speakers because metaphorical extensions are among the most basic mental activities of human beings. The dynamic and universal models represent the way in which speakers form concepts, connecting a linguistic form and a mental picture and controlling iconic metaphorical extensions.

In a labelled concept (e.g. TRIANGLE), a linguistic form (e.g. ‘triangle’) and a mental picture (e.g. [an isosceles triangle]) are connected to each other. I suggest that the speaker switches his or her attention and/or consciousness between a linguistic form and a mental picture, constituting a labelled concept.

In a dynamic and universal model of iconic metaphorical extensions, the connection between a particular linguistic form (e.g. ‘triangle’) and a mental picture (e.g. [an isosceles
triangle) of the source shifts to the connection between the linguistic form and another mental picture (e.g. [She is in love with two men and cannot decide which one to choose]) of the target through an iconic metaphorical extension, and this shift brings about a new concept (e.g. A LOVE TRIANGLE).

This study is organised as follows. Chapters 2 and 3 provide the theoretical framework for this study. In Chapter 2, I discuss cognition and language, visual sense and understanding, and metaphorical understanding. I argue that basic and simple shapes are universal and highly iconic, and are thus ideal objects for the study of cognitive processes in concept formation. In Chapter 3, I consider concept and concept formation, paths in concept formation, and polysemy as important steps towards concept formation based on iconic metaphorical extensions. Chapters 4 and 5 describe the investigation. In Chapter 4, I examine the entries for lexical items denoting basic shapes in dictionaries. I compare entries and their related senses for particular basic shapes between English and Japanese, and build up polysemous networks which represent the relationships among the senses; I investigate historical changes which show principled extensions among the senses in the past. In Chapter 5, I describe several experimental investigations using questionnaires, interviews and tasks. I examine the iconicity in basic shapes by using association tests, speakers’ explanations about the associations, and the influence of existing metaphorical extensions on the understanding of new metaphorical expressions. In Chapter 6, I discuss dynamic and universal models of concept formation through iconic metaphorical extensions. I reconsider the nature of a labelled concept, and discuss polysemy and its production, and concept formation through iconic metaphorical extensions, considering how speakers control iconic metaphorical extensions which shift in the mental space. Repetition of iconic metaphorical extensions and its influence on habits of concept formation are also discussed.
2 Iconic ways of understanding

What do I mean by the statement that people understand the real world? I do not mean that they take an object or event in the real world into the mental place, because that is not physically possible. Instead, people may produce or visualise something similar to that object or event in the mental space. The relationship between two things in which one thing is similar (or analogous) to the other and one thing represents the other is what I call an iconic relationship. These two things can be a real object or event and its representation, which includes a real world representation (e.g. a painting of a flower) and a conceptual representation (e.g. a mental picture of a flower). The iconic relationship can also be seen between a real world representation and a conceptual representation and between two conceptual representations. We propose that iconicity consists of similarity and analogy. Similarity involves resemblance in one or more details between two things, while analogy involves overall resemblance between them. It is this iconic relationship that bolsters understanding. I would like to claim that the reason why people can understand both concrete objects and abstract notions is attributable to the iconic relationship between two things.

Iconic ways of understanding are individual, experiential, and social. They are individual in that they are based on the individual speaker’s cultural context and existing knowledge. They are experiential in that the more experience the speaker has, the more iconic ways of understanding he or she can learn. They are social in that, in a given language or culture, speakers share iconic ways of understanding.

In dealing with iconic ways of understanding, interactions between the speaker and the environment have been the focus of attention for a long time. However, it is not easy to consider what those interactions are. One aspect which makes this difficult yet intriguing is cultural and linguistic diversity. This diversity widens the variety of iconic ways of understanding which are available to a speaker. In this study, I throw light on iconic metaphorical extensions for concept formation through looking at some iconic uses of basic
and simple shapes in order to represent concrete objects (e.g. St Mark’s Square) and abstract notions (e.g. a circular argument). In this chapter I consider cognition and language, visual sense and understanding, and metaphorical understanding as the first steps towards concept formation through iconicity.

2.1 Cognition and language

In this study we discuss some problems about cognition and language on the assumption that cognition is the way in which human beings make sense of an object or event in the real world and that language is a part of human cognitive processes. In Sweetser’s view (1990: 2), the structure of language is based on human cognition of the real world. Human cognition takes priority over human language, since basic cognition exists without language. For example, pre-linguistic infants understand their environment without language. Cognition at this level, however, is definitely limited. The range of cognition expands significantly in proportion to the amount of language acquired. Through language, human beings can establish varied and complex cognitive processes. Thus Sweetser’s assumption that language is part of human cognitive processes does not necessarily downplay language at all, and we use her assumption to discuss the relationship between cognition and language.

In this section, in order to see the fundamental relationship between cognition and language, we deal with cognitive relativity and cognitive universality, and introduce basic shapes and iconicity as the key issues in this study.

2.1.1 Review of Whorfian view

This study partly attempts to review and reinterpret the weak version of the Sapir-Whorf hypothesis by using a comparative study of cognitive processes between English and Japanese. Linguistic relativity exists in the amalgamation of language, thought and culture. These factors intertwine and we can safely say that different languages and/or different cultures demonstrate great potential to create different thoughts.

Lee (1996: 158) states that “Linguistic relativity has to do with the role of language in the interface of human experience and understanding.” Speakers make sense of an object or
event in the real world through their experience very often using language. Language is part of cognition and therefore, in this sense, to think about linguistic relativity is to think about cognitive relativity. We propose that cognitive relativity focuses on the relationship between cognitive processes and reality, very often through language. Language, in particular, the preferred words and expressions used by speakers of a given language, gives many important clues to the study of cognitive relativity. By comparing these preferred words and expressions in different languages, we can investigate and compare cognitive processes in those languages.

2.1.1.1 Study of cognitive processes

Linguistic relativity, which is the weak version of the famous Sapir-Whorf hypothesis of linguistic determinism (Kay and McDaniel 1978, Lee 1996, Lucy 1992, and Smith 1996), states that differences among languages bring about differences in the thoughts of their speakers. That is, the way a speaker views the real world is partly determined by the structure of the speaker’s native language. This hypothesis has had a great influence not only on linguistics but also on various fields such as anthropology and psychology. In the last two decades, the hypothesis has been taken up in cognitive linguistics on the basis that linguistic relativity should be dealt with in the study of cognitive processes and that it is built up through the speaker’s involvement with the environment.\(^1\) Cognitive processes assume connections between the speaker’s shared cultural context and linguistic patterns, which will lead to “fashions of speaking” in a given language (Whorf 1956: 156-159). Fashions of speaking exist in every language. They are never brought about spontaneously, but the speakers develop them generally over time.\(^2\) In other words, fashions of speaking are gradually modified and improved through the speakers’ involvement with their environment.

The incident which sparked Whorf’s interest in linguistic relativity occurred when he was a fire prevention engineer, and one worker caused a serious explosion by tossing a


\(^2\) Whorf explains that the difference in fashions of speaking (e.g. the concepts of “time”, “space” and “matter” between Hopi and the Standard Average European) is based on differences in the cultures as a whole, which are constructed by generations of speakers over a long period of time.
cigarette into an empty drum with the sign ‘empty’, which was full of petrol vapour.
Ikegami (in his commentary on Whorf, 1993: 324) proposes that the processes, the linguistic form ‘empty’ > the judgement EMPTY > the conjecture NOT DANGEROUS > the careless act of tossing a cigarette, underlie the incident. Whorf appears to claim that the linguistic form caused the careless act. Is that true? The linguistic form ‘empty’ only leads to the judgement EMPTY. The cause of the careless act is the conjecture NOT DANGEROUS, which is not a linguistic form but part of the cognitive processes in the worker’s mental space. However, it cannot be reasonably assumed that Whorf ignored the role of cognitive processes in the mental space. As Lucy (1992: 38-40) indicates, for Whorf language has an extensive influence on thought. Whorf must have concluded that linguistic forms, including cognitive processes, caused the careless act. All linguistic forms must entail cognitive processes. An important point in linguistic relativity is the principle that linguistic forms always involve underlying cognitive processes.\footnote{A > B here means A causes B.}

2.1.1.2 Cognitive relativity

Speakers in a given language community develop their own ways of understanding which are suitable for their specific community. This view is important in supporting linguistic relativity. In a narrow sense there are as many world-views as there are people in the world. In a broad sense each language represents a different world-view. When workers see an apparently empty drum, with or without the sign ‘empty’, for example, do they all toss cigarettes into it? Even if they belong to the same language community, they do not always produce the same conjecture NOT DANGEROUS. The question of whether the empty drum is dangerous or not, or whether it makes a good sound or not, has much to do both with the speakers’ cultural context and with their existing knowledge. Speakers belonging to the same language community share some cultural context and existing knowledge, and generally they have similar world-views.

What determines how a speaker grasps an object or event in the real world is how the

\footnote{Bloom (1981: 9-11) states, in relation to language acquisition, that linguistic forms are deeply and strongly connected to their cognitive structures and that this is partly the basis of the Sapir-Whorf}
speaker is involved with the environment. The object or event never enters the speaker’s mental space on its own. The speaker takes it up in his or her own way. In the above example, the linguistic form ‘empty’ did not cause the workers to carelessly toss their cigarettes in the drums. We think that the workers understood what the empty drum was through the judgement EMPTY and the conjecture NOT DANGEROUS, and that a series of these cognitive processes led to the careless act. Thinking about linguistic relativity has much to do with thinking about cognitive relativity. Cognitive relativity is the idea that differences in cognitive processes bring about differences in the speaker’s way of thinking. The way in which a speaker construes the real world is determined by various cognitive processes.

More importantly, cognitive processes (e.g. the judgement EMPTY and the conjecture NOT DANGEROUS), which are completely independent, come together and form a new process (e.g. a series of cognitive processes from the judgement EMPTY to the conjecture NOT DANGEROUS) in the mental space. This process influences the speaker’s thought and world-view, often causing concrete acts. In order to obtain a clear overview of cognitive relativity, we need to investigate not only independent cognitive processes but also their connections in the mental space.

In terms of methodology, Whorf (1995: 65-86) claims that, by comparing the structures of different languages, one can clearly distinguish the differences in thought and its influence on actions. Although his investigation (e.g. the comparison of structures between English and Hopi) has been shown to be of great value in the study of comparative and descriptive linguistics, in fact it does not completely explain how the speaker obtains his or her way of thinking in a given language. Does only a comparison of the structures of languages bring about the understanding of the speaker’s way of thinking? Comparing only the structures of different languages will not allow us to form hypotheses about the nature of thought and its influence on actions, because the structures are products, not dynamic processes which take place in the mental space. Lee (1996: 90-117) indicates that Whorf is interested in a comprehensive approach in linguistic investigations. Whorf always combines linguistic data with non-linguistic data, and combines the speaker’s conscious use of language with unconscious use, in addition to close investigations into the structures of
languages. Therefore it is essential to examine and compare the cognitive processes which underlie the structures of languages in order to begin to understand the nature of thought and its influence on actions.

2.1.2 Cognitive universality

In a comparative study between different languages, we must carefully choose the objects to compare. Ideally the chosen objects should be ones which exist in all language communities. Only then can we compare the linguistic forms for those objects and the cognitive processes through which the speaker takes the objects into the mental space. We need to pursue the way in which the speaker grasps the objects in the environment in the comparative study of cognitive processes.

We consider the way the speaker perceives the objects using his or her senses as being universal. We here call universality in cognitive processes “cognitive universality.” Cognitive universality refers to cognitive processes which are universal to all speakers. Cognitive universality is experiential, rather than objective, because it has been learned through the experience of the speaker. Cognitive universality will be discussed in this section through some studies of colour terms and emotion terms.

2.1.2.1 Perception and cognitive universality

Generally, perception is the recognition of things using the senses. Is perception specific to individual speakers, or universal to all speakers? In one sense perception is specific to a speaker. In another sense perception can be thought of as being universal. In this study, perception is defined as the common recognition of things by using the human senses. Such perception is biologically and neurophysiologically universal for all speakers. For example, on seeing blood, ordinary speakers recognise the red colour through the optic nerve. Touching a needle, they feel pain through their tactile sense. When they get angry, their temperature and blood pressure rise. These are all about perception, and are cognitively universal for all ordinary speakers.

The foundation of cognitive universality is perception which is the starting point for
cognitive processes. Cognitive universality originates from the common stage of perception and can be retained through cognitive processes to some extent. Cognitive universality usually disappears at some point within the cognitive process. Imagine, for instance, that all ordinary workers equally recognise an empty drum, which falls sideways, in the visual sense. Some workers may have the judgement DRUM and others may develop it to the judgement EMPTY. Moreover some workers may have the conjecture DIRTY and others may have the conjecture MAKING A GOOD SOUND. Cognitive universality disappears at some point, and cognitive relativity takes its place. The point at which cognitive universality changes into cognitive relativity is an important turning point in cognitive processes. What makes a speaker change direction and adopt a perspective which is not universal? The speaker’s cultural context, existing knowledge and/or some restrictions in the language which he or she speaks, exert a great influence on this change. We next take up colour terms and emotional terms as examples to consider the usefulness of the object to compare, referring to cognitive universality and cognitive relativity.

2.1.2.2 Colour terms

The claim that there are basic colour terms originated from Berlin and Kay’s study (1969) which found that all languages have colour terms taken from a set of eleven colour denotations. Although their conclusions have been modified by later works, they provide us with the significant idea that perception of colour categories is universal, supporting the formation of basic colour terms. The common set of neurophysiological systems in human beings brings about the universality in colour categories.

Kay and McDaniel (1978) state that perception based on neurophysiological systems determines colour terms. However, while perception is the starting point of cognitive processes, it is not the only factor on which linguistic forms (colour terms) are established. In our understanding, perception is universal, but the speaker’s cultural context and existing knowledge which have a great influence on their cognitive processes are not universal. Perception, in Kay and McDaniel’s approach, must mean not only perception

---

through the human neurophysiological systems but also the ensuing cognitive processes.

Let us turn to visual impressions. Visual impressions are different in different speakers whether or not the language they speak is the same or different. Universal perception can create and develop various visual impressions, which are influenced by the speaker’s cultural context and existing knowledge. For example, the colour which has the longest wavelength in visible rays is seen as identical for all speakers with no visual handicap, including even people such as speakers of Dugum Dani who have only two basic colour terms. The colour can be identified as the English colour term ‘red’, which links to the visual impression of fire, blood, a ripe tomato, and so on. All the cognitive processes necessary to create the colour term are present in each individual speaker. Speakers sharing a cultural context and existing knowledge can obtain similar visual impressions. We suggest that the concepts which are labelled with basic colour terms are based on the whole cognitive process, rather than only on perception as the starting point of the cognitive process. Basic colour terms are typical instances of linguistic forms which reflect the speaker’s comprehensive involvement with the environment, from universal perception to specific visual impressions.

Colour is neither objective nor subjective, but experiential (Sweetser 1992). If colour were based only on universal perception, it would be objective. If it were established only through individual cognitive processes, it would be subjective. In practice, a speaker learns basic colour categories through experience which involves both universal perception and cognitive processes which are specific to the speaker. The speaker recognises colour through the human neurophysiological systems on which his or her perception is based. The ensuing cognitive processes form visual impressions in the mental space which are eventually encoded in the language as colour terms.

The study of colour terms, which is closely related to cognitive universality, could help us to make hypotheses about cognitive relativity by investigating cognitive processes in different languages. However, colour terms, even basic ones, represent certain ranges of colours even within a language, because both real colours and neurophysiological systems have continuity. For instance, the colour represented by the English colour term ‘blue’

---

6 In Dugum Dani, which is spoken in Irian Jaya, the two terms ‘modla’ and ‘mili’, which would correspond to ‘light, bright’ and ‘dark, dull’ respectively, are thought to be the only basic colour terms (Berlin and Kay 1969: 46).
includes a large range of colour shades (e.g. light blue, dark blue, greenish blue, cobalt blue, indigo blue, azure and sapphire). In order to investigate cognitive processes in different languages, it would be helpful to choose an object of investigation whose denotations correspond more closely across languages.

2.1.2.3 Emotion terms

It has been claimed that every emotion is universal among all human beings. For example, Ekman and Oster (1982) assume that there are universal basic emotions in facial expressions. According to them, there are universal facial expressions representing ANGER, which involve the strain of muscles and change of complexion and link to the human nervous system. Generally, when human beings get angry, their skin temperature rises and their heart rate increases. However, although the human nervous system seems to play an important role in universalising emotions, it is not easy to systematically link all emotions to the human nervous system. Lakoff (1987: 175) states that concept formation involving emotions is ambiguous in nature because it is difficult to find any standard or restriction which controls emotion concept formation. We can assume that there are two reasons for this difficulty in construing emotion concepts. One is that emotion terms are culture specific. The meanings or concepts delivered by emotion terms are different in different cultures, and it is not possible to deal with them in identical ways (Wierzbicka 1995). For instance, the concept which underlies the English emotion term ‘anger’ may be different from an apparently otherwise equivalent concept in other languages. Considering ANGER in any language, we need to take into account not only the matter of degree (e.g. strong ANGER and weak ANGER) but also the matter of the kinds of ANGER (e.g. ANNOYANCE, FURY, INDIGNATION, IRRITATION and RAGE). If one concept can represent other related concepts, it must be a more general concept. The other reason is that cognitive universality in emotions is not as high as expected. Although bodily phenomena in relation to the human nervous system are thought to be universal, they are not always definite but rather are changeable. Ungerer and Schmid (1996: 142) claim that positive emotions such as JOY and LOVE lack universally found physical realisations comparable to the rise in skin temperature and increase in heart rate observed for negative
emotions such as ANGER and FEAR.

Emotions may be difficult concepts to study, since their invisibility makes it difficult to understand what the essence of an emotion is, even before we begin to compare emotion terms between different languages. An ideal object of investigation for pursuing cognitive relativity is one that is not culture specific but is universal and visible.

2.1.3 Basic and simple shapes

In this study, we adopt basic and simple shapes as objects in the discussion of concept formation. To our knowledge, this is the first time that basic and simple shapes have been used in the study of linguistic and cognitive processes on concept formation. Basic and simple shapes are one- or two-dimensional, and can very often be drawn in a single stroke.

In this section, we consider the features and argue for the usefulness of one- and two-dimensional basic and simple shapes as objects for studying concept formation. Basic and simple shapes are visible, and are cognitively universal. We also discuss the idea that basic and simple shapes contribute to the development of cognitive processes as elemental units of images.

2.1.3.1 Features of basic shapes

One of the most noticeable features of basic shapes is their simple structure, which is comprised of one to several lines. The shape, in general, is a space enclosed by an outline (e.g. Circle, Triangle and Square). In this study, the straight or curved line and the right angle which is the combination of two straight lines are seen as shapes because they are not only an essential part of various shapes, but, we claim, have as much relevance to the present study as do enclosed shapes. In addition, basic shapes are two-dimensional except for Straight Line which is one-dimensional, and we will refer to other kinds of shapes such as three-dimensional shapes on a separate basis during the course of the study.

Basic shapes have cognitive universality in the human visual system because of their

---

7 After this, names of basic shapes are written with the initial letters in capitals.
visibility and visible omnipresence in the environment. The starting point for cognitive processes to take basic shapes into the mental space is the neurophysiological system. When two speakers, with no visual handicap, see an identical basic shape, its image in each speaker’s retina is identical, or very similar to each other. This suggests that basic shapes have visual commonality at the starting point of cognitive processes.

Basic shapes are seen in many and varied objects surrounding the speaker. For example, Circle is seen in the sun and the moon, and Triangle in the image or scene of a mountain or a tree. Near squares or rectangles can be seen in salt crystals. In addition, basic shapes can be seen in the speaker’s body (or bodily experience) and the environment. For instance, the body has straight parts (e.g. limbs), angular parts (e.g. elbows and knees), and round parts (e.g. a face). The symmetry in basic shapes (e.g. Circle, (equilateral) Triangle and Square) is found in the body. The body standing upright is associated with verticality and the body lying down is associated with horizontality in the plane. These two features of basic shapes allow us to take basic shapes as suitable objects for the study of cognitive relativity.

Cognitive universality in basic shapes relies on the likelihood that speakers can find examples in their environment, and will probably have nothing to do with the range of basic shape terms. For example, the Dani in Irian Jaya did not engage in carpentry and did not have any basic shape terms such as ‘rectangle’ (Segall et al. 1966: 84). It is very difficult to find a Rectangle in the natural world, but most other basic shapes can be found. Circle can be observed in the sun and the moon, Triangle in the mountain and Straight Line in the horizon. Moreover, even though Rectangle may not be readily found, Right Angle can be observed in any scene in which a tree stands upright on the ground. The Dani may have had the concepts of Straight Line and Right Angle, and may have combined them, for example, to build their huts. They may have had the concept of Rectangle in seeing a side view of a log cut with a stone axe. The Dani would have had Rectangle in their mental space before they encountered machine-made rectangular objects such as boxes and picture

8 We discuss the human visual system later in 2.2.

9 While this claim might be too strong, it is certainly true that many languages have lexicalised basic shape terms such as ‘triangle’ and ‘square’. The fact that some languages, such as Australian Aboriginal languages, do not lexicalise concepts of basic shapes does not detract from the fact that many languages, quite unrelated historically and typologically, do lexicalise concepts of basic shapes and build predictable metaphorical
frames.

As discussed above, basic shapes have cognitive universality in the human visual system, but, of course, in different languages, terms denoting basic shapes differ as to the range of their denotations. In contemporary languages, terms denoting basic shapes may differ according to whether they date back to much earlier stages of the language, or whether they are recent borrowings. For example, the English basic shape term ‘square’, which is Latinate, has been used since the fourteenth century and it is used in everyday talk today. Some basic shape terms have been used for a long time, while others were borrowed recently from other languages. For instance, the Japanese basic shape term ‘sikaku’ (square), which is Sino-Japanese, has been used since the sixteenth century, and ‘sukuea’ (square) was borrowed from English in the nineteenth century. Several investigations including historical changes of the senses for basic shapes are shown in Chapter 4.

Terms denoting basic shapes may differ according to whether they belong only to a scientific register, or whether they are used in everyday talk. In many languages, at present, the denotation of basic shape terms includes basic shapes which can be geometrically defined. The geometrical definitions of basic shapes have been brought into everyday language through the popularisation of mathematics. Remember that the structure of basic shapes is simple. The geometric definitions of the basic shape terms are also simple. The geometric definitions of four basic shapes and their analogous shapes are shown in Figure 2.1.\footnote{There is no native Japanese basic shape term denoting Square. ‘Sikaku’ (square) consists of two parts: ‘si-’ (four) and ‘-kaku’ (Angle/Corner).}

\footnote{Figure 2.1 is based on my own intuition as a native speaker of Japanese and some references to geometry (Abelson and diSessa 1981, Behr and Jungst 1972, Roe 1993).}
Basic shapes | Geometric definition | Analogous basic shapes
---|---|---
Circle | A circle is a shape consisting of a curved line completely surrounding an area. Every part of the line is the same distance from the centre of the area. | Ellipse

Triangle (equilateral) | A triangle is a shape with three straight sides and three angles. | Triangle (right-angled) Triangle (isosceles)

Square | A square is a shape with four sides that are all the same length and four corners that are all right angles. | Rectangle Rhombus

Straight Line (horizontal) | A line is a long thin mark which is drawn on a surface. | Straight Line (vertical) Curved Line

Cross X | Right Angle

**Figure 2.1 Basic shapes**

In Figure 2.1, basic shapes (e.g. Triangle) are defined by a set of geometric features (e.g. “with three straight sides” and “with three angles”). The geometric definitions will be identical across languages, because they are analytic definitions which have been agreed upon as part of agreeing to use a common theory of geometry. They were superimposed on different folk taxonomies of shape, but are now part of everyday speech.

Finally, we consider the issue of contiguity in basic shapes. Shapes can evolve into other shapes gradually. For instance, Circle can become Ellipse by a series of small changes. In some languages, Ellipse is distinguished from Circle with different basic shape terms, while, in other languages, Circle and Ellipse are dealt with as one shape with a single basic shape term. Circle and Ellipse have different definitions: ‘a shape consisting of a
curved line completely surrounding an area, and every part of the line being the same distance from the centre of the area’ and ‘a shape consisting of a curved line completely surrounding an area, but being wider in one direction than the other’. The differences in these definitions are clear-cut.

If the denotation of basic shape terms includes basic shapes which can be geometrically defined in two languages, we can recognise the basic shapes which are denoted by different basic shape terms as to be identical. Comparing various things derived from the basic shapes, we can use them as suitable objects for the study of cognitive relativity. The geometrical definitions in English, in Figure 2.1, are identical with those in Japanese. The correspondences between them are discussed in 4.1.

2.1.3.2 Elemental units of images

An image is the reflection of an object or event in the speaker’s mental space. An image involves two aspects: a visual picture and a mental picture. The visual picture exists in the stage of perception in cognitive processes and the mental picture appears at some point in the ensuing stages. When a speaker sees a Triangle drawn on a piece of paper for example, a visual picture is formed in the retina. The visual picture is elemental for all speakers in that it has not been processed at all, though it may differ a little in size and colour from the Triangle on a piece of paper. Next, the visual picture proceeds and changes into many kinds of mental pictures. A vast number of mental pictures can be formed from one visual picture. The process from the visual picture to the mental picture reflects the speaker’s cultural context and existing knowledge, and cannot be separated from them. Seeing a Triangle drawn on a piece of paper, for instance, some speakers regard it as just a triangular shape, while others regard it as some sign or the symbol of something (e.g. a sign indicating mountains or a symbol summarising a human relationship). In different speakers’ mental spaces, different mental pictures are formed as a result of the different cultural contexts and existing knowledge (e.g. whether one is bushwalking or is involved in a love triangle).

One reason why mental pictures of basic shapes can reflect the speaker’s cultural context and existing knowledge is the simple structure of basic shapes. The simple structure can represent simple objects or events in the real world (e.g. Triangle as a sign
indicating a mountain). In addition, the simple structure can be the foundation of standing for complicated objects or events (e.g. Triangle as a symbol summarising a human relationship).

The idea that the mental pictures of basic shapes can reflect the speaker’s cultural context and existing knowledge provides us with the possibility for pursuing cognitive relativity. In different languages and cultures, the mental pictures are elemental, and at the same time, can reflect various contexts and knowledge. Therefore, basic shapes are among the most useful objects for pursuing the study of cognitive relativity.

2.1.4 Iconicity

The mental picture which the speaker associates with an object or event in the external world can be seen as its icon in the mental space. The speaker understands the object or event by considering it and its mental picture as equivalent in some respects. The mental picture is only a substitute for the real object or event, but it retains some of the same properties. The mental picture is thus a prerequisite for supporting the speaker’s understanding.

If iconicity plays an important role in understanding the real world, what exactly is iconicity? How does it relate to basic shapes? In this section, we discuss icons and iconicity, the degree of iconicity, and iconicity in basic shapes.

2.1.4.1 Icon and iconicity

Is a Triangle drawn on a piece of paper an icon of a pyramid or a symbol of a pyramid? A basic shape is often seen as a symbol. What then is the difference between an icon and a symbol? Jakobson (1971: 346-347), developing Peirce’s semiotic idea, defines icon, index and symbol, as follows.

Icon : formed by factual analogy (e.g. Pictured flowers are the icon of real flowers.)
Index : formed by factual contiguity (e.g. Real smoke is the index of real fire.)

---

12 Peirce (1984) regards sign systems as part of general science and classifies signs into three types: likeness, index and symbol.
Symbol : formed by contiguity learned by experience (e.g. The dove is the symbol of peace.)
The icon, index and symbol are all based on the speaker’s value judgement of the relationships between two (or more) things in reality.\(^{13}\) The relationships are mediated by pictures including images and scenes. In the relationships, one thing represents the other. The icon is based on similarity and analogy between two things whereas the index is based on the state of being in some kind of contact such as that between a part and a whole.\(^{14}\) The relationship between an object and its symbol is attributable to given rules. An object in the real world and its index (e.g. real smoke and real fire) are real. As for the icon, the object (e.g. real flowers) is real, but its icon (e.g. pictured flowers) is a representation. The icon can not only illustrate the appearance of the object (e.g. the appearance of real flowers) but it can also include other properties (e.g. the flowering time and place of real flowers). It can thus be said that the icon is established through the speaker’s cultural context and existing knowledge. In this sense, the icon is learned through experience, and, in this respect, it resembles the symbol.\(^{15}\) Although the relationship between Triangle on a piece of paper and a pyramid seems to be generated through the speaker’s experience alone, it is more iconic than symbolic, because it is based on similarity and/or analogy between them.

When the speaker attempts to understand the real world, iconicity is very important, because iconic relationships are seen not only between a certain object or event in the external world and its real world representation, but also between an object or event and its conceptual representation and between conceptual representations. Generally, iconic relationships are seen between an object or event and its icon. Actually, however, iconic relationships are based on the speaker’s value judgement between two (or more) things.\(^{16}\) In other words, the relationship between them is not iconic without the presence of speakers. What enables the speaker to see an iconic relationship between the object or

\(^{13}\) Nöth (2000) states that “Icons, indices, and symbols are by no means mutually exclusive categories. Every language sign, even an iconic or an indexical word is a symbol. In this respect, deictic words are indexical symbols, and iconicity in language is iconicity in symbolic sign.”

\(^{14}\) Iconicity includes similarity and analogy. This issue is discussed later in this section.

\(^{15}\) Lee (2001: 77) considers that a relationship between a symbol and its referent is iconic when they have some structural or formal correspondence in common.

\(^{16}\) Radwa_ska-Williams (1994) regards iconicity as being diametrically opposed to arbitrariness, and claims that iconicity is based on the speaker’s intention.
event and its icon? That is a mental picture which is a conceptual representation of the object or event. When a speaker sees an icon (e.g. a pictured flower), he or she conjures up one or more mental pictures related to the icon. This mental picture mediates between a real object (e.g. a real flower) and its icon (e.g. a picture of the flower). In this stage, the mental picture can be an icon of the real object and also of the picture of the real object, and represent them. The relationships both between a real object and its related mental picture and between a real world icon (e.g. a picture of the flower) and its related mental picture are iconic. These two iconic relationships support the iconic relationship between the real object and its icon. Those relationships are depicted in Figure 2.2.

![Figure 2.2 Iconic relationships between real objects, their mental pictures and icons](image)

In 1 of Figure 2.2, an iconic relationship between a real flower and its icon is seen, while in 2, a mental picture mediates between them and there are two iconic relationships. The mental picture may have the whole appearance of the real flower and/or some attributes such as a particular number of petals and a particular shape of leaves in the real flower. The mental picture is an icon of the real flower, just as the painting of a flower is an icon of
the flower. In Figure 2.2, only one mental picture mediates, but there can be many and varied mental pictures between a real flower and its icon. These mental pictures may share the whole appearance of the real flower and/or some attributes in the real flower, and the relationship between these mental pictures is also iconic.

The iconic relationships between a real object or event and its related mental picture and between related mental pictures are very important in considering the speaker’s understanding. Although the mental picture is only a substitute for the real object or event, it retains the whole appearance of the real object and/or some attributes in the real object. Neither the whole appearance nor the attributes are static and the mental picture can change according to the speaker’s cultural context and existing knowledge.

As discussed above, iconicity is a relationship between two things in which one thing represents the other. We propose that iconicity includes similarity and analogy in that iconicity has their features. How does iconicity include similarity and analogy? Both similarity and analogy are based on the relationship between two things which are alike in some respects. In similarity, one or more attributes in the two things are important, while in analogy, the whole image or scene of the two things are important. We propose that similarity involves resemblance in one or more details and that analogy involves overall resemblance. For example, the relationship between a particular number of petals in a real flower and that in its icon has to do with similarity, and the relationship between the whole appearance of the real flower and that of its icon involves analogy. Iconicity has these features.

Finally, let us consider the degree of iconicity. There are two types of iconicity, faithfulness of representation, and ability to represent many objects. For example, a photograph or a well-drawn picture of an apple enables the speaker to call to mind a real apple. The more faithful the representation is, the higher the iconicity is. Generally, high iconicity occurs when the correspondence between a real object or event and its icon is close, and low iconicity occurs when the correspondence is not close. However, a sketch of an apple may also have iconicity in the second sense, because it may call to the speaker’s mind not only an apple but also other items such as an orange, the moon or the sun. Thus even a poor picture can have high iconicity if it can easily represent more than one real object or event. For the study of cognitive relativity, high iconicity in the latter sense
(representing more than one object) is much more important than in the former (high degree of faithfulness to the original). Once an icon can stand for more than one real object or event, there is the opportunity to observe if speakers differ as to what they take the icon to represent. This leads to examining the role of the speaker’s language and environment in influencing which icons the speaker takes as representing which objects.

2.1.4.2 Iconicity in basic shapes

Sometimes the speaker grasps an object or event in the real world (e.g. a mountain or a love triangle) by using basic shapes (e.g. Triangle) as an icon of that object or event. As discussed above, both visual pictures and mental pictures can be icons of real objects or events, and basic shapes as icons thus exist both in reality and in the mental space. Mental pictures of basic shapes, as well as visual pictures of basic shapes, share the whole image and some attributes with the real object or event. For example, one mental picture [Triangle] which is an icon of a pyramid may be the whole image of the pyramid; another may consist of a pyramid-shaped heap of rocks. The iconic relationship between the pyramid and its related mental picture [Triangle] is supported by analogy and similarity between them.

Basic shapes are so simple, as defined above, that the speaker can easily imagine that he or she can see the sun, the moon or a face as Circle, or the horizon or a road as Straight Line. This means that basic shapes have high iconicity in the second sense discussed above (representing more than one object). However, there will be a considerable difference in the degree of iconicity among different basic shapes. This is attributable to the possibility that real objects or events which the speaker can see as particular basic shapes exist. Circle, for example, would probably have high iconicity since the speaker can see many real objects such as the sun, the moon, a face, an eye and a drop of water as Circle. By contrast, Triangle would have low iconicity because there are fewer objects (e.g. mountains and trees) which are readily seen as Triangle. Environment may play a role: if some speakers tend to see a drop of water as Circle, they may be surrounded by plenty of water. If others tend to see a tree as Triangle, they may live with rich forest resources. The high iconicity in basic shapes and the comparison of the degree of iconicity between different languages
allow basic shapes to be a valid and useful object in the study of cognitive relativity, along with the other features mentioned above.

2.2 Visual sense and understanding

The interaction between seeing and understanding has been discussed in the literature a lot during the past decade (e.g. Mey 1993, Nagataki 1999, Schön 1993, Sweetser 1990). While there is still no comprehensive or clear-cut illustration of this interaction, it is clear that seeing and understanding have a strong and profound influence on each other, mainly through the speaker’s visual involvement with the environment.

In this section, we discuss the human visual system and its relation to human understanding. Many things are visually recognised by human beings. How does visual recognition lead to understanding? Yamadori (1998: 44) proposes that the speaker picks up the important and necessary parts of the object or event, and, in the mental space, reconstructs the whole image based on the important and necessary parts. Therefore, the speaker’s mental images will differ from an object or event in the real world. When he or she chooses parts of an object or event, the speaker is influenced by cultural context and existing knowledge. The speaker’s involvement with the environment would probably control how he or she sees the object or event, leading to the way in which it is understood.

2.2.1 From visual pictures to mental pictures

Marr (1976) and Marr and Nishihara (1978) state that “Vision is a process that produces from images of the external world a description that is useful to the viewer and not cluttered with irrelevant information.” Vision is not a product but a process which consists of two stages: “images of the external world” and “the viewer’s description.” The first we call “visual pictures” and the second “mental pictures.” Visual pictures are reflections of objects or events in the external world on the retina.18 Mental pictures are

---

17 Yamadori also claims that speakers do not see the object or event, but have it in their mind.

18 Marr (1982: 22-24) explains that the first representation in a mapping between two representations
descriptions which the speaker produces from visual pictures. These ideas are very important when we consider the cognitive processes by which an image on the retina of an object or event in the external world becomes a conceptual representation.

Speakers see an object or event in the external world through the visual system, consciously or unconsciously. They can freely change their viewpoint and their focusing point. Moreover, they can see the whole object or event, or they can merely pay attention to its details, blocking out other parts. Seeing the whole or parts involves recognising the principles for separating the object or event into two parts: the figure and the ground.¹⁹

Seeing the same objects or events, some speakers perceive them in the same way, while others recognise them very differently. The visual sense, which brings visual pictures to the starting point for cognitive processes, is universal to all normal speakers. In the ensuing stages of cognitive processes, however, various mental pictures, some of which are specific to a given language or culture, appear. In this section, we deal with human vision in the senses and the profiling system.

2.2.1.1 Vision in the senses

Vision is the ability to see with the eyes. An object or event in the external world is reflected as a visual picture on the retina and then it reaches the brain through the optic nerve, becoming a mental picture. Human vision has the functions of taking information into the brain through the visual sense organs.

Vision can deal with much more information than the other senses (Geldard 1972: 18). More so than other senses, through vision a speaker can perceive many things at one time, or focus on one thing in detail. Thus there is something about vision that distinguishes it from all other senses.²⁰

We place vision at the starting point for cognitive processes (see 2.1.2.1). Undoubtedly, visual pictures which are reflected on different speakers’ retinas are similar, because of similarity in neurophysiological functions in the human visual system. On the other hand,

---

¹⁹ When the speaker sees an object or event in the real world, he or she usually separates a highlighted part from its background. The former is the figure and the latter is the ground. We discuss the separation of the figure and the ground later in 2.2.1.2.

²⁰
there is a great variety of mental pictures which are developed from the visual pictures in the cognitive processes. Different speakers naturally have different mental pictures. However, some mental pictures or parts of a mental picture are shared by some speakers, in particular, by those who share a similar cultural context and existing knowledge.

The speaker can have a variety of mental pictures associated with one visual picture. The speaker consciously and unconsciously develops one visual picture into various corresponding mental pictures. For instance, seeing an apple on the table, the speaker will be able to develop innumerable mental pictures (e.g. an object to eat or to paint, the symbol for temptation (from the forbidden fruit of the tree in the Garden of Eden), New York (the Big Apple) or Apple (computer)). The human visual system is so flexible that the speaker can freely take up the whole or some parts of an object or event. The flexibility of the human visual system allows the speaker to develop various visual pictures from a single object.

2.2.1.2 Profiling system

When the speaker sees an apple on the table, whether it is for eating or painting, he or she has two ways of seeing: seeing the apple itself and seeing the whole scene surrounding the apple. We call this the profiling system. Goatly (1997: 2-3) states that the speaker profiles some features subjectively, positively and actively, and, at the same time, ignores other features subjectively, positively and actively. Profiling something does not mean missing, but selectively ignoring something else; thus paying attention to the apple, rather than to the background of the apple. The speaker sees an object or event in the real world, consciously and unconsciously, choosing something to see and something else to ignore at the same time.

The profiling system is influenced by the speaker’s cultural context and existing knowledge to greater or lesser extent. For instance, some speakers see and recognise an apple on the table, referring to existing information or their experience of apples. Others,

---

20 Schiffman (1990: 197) states that “Vision is the dominant sensory system for the human.”

21 Wade and Swanston (2001: 229-231) explain the relationship between parts and wholes in vision referring to gestalt psychology.
who see it for the first time and have no existing information about it, or experience of it, cannot recognise it as an apple, but, instead, may imagine what it is, by consciously or unconsciously deciding what to profile and by using other existing information and experience. If they pay attention to its size and colour, they may imagine that it is something to hold or play with; if they see it on a plate, they may think of it as something to eat. If they see the whole scene surrounding the apple, they may think of it as a subject for painting.

In order to use the profiling system, the speaker makes use of the principles which separate the figure and the ground. Ungerer and Schmid (1996: 157) refer to this figure/ground segregation as follows:

1) The figure has formed a shape whereas the ground is formless and the shared contour seems to belong to the figure.
2) The figure seems to have other thing-like qualities such as structure and coherence, whereas the ground is unstructured, shapeless and uniform.

We suggest, in addition, that the separation of the figure and the ground is not determinate but flexible. The profiling system obviously relies on these three points. The speaker freely sees an object or event, using the ability to separate the figure and the ground.

We turn now to the components of the profiling system. We assume that the profiling system consists of three components: the viewpoint, the focal point and the extent of profiling. The viewpoint is the space or environment from which a speaker sees an object or event. If a speaker changes the viewpoint, this entails changing his or her spatial or environmental position. The focal point is the point which the speaker pays attention to. The focal point may be the whole object or event, or part of it. The extent of profiling involves how closely and how meticulously the speaker grasps the object or event. These three components are not independent but interdependent, and together form the profiling system.

For basic shapes, what is the profiling system? First, the viewpoint is no different from that involved in seeing any other object or event in the real world. It is the speaker’s spatial or environmental position from which he or she sees basic shapes. Second, the focal point can be on the whole shape or part of a basic shape (e.g. the whole Circle or a curved
line of Circle). Since the simple structures of basic shapes limit the number of focal points, there are few focal points to choose from. Finally, the extent of profiling is seen in the variety of geometric features of the shape. If a speaker chooses a single focal point (e.g. a curved line of Circle), he or she does not pay much attention to a given shape (e.g. Circle). If the speaker chooses several focal points (e.g. the curved line, the closed part and the symmetry in Circle) even within a limited number of geometric features of the shape, he or she pays much attention to the basic shape. Out of the three components, the focal point and the extent of profiling are of greatest importance because they can help us to investigate the variety of cognitive processes involved in using basic shapes in metaphorical (or metonymical) extensions.

2.2.2 Seeing is understanding

How is the human visual system connected to human understanding? First, let us look at some old proverbs in English and Japanese. ‘Seeing is believing’ in English has been claimed to correspond to ‘Hyakubun wa ikken ni sikazu’ (To see something once is better than hearing about it one hundred times) in Japanese.\(^2\) The literal meaning of the Japanese proverb is that even one hundred hearings can not amount to a single glance, indicating the superiority of vision over hearing. Even though the English proverb contrasts direct recognition (primary evidence) with indirect recognition (secondary evidence), and implicitly comparing seeing with hearing, it provides evidence for folk beliefs in the primacy of vision in understanding because it takes vision as the prototypical sense for causing knowledge acquisition. Despite the difference in the details, both proverbs show a folk belief in the superiority of vision in dealing with information, compared to the other senses.\(^3\)

In this section, we discuss ‘Seeing is understanding’, in particular, the relationship between how the speaker sees an object or event in the real world and how he or she then understands it. Understanding is the way the speaker “has a world” (Johnson 1987:

---

\(^2\) This proverb derives from classical Chinese (Han shu (the History of Han)).

\(^3\) This idea does not deny the relationships between the other senses and understanding (e.g. the close connection between hearing and understanding in many Australian indigenous languages observed by Evans and Wilkins 2000); this section takes up only the relationship between the visual system and understanding,
In order to have a world, the speaker must use all the senses, and above all, he or she must rely on vision because of its capacity to deal with information. In seeing the object or event, roughly speaking, the speaker has two choices, seeing it as it is and seeing it “as” something else. The second is of significance because seeing something “as” something else involves some categorisation which will lead to the basis of understanding.

2.2.2.1 Seeing, categorising, and understanding

The English word ‘see’ has a number of senses, some of which express ideas involving thinking. Let us consider the senses of ‘see’. In the Collins COBUILD English Dictionary (CED), for example, we find more than twenty senses including ‘visually see’, ‘watch’, ‘understand’, ‘perceive’, ‘imagine’, ‘witness’, ‘find out’, ‘accompany’, and so on. When some synonyms (e.g. ‘look’, ‘view’, ‘gaze’, and ‘stare’) and compounds (e.g. ‘see off’, ‘look after’, and ‘stare out’) are taken into account along with their senses, the number of senses becomes very large. In Japanese, ‘miru’ (to see) has seven senses in the SHIN-JIRIN (Dictionary) (SJD), including ‘visually see’, ‘judge’, ‘examine’, ‘care for’, ‘experience’, and the like. The word ‘miru’ seems to have fewer senses than ‘see’ in English, apart from the difference in total lexical volume between the CED and the SJD. In fact, however, ‘miru’ has many homophones (e.g. ‘miru’ (to care for), ‘miru’ (to watch), ‘miru’ (to examine) and ‘miru’ (to view)), and compounds (e.g. ‘mitoosu’ (to see through), ‘mikomu’ (to take into account), ‘mitoru’ (to look after), and ‘miokuru’ (to see off; to pass up)). Although there are correspondences in meaning between ‘see’ and ‘miru’, we are not concerned with them here. What is significant in this study is that both ‘see’ and ‘miru’ have many senses and that some of them are related to thought. This means that, in both English and Japanese, speakers speak as though the act of seeing develops because basic shapes (two-dimensional) are perceived by the visual system alone.

Johnson also claims that understanding is the speaker’s mode of “being in the world.”

These are distinctions only in the orthography based on distinctions made in classical Chinese:

見る ‘miru’ to visually see, to judge, to examine, to care for, to experience
看る ‘miru’ to care for
視る ‘miru’ to watch
診る ‘miru’ to examine
観る ‘miru’ to view
into various kinds of actions, and in particular, plays a crucial role in taking an object and event from the external world into the mental space, leading the English or Japanese speaker to equate seeing with understanding.

Now we need to consider what understanding is. We assume that the basis of understanding is to discriminate something from something else, that is, to categorise something in the mental space. According to some category standard with which the speaker takes an object or event in the external world into a certain slot of the mental space, he or she categorises the real world. The category standard functions as a discriminator when the speaker regards the non-identical as the identical (Rosch et al. 1976, Medin 1983). The speaker attempts to find some similarity and/or analogy between the new information in the object or event and the existing information in the mental space, both of which are seemingly unrelated. This is discussed in the following section.

2.2.2.2 What is SEEING-AS?

There are two main ways that the speaker takes an object or event in the external world into the mental space as a mental picture. One is to deal with the object or event as it is, i.e. the mental picture (e.g. a beautiful flower) is similar to the visual picture (e.g. a rose). The other is to transform the visual picture (e.g. a rose) into the mental picture (e.g. a beautiful girl), i.e. the mental picture is different from the visual picture. Both ways are concerned with understanding, and, in particular, the latter widens the scope of understanding. The transformation of pictures allows the speaker to categorise the object or event into existing slots in the mental space, and often leads to the extension of concrete objects or events (e.g. a rose) to abstract notions (e.g. BEAUTY). In the transformation of pictures, seeing something as something else is a basic operation. We think of seeing A as B, as seeing A through B, categorising A in the slot to which B belongs, and understanding A as B.

SEEING-AS is based on iconicity between visual pictures and mental pictures. Some similarity and analogy between them support SEEING-AS. For instance, some speakers

26 In Old Japanese, ‘wakaru’ (to understand) is ‘waku’ which means ‘to separate one thing from another’ (Kadokawa Kogo Dai-jiten (Kadokawa Classical Japanese Dictionary)). By separating it, the speaker can distinguish it from other objects or events.
see a rose as a beautiful flower and others see it as a beautiful girl. The former is direct SEEING-AS and the latter is indirect SEEING-AS. The relationship between a rose (a visual picture) and a beautiful flower (a mental picture) is iconic in that the beautiful flower has the whole appearance and particular attributes of the rose (e.g. a specific shape of petals or leaves). The relationship between a rose (a visual picture) and a beautiful girl (a mental picture) is also iconic in that the beautiful girl has the whole image (e.g. a bright image) and particular attributes of the rose (e.g. a small and lovely bud).

SEEING-AS is influenced by the speaker’s environment. First, whether speakers think of a beautiful girl as a rose or a lily may be attributable to the presence of the rose or the lily in their environment. Second, whether speakers think of a beautiful girl or a severe girl as a rose is attributable to the speakers’ value judgement on the rose in their environment. It is obvious that a speaker can freely see A as B, but often, the combination of A and B is stabilised in a given environment so that the speaker can use the same SEEING-AS repeatedly. The stabilised combination is created from speakers’ shared experience in the environment.

2.2.3 Seeing and understanding through basic shapes

The speaker sees an object or event in the external world through a visual picture and understands an object or event through its mental picture. The speaker sometimes makes use of basic shapes in SEEING-AS (e.g. seeing the sun as Circle). Mental pictures associated with basic shapes are diverse because the simplicity of basic shapes makes it easy to detect them in many objects or events in the real world. The speaker analyses and evaluates basic shapes as tools for SEEING-AS, using the profiling system and, above all, changing the focal points (e.g. the whole Circle or merely a curved line of Circle). The speaker pays attention to one or more geometric features in a certain basic shape. Although the number of geometric features is limited, they can extend to various features other than geometric ones in the mental space. Some extensions are common to most languages and cultures, and others are peculiar to individual languages and cultures.
2.2.3.1 From geometric features to other features

To see something through a basic shape is to see it as something else. This “something else” may be based on a single geometric feature or a set of geometric features. Basic shapes are characterised by their simple structures, in which the number of geometric features is limited (see 2.1.3.1). Conventional geometric features are listed in Figure 2.3, below.

<table>
<thead>
<tr>
<th>Features</th>
<th>Examples</th>
</tr>
</thead>
<tbody>
<tr>
<td>line, side</td>
<td>• straight, direct, horizontal, vertical, diagonal</td>
</tr>
<tr>
<td></td>
<td>• curved, bent, round, circular</td>
</tr>
<tr>
<td></td>
<td>• flat / not flat</td>
</tr>
<tr>
<td></td>
<td>• parallel, intersected</td>
</tr>
<tr>
<td>corner, edge,</td>
<td>• cornered, edgy, angular, pointy</td>
</tr>
<tr>
<td>angle, point</td>
<td></td>
</tr>
<tr>
<td>degree</td>
<td>• of (e.g. 90 and 150) degrees, right-angled, perpendicular acute / obtuse</td>
</tr>
<tr>
<td>whole shape</td>
<td>• open / closed</td>
</tr>
<tr>
<td></td>
<td>• symmetrical /</td>
</tr>
</tbody>
</table>

**Figure 2.3 Basic geometric**

The speaker’s profiling system in a particular context determines what geometric feature he or she chooses in seeing something through a given basic shape. An important point to emphasise is that the focal points and the extent of profiling play crucial roles in both direct and indirect SEEING-AS. The speaker may choose one or more than one feature which is similar in both. In direct SEEING-AS, for instance, the speaker may see the sun
or a face as Circle. The geometric feature “round”, “circular” and “closed”, which are the focal points, are important in seeing it as Circle. In indirect SEEING-AS, geometric features as focal points extend to other features. In seeing the connection of three people with different interests in a particular situation as Triangle, the geometric feature “three angles” extends to the feature “physical or psychological position of the three people.” The speaker may be thinking more of the three angles than the three straight sides, as a focal point. This is because the three angles can better represent the separated “points” of three people than the three straight sides. Regarding the extent of profiling, the speaker can change the extent (e.g. of the angle) in chosen geometric features. In the above example, the degree of the three angles can change (e.g. acute-angled or obtuse-angled triangles).

Understanding something through a basic shape has a great variety of applications despite the fact that it relies on a limited number of geometric features. This is attributable to the idea that geometric features can flexibly extend to other features according to the speaker’s individual context of understanding. These flexible extensions help the speaker to understand abstract notions.

2.2.3.2 Range of SEEING-AS

Geometric features, despite their limited number, can extend to other various features: degrees, conditions, properties, actions, and so on. Some extensions are specific to a given language or culture and others are universal. Speakers who share cultural context and existing knowledge tend to have similar extensions for geometric features. In seeing and understanding an object or event, there must exist a certain range of SEEING-AS in the language and culture.

The range of SEEING-AS, first, means the extent of directness of SEEING-AS. There are different SEEING-ASes in different languages or cultures, and they are based on the extent of directness. Take a round shape or Circle for instance. When some speakers see the sun, they may regard it as Circle (direct SEEING-AS). Or other speakers may see the abstract notion ‘using a statement to prove something which is then used to prove the statement’ as Circle (indirect SEEING-AS). Second, the range of SEEING-AS represents the extent of commonality in SEEING-AS. Some SEEING-ASes are common to many
speakers, while others are specific to a limited number of speakers. What needs to be noted here is that directness is not always connected to commonality. Direct SEEING-AS is generally common, but indirect SEEING-AS is not necessarily specific to given speakers. For example, many speakers may see the sun, the moon, an eye or a drop of water as Circle. These SEEING-ASes are direct and common to them. On the other hand, the abstract notion “using a statement to prove something which is then used to prove the statement” in the English expression ‘a circular argument’ is seen as Circle. This SEEING-AS is indirect but similar metaphorical expressions can be found in many languages.  

To summarise, direct SEEING-AS is immediately based on concrete objects or events in the real world. The relationship between concrete objects or events and basic shapes is iconic, and geometric features of basic shapes are observed in the concrete objects or events as they are. Indirect SEEING-AS involves abstract notions. The relationship between abstract notions and basic shapes is iconic. However, this iconic relationship differs from that in direct SEEING-AS. In indirect SEEING-AS, geometric features of basic shapes extend to other features of abstract notions. This enables new concepts to be formed, showing indirect SEEING-AS to be a useful means of understanding.

2.3 Metaphorical understanding

In the preceding section, we discussed extensions from geometric features to other features in indirect SEEING-AS as useful tools for understanding. These kinds of extensions can be seen in “metaphor.” We here consider metaphor and metaphorical understanding.

Metaphor as a figure of speech represents an imaginative way of describing something by relating it to something else which has the qualities that the speaker wants to highlight. People use metaphor in everyday life, consciously or unconsciously, either with a great deal of calculation or with no effort at all.

At school we learn that a metaphor is a figure of speech used to embellish prose or poetry. In fact, people use metaphor as a figure of thought. By using metaphors as figures

---

27 E.g. ‘doodoomeguri’ in Japanese, ‘sich im Kreis bewegen’ in German, ‘razonamiento circular’ in Spanish.
of speech and figures of thought, people can make sense of the real world. The number of objects, events or abstract notions in the real world is infinite, but, as long as people do not freely produce new words for every new object, event or abstract notion, the number of words is limited. The metaphorical extension underlying a metaphor represents the important cognitive ability to deal with innumerable objects, events or abstract notions with a limited number of words.

As for metaphorical understanding, we suggest that it is not important, or even possible, to distinguish the rhetorical metaphor as a figure of speech from the cognitive metaphor as a figure of thought. Of greater significance is the fact that people make sense of the real world using both rhetorical and cognitive metaphors in everyday life. In this section we consider rhetorical and cognitive metaphor, and shed light on the structure of metaphorical understanding.

2.3.1 Rhetorical metaphor

From the age of Aristotle to the present day, metaphor has held its position as one of the most important figures of rhetoric. One reason for its importance is that metaphor is often the best and the most suitable means to represent a speaker’s ideas and intentions at a particular time and place. It is usually impossible to paraphrase metaphors exactly with more literal words or expressions. Even if the speaker can express a metaphor in a more literal way, he or she cannot capture all the conditions and connotations of the original metaphor.

A metaphorical extension is based on a motivated relationship between the target and the source. In a metaphorical extension, the source extends to the target. The target is the subject and the source is the referent being used metaphorically. In other words, the source is one of the basic senses of a form and the source is used to grasp or explain a sense in a different domain which is called the target. Of course all metaphors are influenced by the speaker’s cultural context and existing knowledge because all metaphorical extensions are based on those from the source to the target in a given language or culture. The speaker creates metaphors on the basis of his or her involvement with the environment.

We now discuss some features of metaphor, the role of iconicity in metaphorical extensions, and the influence of the speaker’s experience on metaphorical extensions.
2.3.1.1 Features of metaphor

‘She is a rose’ is a typical rhetorical metaphor. Rhetorical metaphor often aims at creating embellishing effects. Max Black (1962: 35-36) defines metaphor as a way of embellishing something, discovering new meanings decorated by substituting a source domain (e.g. A ROSE) for a target domain (e.g. BEAUTY). As a figure of speech, metaphor carries embellishing effects, both positive (e.g. ‘She is a rose’) and negative (e.g. ‘She is a hyena’). The operation of substituting the source for the target is the basis of establishing metaphor. Some common features of metaphor are shown below:

- Metaphors can represent what literal expressions cannot.
- New metaphors can be produced limitlessly.
- Metaphors have much information in themselves.

In addition, we suggest that metaphors are culture specific (Gibbs 1994, Grady 1997, Lakoff and Johnson 1980, Quinn and Holland 1987, Radwa_ska-Williams and Hiraga 1995, Ross 1993, Sweetser 1995). This idea is not surprising because, even though some metaphors can have the same meaning, they can have different forms. For example, the metaphor ‘Kanozyo wa bara da’ (She is a rose) is widely recognised in present-day Japanese, and the metaphor ‘Kanozyo wa yuri da’ (She is a lily) is known as an old-fashioned metaphor.28 Both the metaphors mean ‘She is beautiful’.

The speaker’s cultural context and existing knowledge have a great influence on what should be placed in the source domain. There will be various reasons to decide on candidates for the source domain. When some speakers belonging to different language and culture communities use the same metaphor (e.g. ‘She is a rose’), the meaning which they want to represent is not always identical. The images and scenes which come to mind from a metaphor are different in different languages and cultures.

In a given environment, what makes the speaker create and use a certain metaphor? Metaphor has an important role in filling lexical gaps (Goatly 1997: 27). The speaker deals with innumerable objects and events in the real world, relying on a limited number of

---

28 There is an old expression to represent a beautiful woman ‘Tateba syakuyaku, suwareba botan, aruku sugata wa yuri no hana’ (When standing, she is a syakuyaku (a kind of peony), when sitting she is a botan (another kind of peony), and when walking, she is (the flower of) a lily).
words. Metaphor enables the speaker to solve this problem without having to overproduce new words. In Lyons’s view (1995: 100), metaphor aims at word-to-world relation, not word-to-word relation. This view is based on the idea that the speaker’s knowledge of some kinds of words or expressions is connected to the speaker’s knowledge of the real world. Metaphor seemingly connects one word to another, but actually, relates the word to the object or event in the real world. This word-to-world relation can make metaphor a suitable mode of expression to represent the speaker’s ideas and intentions at a particular time and place.

Finally we look at the relationship between the source and the target. Metaphor is based on the motivated relationships between the source and the target. “Motivated” means that speakers expect to find a connection between the source and the target. Conversely motivated relationships can be said to create metaphor. Johnson (1987: 113) states that the motivated relationship in metaphorical extensions is based on the “inclusion” in the target and the source. Inclusion means that one domain is subordinate to the other. In metaphorical extensions, the target is usually subordinate to the source.\footnote{Steen (1994: 14) claims that, in metaphor, the target semantically belongs to the source.} For example, in the metaphor ‘She is a rose’, the target BEAUTY is included in the source A ROSE.

2.3.1.2 Metaphor and iconicity

In the metaphor ‘She is a rose’, out of context it is difficult to specify exactly whether the target BEAUTY represents her appearance or whether the source A ROSE stands for a red rose. The target can represent her appearance or attitude, while the source may stand for the red colour of a rose, a fat rose bud, or a bunch of roses. The speaker can imagine various connections between the two domains. What makes these connections possible is “iconicity.” As discussed in 2.1.4.1, iconicity is a relationship between two things in which one thing represents the other, and iconicity includes similarity and analogy. In metaphorical extensions, the source represents the target in some respects. How does iconicity include similarity and analogy in metaphorical extensions, then?

Similarity is based on one or more properties which link the source to the target. Medin
(1983) claims that multiple properties which are common to two domains build up a metaphorical extension. The speaker will choose one or more of these properties when he or she needs to connect the source to the target. For instance, in the metaphor ‘a literary circle’, the source is CIRCULARITY and the target is A GROUP OF PEOPLE MEETING ONE ANOTHER REGULARLY. The target and the source are connected through some properties which belong to each domain: “a curved line completely surrounding an area” and “a round flat area” in the source and “people gathering at a particular time and place” and “people talking in a circle.”

Analogy is supported by the whole image or scene which links the source to the target. Seto (1995: 186-187) states that analogy in metaphorical extensions is found between the two domains when the whole images associated with each domain are alike. In the above example, the whole image associated with CIRCULARITY extends to the whole scene associated with A GROUP OF PEOPLE MEETING ONE ANOTHER REGULARLY in addition to the above mentioned specific properties. We call metaphorical extensions supported by the whole and partial connections between the source and the target “iconic metaphorical extensions.” We suggest that iconic metaphorical extensions can provide the speaker with metaphorical understanding.

Finally, in order to promote our understanding of iconic metaphorical extensions, we compare metaphor with simile and metonymy. First, the simile ‘She is like a rose’ is apparently similar to the metaphor ‘She is a rose’. In ‘She is a rose’ which involves implicit assertion, A ROSE represents BEAUTY. In ‘She is like a rose’ which involves explicit comparison, however, A ROSE does not represent BEAUTY because the relationship between A ROSE and BEAUTY is compulsorily established through ‘like’ which leaves A ROSE and BEAUTY separated. ‘She is like a rose’ entails ‘She is not a rose’.

Second, metonymy is the substitution of the name of an attribute or adjunct for an object (e.g. ‘the bottle’ for ‘strong drink’, ‘the purple’ for ‘persons imperial, royal or other high rank’ in English, ‘kuroobi’ (the black belt) for ‘rank holders in Judo’, ‘kinbazzi’ (the

30 Medin regards similarity as “a fixed entity.”
31 Sato (1992: 139) claims that metaphor does not create a relationship between the source and the target as compulsorily as a simile does.
32 Vogel (2001) states that, between metaphor and metonymy, the truth conditions differ.
gold badge) for ‘Members of Parliament’ in Japanese). The relationship between a part and a whole, a container and the contents or a place and its inhabitants builds up metonymy. Metonymy is based on contiguity in two things which are next to each other, while metaphor is based on iconicity between two things which may be next to each other and be apart from each other.\(^\text{33}\)

2.3.1.3 Form, meaning, and experience

The flexibility of metaphor concerns form and meaning. The speaker can change the form of metaphor freely, creating various forms of metaphor according to his or her cultural context and existing knowledge (e.g. ‘She is a rose’ and ‘She is a lily’). The speaker can also freely change the meaning of metaphor (e.g. ‘She is a rose’ means ‘She is beautiful’ and ‘She is severe’ (because a rose has thorny stems)). This has been treated as the issue of the lack of a hard-and-fast division between literal meaning and real meaning in metaphor.\(^\text{34}\)

Furthermore, a given metaphor has more than one meaning, because the metaphor involves many factors such as the speaker’s cultural context and existing knowledge, which can change the meaning in diverse ways (e.g. ‘She is a rose’ means ‘She is beautiful’, ‘She is gorgeous’ and ‘She is bright’).

One method for considering the variety of the forms and the meanings of metaphor is to recognise that metaphor can be both an individual and a social entity. Social metaphors are made up of individual ones. It is easy to produce new individual metaphors (e.g. ‘She is a dandelion’), but difficult for all of them to become social metaphors (e.g. ‘She is a rose’). That is, most English speakers will not assign similar meanings to ‘She is a dandelion’, but will assign similar meanings to ‘She is a rose’. The most important aspect in the classification of individual and social metaphors is the existence of a hearer. All speakers tend to create metaphors in areas familiar to them, and in their fields of specialisation (Edwards and Clevenger 1990), but not all hearers share these areas and fields. When metaphors are used as part of communication, the speaker and the hearer need to interpret the metaphors in similar ways (Searle 1993). This suggests that the hearer’s understanding

\(^{33}\) Taylor (1989: 138-140) claims that metaphor is based on metonymy in that metonymy is more fundamental than metaphor in meaning extension.

\(^{34}\) Berg (1988) and Goatly (1997: 38) state that there is a series of continuous meanings between literal meaning and real meaning in metaphor.
plays a significant role in whether or not individual metaphors can develop into social ones.

It may appear that social metaphors seem to be objective, while individual metaphors seem to be subjective. However, metaphor is neither objective nor subjective, but experiential in nature. Individual metaphors are produced from the speaker’s individual experience, and the hearer attempts to understand them by comparing them with his or her individual experience. Social metaphors are based on shared individual experience. Gibbs (1994: 249) explains that what has been learned through experience strongly supports the understanding of metaphor. He calls this “structurally meaningful wholes within experience.” When the speaker uses individual metaphors or the hearer recognises social metaphors, the speaker and the hearer refer not only to experience immediately related to these metaphors but also to other experiences apparently unrelated to them. For example, in order to use and recognise the metaphor ‘a love triangle’, the speaker and the hearer refer not only to the direct experience (or knowledge) of “a group of three people who are each in love with at least one other person in the group” and the shape of Triangle, but also to other experiences (or knowledge) such as “friends”, “lovers”, “marriage” and “jealousy.” The combination of experience supports the interpretation of the metaphor ‘a love triangle’.

Many researchers (e.g. Johnson 1987, Lakoff 1987, Lakoff and Johnson 1980, Lakoff and Turner 1989, Sweetser 1990, Turner 1991) agree with the idea that metaphor is experiential on the ground that the speaker metaphorically understands the real world only through physical and mental experience. The most important part of this idea is that experience is not only real and direct experience, but also imaginary and indirect experience. Lakoff (1987: 309) calls the ability “the human imaginative capacity” that human beings can recognise what they do not directly experience. The speaker makes use of both direct and indirect experience in order to access the real world. Using and recognising the metaphor ‘a love triangle’, for example, the speaker and the hearer do not always need direct experience. Instead, they can make use of indirect experience such as the story of three people in novels or movies, and visualise their own images or scenes onto ‘a love triangle’.

Lakoff also claims that “the human imaginative capacity” is culture specific. Social
metaphors developed from individual metaphors are naturally many and varied, and some of them enter fashions of speaking in a particular language and culture community. There are various ways to learn through experience, and since metaphor is experiential, the form and meaning of metaphor can vary widely.

2.3.2 Cognitive metaphor

Apart from rhetorical metaphor, the speaker frequently uses other kinds of metaphors in everyday life, that is, metaphor as a figure of thought. Thought is created by metaphor (Akaba 1998a: 8) and metaphor can control the speaker’s thought (Akaba 1998b: 171). In order to think of something, the speaker makes use of metaphorical extensions. Metaphor as a figure of thought is as important as metaphor as a figure of speech, and plays a crucial role in controlling the way a speaker makes sense of an object or event in the real world.

In this section, we discuss what function metaphor has as a way of thinking, focusing on metaphorical understanding, and what the structure of metaphorical understanding is by looking at its cognitive processes.

2.3.2.1 Understanding by cognitive metaphor

The term ‘metaphor’ is applied both to the rhetorical product (e.g. ‘She is a rose’), which has a form, is static and results from the speaker’s viewpoint (Schön 1993), and to the cognitive process in which the speaker makes sense of the external world. The process, whereby the speaker creates the rhetorical product ‘She is a rose’, undoubtedly exists, but it is not only a process. The idea that metaphor itself is a process does not stress the importance of the established linguistic form of metaphor but rather of the on-going metaphorical extensions underlying it. Metaphor goes far beyond the purely rhetorical product. Metaphor is “a reasoning and inferential process” (Cacciari and Glucksberg 1994). Metaphor may be both the basis of concept formation and that concept formation itself (Lakoff 1987, 1993, Lakoff and Johnson 1980). Metaphor deeply involves basic mental activities. It can safely be said that metaphor plays a role in controlling some basic mental activities in everyday life.
The rhetorical metaphor ‘She is a rose’ is, in practice, useful as a measure of understanding. The speaker can understand her beauty or gracefulness by seeing her as a rose. In everyday life, however, the speaker also uses other kinds of metaphor for understanding alone and not for embellishment. We will call these “cognitive metaphors.” Cognitive metaphors have two outstanding features. One is that most cognitive metaphors, if not all, are unconsciously and automatically used. Cognitive metaphors are so deeply entrenched in speakers’ ordinary conceptual system that their metaphorical properties are no longer apparent. The other is that cognitive metaphors are founded on basic concepts in space and movement. This second feature makes most cognitive metaphors understandable across different languages and cultures. For example, ‘to bring someone around’ in ‘They will do everything to bring her around to their point of view’ is a cognitive metaphor, and, in English, many cognitive metaphors appear in the form of idioms. The English speaker uses ‘to bring someone around’ to mean ‘to cause someone to change their opinion about something so that they agree with you’ without paying any special attention to ‘around’ to mean that something turns on its axis. There is no Japanese equivalent which has the same linguistic structure as ‘to bring someone around’, but, with some appropriate translation, most Japanese speakers can understand its meaning and structure because ‘bring’ and ‘around’ are concepts involving space and movement. On the other hand, the compound verb ‘marumekomu’ (to wheedle someone into something) which is a cognitive metaphor in Japanese, can be divided into ‘marume-’ (to make a ball, to curl up, or to roll up) and ‘komu’ (to do completely). There is no English equivalent which has the same linguistic structure as ‘marumekomu’, but, again, with some appropriate translation, most English speakers can understand its meaning and structure because of ‘marume-’ (to make a ball, to curl up, or to roll up) being a basic movement.

Cognitive metaphor crystallises understanding in the mental space by giving linguistic forms to the speaker’s cognitive processes to make sense of an object or event in the real world. Sato (1993: 200-204) states that the speaker grasps new concepts through the formation of (cognitive) metaphor. Although the speaker unconsciously and automatically uses cognitive metaphor in everyday life, its formation is likely to be intricate and profound, because the speaker’s cognitive processes for making sense of the object or event are varied even in a given language and culture. In order to manage various cognitive
processes and give linguistic forms to them, cognitive metaphor makes use of an iconic relationship between two concepts.\textsuperscript{35} By using similarity, the speaker connects two properties, each of which belongs to one of the two concepts. The speaker compares two properties and regards them as equivalent. At the same time, the speaker throws light on the analogy between the two concepts. The speaker connects the whole images associated with each concept. These two stages allow cognitive metaphor to be a useful tool of metaphorical understanding. For example, the cognitive metaphor ‘to bring someone around’ consists of two stages. One is the stage where the speaker regards two properties, “changing the hearer’s opinion” and “changing the direction of the hearer towards the speaker” as equivalent. The other is the stage in which the speaker connects two images, “Someone changes opinion” and “Something turns around.” Combining these two stages, the speaker achieves the concept PERSUADING with the linguistic form ‘to bring someone around’.

2.3.2.2 Existence of conceptual metaphor

Speakers do not create new cognitive metaphors out of thin air. Rather, the ability to regard something as something else, which they learn as they acquire their native language, disposes them to particular ways of creating new cognitive metaphors. Within the restrictions of cultural context, existing knowledge and the structure of the language, speakers are able to see something as something else. For this, there must be some standards and patterns specific to a given language and culture.

The main structure of a metaphorical extension in which the source extends to the target is called conceptual metaphor.\textsuperscript{36} Conceptual metaphor connects two independent things such as a concrete object and an abstract notion, and its structure is propositional. For instance, the metaphorical expression ‘Anger made her blood boil’ is based on the conceptual metaphor ANGER IS HEAT. This conceptual metaphor not only establishes one metaphorical expression but also enables the speaker to understand a particular kind of anger related to HEAT. Conceptual metaphor thus contributes to the speaker’s

\textsuperscript{35} An iconic relationship incorporates the properties of analogy and similarity (see 2.1.4.1 and 2.3.1.2).

\textsuperscript{36} Conceptual metaphor was suggested by Lakoff and Johnson (1980) as a metaphor of understanding one thing in terms of another.
understanding, supporting the cognitive processes in which complicated and abstract things can be converted to simple and concrete ones. The speaker understands a particular kind of anger by regarding ANGER and HEAT as equivalent, through the similarity of rising temperature.

There are many and varied conceptual metaphors. Underlying these conceptual metaphors is the speaker’s direct and indirect experience, and various aspects of experience create different conceptual metaphors. Some of them are individual or culture specific, and others are universal to all speakers (Sweetser 1990: 45). The fundamental fact that there is a great variety of conceptual metaphors means that the speaker has a number of options available for understanding a certain object or event. When a speaker sees someone getting very angry, for example, he or she uses the metaphorical expressions ‘Anger made her blood boil’, ‘He let out his anger’ and ‘They are battling with anger’ which would have the underlying conceptual metaphors ANGER IS HEAT, ANGER IS PRESSURE and ANGER IS AN OPPONENT respectively.

Conceptual metaphor exists not only in rhetorical metaphors but also in cognitive metaphors. For instance, under the cognitive metaphor ‘to bring someone around’, there exists the conceptual metaphor CONVINCING IS TO CHANGE DIRECTION. It may not be easy to define conceptual metaphors under cognitive metaphors because their simple structures, which rely on basic concepts in space and movement, lend themselves to many possible conceptual metaphors.37

Some researchers have criticised the arguments for the existence of conceptual metaphor. One criticism is that, in using old metaphors in existing knowledge, the speaker does not always need to recall the underlying conceptual metaphors (e.g. Gibbs 1994: 9, Steen 1994: 22). This may be a reasonable idea in that the speaker does not usually think about conceptual metaphor consciously and instead uses old and preferred metaphorical expressions automatically.38 Presumably in idiomatic expressions the underlying conceptual metaphors can be lost from the language altogether.

37 Underlying the cognitive metaphor ‘to bring someone around’ are further conceptual metaphors such as CONVERSION IS TURNING and CONTROL IS TO CHANGE DIRECTION.

38 Bortfeld and McGlone (2001) claim that “Whether the interpreter will employ a conceptual metaphor processing set depends critically on the operative time constraints in the interpretational context, as well as on the goals of the interpreter.”
Another criticism is that conceptual metaphors are merely conjectures crystallised as afterthoughts by researchers (e.g. Murphy 1996, Quinn 1991). This comes from the viewpoint that, although the speaker would have conceptual metaphors (e.g. ANGER IS HEAT) in using particular metaphorical expression (e.g. ‘Anger made her blood boil’), researchers can only conjecture the conceptual metaphors from the speaker’s use of the metaphorical expressions. Presumably it is more than plausible, but it is true that conceptual metaphors such as ANGER IS HEAT are constructs of the researchers. However, conceptual metaphors are still useful in the study of metaphorical understanding. Even if conceptual metaphors are merely conjectures, they succeed in representing the main structure of a metaphorical extension. An important point here is that we can analytically rediscover and reconstruct conceptual metaphors. It is by rediscovering conceptual metaphors that we can investigate and understand the structure of metaphorical extensions.

2.3.3 Structure of metaphorical understanding

Metaphor has various forms and meanings. Metaphorical understanding allows the speaker to cope with a vast number of objects and events in the real world. The most basic functions of metaphorical understanding are to find iconicity between existing information and new information. What particular structure of metaphorical understanding allows these functions to be brought about?

In this section, we discuss the proposal that metaphorical understanding has a hierarchical structure and that it consists of different levels of cognitive processes.

2.3.3.1 Hierarchical structure

Some metaphorical extensions based on fundamental concepts in space and movement are easier to understand cross-linguistically, while others are difficult to understand. We propose to represent this as a vertical hierarchical structure. We assume that at the lower level are those extensions based on concepts in space and movement which are universal.

The English rhetorical metaphor ‘She is a rose’ has similar meanings in several other languages and cultures. Usually this metaphor represents her beauty or gracefulness, but
we can imagine that in another culture this might mean that she is sharp or severe because roses have thorny stems. Thus, the metaphor can be interpreted in various ways. The cognitive metaphor ‘to bring someone around’ in ‘They will do everything to bring her around to their point of view’ is easy to understand, not only for English speakers but also for Japanese speakers. ‘To bring someone around’ can take the meaning of ‘to cause someone to change their opinion about something so that they agree with you’ in both English and Japanese. Of course, the fact that a cognitive metaphor is easy to understand in English and Japanese does not mean that it will be easy to understand elsewhere. As discussed in 2.3.2.1, however, cognitive metaphors are based on fundamental concepts in space and movement, and most of them have great potential for being understood across different languages.

The difference between rhetorical and cognitive metaphors can be represented as a vertical structure in which rhetorical metaphors are placed at the higher level and cognitive metaphors at the lower level. This follows Cienki’s (1998) suggestion that metaphorical extensions in a given language have hierarchical structures, where lower level extensions are more common and higher level ones are more specific to the language. In general, what is in the lower level of the vertical structure is easy to see and what is in the higher level is difficult to grasp. Lower level extensions are shared cross-culturally because they are based on fundamental concepts in space and movement. However, higher level extensions are more likely to vary across cultures because they develop freely according to the individual speaker’s cultural context and existing knowledge. Figure 2.4 below shows the hierarchical structure of metaphorical extensions.

---
39 Neumann (2001) shows that German and Japanese metaphorical understandings based on embodied experience are very similar to each other.
The lower and higher levels exist in the speaker’s mental space, and in practice, it is impossible to distinguish them precisely. It is also impossible to divide rhetorical metaphors and cognitive metaphors absolutely. The most important aspect of Figure 2.4 is that the vertical structure of metaphorical extensions consists of two levels: the lower and higher levels, and cognitive metaphors exist at the lower level and rhetorical metaphors at the higher level.

In order to investigate the structure of a given metaphor, we can capitalise on the conceptual metaphors underlying it. For instance, under the cognitive metaphor ‘to bring someone around’, there is the conceptual metaphor CONVINCING IS TO CHANGE DIRECTION. This conceptual metaphor is partly based on an image schema TURNING, which we shall discuss further below, and it exists in the lower level (A_A’ in Metaphor A) in Figure 2.4. In the rhetorical metaphor ‘She is a rose’, the conceptual metaphor BEAUTY IS A ROSE is seen. This is in the higher level, as shown in Metaphor B₁ (B_B’), because it is a specific and elaborate conceptual metaphor in certain cultures (e.g. English and Japanese cultures). Furthermore, BEAUTY IS A ROSE is not the only plausible conceptual metaphor, others such as SHARPNESS IS A ROSE may also exist (B_B’’ in Metaphor B₂). In the higher level, metaphorical extensions are influenced by the speaker’s cultural context and existing knowledge to a greater extent than those in the lower level.
What are the basic concepts in space and movement which enable lower level extensions to be shared cross-culturally? The answer has much to do with the speaker’s experience. Upon encountering a new object or event in the external world, the speaker usually understands it through his or her previous experience. The speaker, however, does not always use his or her concrete experience, and, instead, uses image schemata in order to save time and energy in understanding. Johnson (1987: xiv) considers an image schema to be “a recurring dynamic pattern of our perceptual interactions and motor programs that gives coherence and structure to our experience.” Ungerer and Schmid (1996: 160) define image schemata as:

1) simple and basic cognitive structures which are derived from our everyday interaction with the world
2) not just an abstract semantic principle, but a mental picture which is more elementary than both concrete categories and abstract principles

Image schemata are simple and basic in that they are based on the speaker’s direct and regular experience, and are elementary in that they involve simplified mental pictures.

A number of researchers have proposed various image schemata such as WHOLE-PART, CENTRE-PERIPHERY, IN-OUT, UP-DOWN, FRONT-BACK and RIGHT-LEFT, which are all bi-polar. Some researchers (e.g. Johnson 1987, Krzeszowski 1993, Lakoff 1987, Ross 1993, Turner 1993) have given BALANCE, LINK and GOAL, which also have opposite concepts such as NO BALANCE, NO LINK and NO GOAL. In addition to the above definitions, another important feature of image schemata is that they are all based on spatial movement or on a bodily sense of spatiality. This feature enables lower level extensions to be shared cross-culturally. We assume that all normal speakers experience spatial movement or a bodily sense of spatiality.

Lakoff and Johnson (1980: 56) explain that the speaker’s body and his or her interaction with the environment create the basis of spatial movement or bodily experience. The structure of the speaker’s body is such that his or her head is at the upper extremity of the body and his or her feet are at the lower end, with distinctions of right and left, and of front and back. The position of the speaker can change in the environment: at the centre
or periphery of something, and in linking or touching to something. Through these basic spatial movements or bodily experience, the speaker consciously and unconsciously obtains image schemata which represent the functions of the body and the relations between the speaker and the environment.

Once image schemata have been formed as basic cognitive frameworks in the speaker’s mental space, they play an important role in understanding an object or event. For instance, many speakers recognise the concept STABILITY in Circle, (equilateral) Triangle (with a wide bottom) and Square. STABILITY here represents ‘to remain in the same concrete or abstract state’, and it involves underlying image schemata such as BALANCE and RIGHT-LEFT. These image schemata help the speaker to understand the concept STABILITY. Another image schema, TURNING, underlies the cognitive metaphor ‘to bring someone around’. The scene ‘Someone turns around’ is based on TURNING, leading to the conceptual metaphor CONVINCING IS TO CHANGE DIRECTION, which involves the change of both the direction of the hearer towards the speaker and the change in the hearer’s opinion. The image schema TURNING allows the speaker to give the meaning ‘to persuade’ to the cognitive metaphor ‘to bring someone around’.

2.3.3.3 Idealised Cognitive Models (ICMs) and cultural experience

What places rhetorical metaphors at the higher level in the vertical structure of metaphorical extensions, which is claimed to be culture specific? The higher level is different from the lower level in which spatial movement and bodily experience play a leading role. Nonetheless we suggest that the higher level is still closely connected to the speaker, and is a developed version of the lower level. This is not only because these two levels compose the vertical structure, but also because all metaphorical extensions, in the lower or higher level, take place within the speaker’s mental space.

We propose that Idealised Cognitive Models (ICMs)\(^4\) place rhetorical metaphors at the higher level. ICMs are cognitive frameworks, and are more specific to a given language or culture community than image schemata. ICMs are created and used by the speaker in

\(^4\) ICMs are treated as schemata by some researchers. A schema, which is often used as a concept in text linguistics and discourse analysis, is knowledge and experience which has been stored in the speaker’s mental space and has a great influence on the speaker’s thought and action (Carrell and Eisterhold 1983, Lange 1981, Yoshida 1995).
recognising and understanding an object or event. By using ICMs, the speaker defines and characterises an object or event, and instinctively acts within so doing (Lakoff 1987: 68-76). ICMs are basic kinds of mental resources, from which the speaker can spontaneously extend other concepts with minimal effort. For instance, most English speakers understand the meaning ‘She is beautiful’ from the metaphor ‘She is a rose’. The metaphorical extension which is based on the conceptual metaphor BEAUTY IS A ROSE, forms an ICM. On the other hand, while modern Japanese speakers use the same metaphor, in earlier times its Japanese equivalent was the metaphor ‘She is a peony/lily’. For earlier Japanese speakers, a peony/lily was equivalent to something beautiful. The metaphorical extension, which was based on BEAUTY IS A PEONY/LILY, formed an ICM. The difference between these two ICMs has to do with the appearances of roses or peonies/lilies, but mainly comes from the presence of these flowers in the environment surrounding the English and Japanese speakers.

In the formation of ICMs, metaphorical extensions in the mental space are brought about with little effort. The speaker chooses metaphorical extensions with “optimal relevance” (Sperber and Wilson 1995) to the environment in which the speaker is usually involved. In metaphorically understanding an object or event, the speaker usually pays attention to the more relevant extensions which give greater cognitive effect with the least cognitive load. The term “idealised” in ICMs shows that the speaker can effectively and effortlessly extend concepts in the environment. In the above examples, for the Japanese speakers, before major contact with the rose, the peony/lily would have been more easily recognised in the environment and more feasibly regarded as something beautiful than other flowers. These days, the rose is one of the most familiar flowers to both English and Japanese speakers, and they conceive of the equivalent of something beautiful in the environment as a rose, with little cognitive effort.
2.4 Summary and assumptions

The study of concept formation through iconic metaphoric extensions is a study of cognitive processes. In order to compare cognitive processes between different languages or cultures, we need to use objects which have cognitive universality and high iconicity. Basic and simple shapes have both of these features and are thus ideal objects for the study of concept formation.

The human visual system is the starting point for cognitive processes, where the speaker sees the external world, making full use of the profiling system which consists of the viewpoint, focal point and extent of profiling. Seeing leads to understanding by way of categorisation. SEEING-AS in basic shapes is based on metaphorical extensions from geometric features to other features.

Metaphor plays a crucial role in understanding an object or event in the real world not only as a figure of speech but also as a figure of thought. All metaphorical extensions have underlying conceptual metaphors and may be classified as lower or higher level in a vertical structure of metaphorical extensions.

Carrying forward the study of concept formation through iconic metaphorical extensions, we make the following three assumptions:

1) Concept formation through iconic metaphorical extensions is a cognitive process in which the speaker attempts to metaphorically understand an object or event in the real world. Iconic metaphorical extensions are supported by the whole and partial connections between the source and the target.

2) Conceptual metaphors, which underlie all metaphorical extensions and are analytically produced, help us to investigate the structure of metaphorical understanding.

3) Basic and simple shapes are ideal objects for this study, because they are universal in the human visual system and are highly iconic. Basic shapes can reflect the speaker’s cultural context and existing knowledge in metaphorical extensions, through cognitive frameworks such as image schemata and ICMs.

These assumptions give us general directions of our empirical study, and based on them, we conduct several descriptive and experimental investigations. The following chapter
discusses the foundations of concept formation in order to make clear what many people believe to be the case about concept formation through iconic metaphorical extensions and to crystallise the points which will be investigated in Chapters 4 and 5.
3 Foundations of concept formation

In the preceding chapter, we considered cognitive universality and iconicity, the visual system and understanding, and metaphor and metaphorical extensions, in terms of the role they play in concept formation. While there are several different ways in which concepts can be formed, I shall focus in this chapter on concept formation based on iconic metaphorical extensions. People create new concepts through metaphorical extensions of existing concepts. Concept formation through metaphorical extensions is a basic mental ability. Before dealing with the role of iconicity, it is necessary to understand what a concept is and what a cognitive process in metaphorical extensions is. I suggest that there are two kinds of concepts, unlabelled concepts and labelled concepts. Using these two kinds of concepts, I will discuss structures and processes of concept formation through metaphorical extensions.

Another important idea for concept formation is that concept formation is the formation of a path between two concepts, where concepts are positioned entities in the mental space. I propose that these paths formed by metaphorical extensions have direction and distance. The direction and distance of these paths proves important in classifying metaphorical extensions.

In discussing concept formation, polysemy is an important issue because polysemy is thought to be the result of concept formation through metaphorical (or metonymical) extensions (e.g. Bartsch 1998, Johnson 1987). Polysemy, in which one linguistic form has multiple meanings, allows us to study not only the relationship between the linguistic form and its related meanings but also concept formation through metaphorical extensions.

In this chapter, I will present the importance of and the relationship between concept and concept formation, paths in concept formation, and polysemy.

3.1 Concept and concept formation

1993). The process consists of creation, extension, or transformation of mental pictures and linguistic forms. We are interested in extensions between mental pictures which support metaphorical extensions. By utilising iconicity between two (or more) mental pictures, the speaker is able to connect two (or more) existing concepts. The linguistic forms refer to the mental pictures which are needed for connecting the two concepts. The presence or absence of a relationship between the mental pictures and the linguistic forms leads to the idea that there are two kinds of concepts, i.e. labelled concepts and unlabelled concepts. Concepts with a corresponding linguistic form are labelled concepts and those without a corresponding linguistic form are unlabelled concepts.

In this section, we see how concepts can be divided into unlabelled and labelled concepts and how concepts are formed through “iconic metaphorical extensions,” and consider the idea that concepts are formed through repetition.

3.1.1 Definition of concept

What is a concept? To answer this question, Bartsch (1998: 1) introduces a traditional definition: a concept is the “mental representation or reconstruction of properties, relationships, regularities and contiguities in the world, experienced or stated in theories.” People seem to base mental representations or reconstruction of this kind on their own experience. Lakoff and Johnson (1980: 56-60) state that concepts are both experiential and metaphorical. This suggests that concept formation is partly based on metaphorical extensions. In this study, we are dealing with concepts which are provided through metaphorical extensions, focusing on the iconicity between the source and the target. In practice, however, it is difficult to distinguish concepts which are based on metaphorical extensions from those which are based on experience. Most concepts are in fact based on both metaphorical extensions as well as on experience (Howard 1992). We must consider both metaphorical and experiential concepts in order to understand exactly what a concept is.

3.1.1.1 Concept in the mental space

We suppose that concepts exist along with the speaker’s cultural context and existing
knowledge and that concepts are founded on the speaker’s everyday life experience. Whorf (1956: 266) claims, quoting three causal verb-forms in the Coeur d’Alene language, that:

If given a more sophisticated culture, their thinkers erected these now unconscious discriminations into a theory of triadic causality, fitted to scientific observations, they might thereby produce a valuable intellectual tool for science. WE could imitate artificially such a theory, perhaps, but we could NOT apply it, for WE are not habituated to making such distinctions with effortless ease in daily life. Concepts have a basis in daily talk before scientific workers will attempt to use them in the laboratory.

In a given language or culture, concepts are based on the speaker’s everyday life. That is, the concepts which exist in the speaker’s mental space, are closely related to objects or events in the real world.

Bartsch (1998: 64, 91) states that concepts represent “a structural set of data” and “information about the conditions of application of an expression.” Her claim successfully represents two aspects of a concept. A concept organises data in the speaker’s everyday life and also controls the use of linguistic forms which are assigned to these data. What enables concepts to perform these functions? We assume that categorisation in each speaker’s context plays a crucial role in the way they form concepts. Let us consider categories and concepts for a moment.

Categories and concepts are similar in that the speaker forms both of them in an attempt to make sense of an object or event in the real world. Categories are constituted generally so that the members of each group are similar to each other in some way. Can we distinguish these groups clearly? Cognitive linguists propose that categories have a great deal of flexibility and their boundaries are ambiguous per se (Gibbs 1994: 52, Ungerer and Schmid 1996: 16). This flexibility and ambiguity plays an important role in the characterisation of categories. Prototype theory claims that categories have fuzzy boundaries (e.g. Aitchison 1987, Fauconnier 1985, Gunji et al. 1998, Taylor 1989, Ungerer and Schmid 1996, Yamanashi 2000). Members of a category are characterised by having common attributes. The more attributes a member shares with other members of the category, the more prototypical that member is. A radial category is formed by putting the prototypical member at the centre and the other members at the peripheries. At the centre of the radial category, the attributes of the members are stable, but, at the periphery they are unstable, diversifying the members at the peripheries. What is considered as a
prototypical member of a category differs from society to society. For instance, a prototypical member of the category FRUIT could be an apple, an orange, a banana. This is because what are taken to be the significant attributes of the prototypical members (e.g. vegetation, taste, or nutrient) can change from society to society. Prototypes are designed to meet cognitive needs in certain cultural communities. Categories are thus flexible and highly dependent on the speaker’s involvement with the environment.

We have so far claimed that concepts exist in the mental space. Fauconnier and his colleagues have used “mental space” for a cognitive field which is created when the speaker thinks or talks about context and background knowledge (e.g. Coulson and Oakley 2000, Fauconnier 1985, Fauconnier and Turner 1996, Sweetser and Fauconnier 1996). Mental spaces are “small conceptual packets” (Fauconnier and Turner 1996). The speaker can create and retain concepts by using networks which consist of mental spaces related to those concepts. According to their claim, the target and the source in metaphorical extensions produce a kind of mental space, in which the two domains are connected through metaphoricity. This idea shows that a concept which is made through metaphorical extensions is in fact a mental space. However, in the approach adopted for this study, the mental space is a kind of cognitive space which is much larger than the mental space of Fauconnier, and consists of a vast number of different “small conceptual packets.”

3.1.1.2 Concept and language

Concepts are based on the speaker’s everyday life, and are supported by the speaker’s everyday language. Of course, concepts without a corresponding linguistic form exist as mental pictures. For example, pre-linguistic infants usually have concepts such as [a carer] and [mother’s milk] as mental pictures, without any linguistic information. However, most concepts are usually accompanied with a piece or pieces of linguistic information. What is the relationship between concepts and language per se? To answer this question, we must consider linguistic relativity, since different languages may create different concepts or have different ways to form concepts.
Languages clearly demonstrate the existence of concepts (Wierzbicka 1995). Wierzbicka puts special emphasis on lexicalisation of concepts in a society and claims that the presence of a word indicating a certain concept is reliable evidence for the existence of that concept in a language society. While the existence of a concept can be proved by the presence of linguistic forms for that concept, the absence of such forms does not always prove the non-existence of the concept. The presence of linguistic forms might not be a prerequisite for the existence of concepts, but it does play a decisive role in creating and retaining concepts in the mental space.

A piece or pieces of linguistic information which are attached to a concept can be regarded as a name (or a label). The relationship between concepts and their names is arbitrary. In general, when something indicated is flexible or unstable, indicators appear in order to fix or stabilise it. These indicators would be names for concepts. For instance, the names ‘apple’ in English and ‘ringo’ in Japanese both represent the concept APPLE. APPLE has a number of attributes (e.g. size, colour and taste), but ‘apple’ and ‘ringo’ enable APPLE to be represented in certain ways. When the speaker wants to represent a certain concept (e.g. A BIG RED JUICY APPLE) precisely, the speaker generally uses a longer name (e.g. ‘a big red juicy apple’ in English or ‘ookina akai sinsenna ringo’ in Japanese). The relationship between the concept and the longer name is still arbitrary.

There are some reasons why concepts are named using linguistic information. Naming is a way of understanding (Yamadori 1998: 181-182). According to his view, by giving names to various conceptual representations, the speaker can categorise them in the mental space. We have already considered the connection between categorisation and understanding (see 2.2.2.1). Importantly, naming creates categorisation; categorisation does not bring about naming, i.e. the speaker can categorise something without having a name for it. To name a concept is to bring its properties together. For example, an English speaker can categorise MANGO without having its name. In this stage, MANGO may not be clearly distinguished from PAWPAW (PAPAYA) in some properties (e.g. size and colour). Once the speaker gives the English name ‘mango’ to MANGO, all properties (e.g. size, colour, taste, and the size of, and the number of, seeds) which he or she knows at that time converge under the name. The name ‘mango’ enables him or her to categorise MANGO more clearly. Moreover, naming concepts allows the speaker to refer to and to repeat
existing concepts easily. By using the English name ‘mango’, for instance, English speakers can refer to and repeat MANGO in different contexts. Finally, naming concepts contributes to the sharing of concepts in a certain language community. When the name of a concept is adopted by members of the language community, not only the name but also the concept itself can be shared by the members.

A name represents a concept. However, the names cannot completely fix the concept nor make clear its boundary. If names did make concepts fixed or their boundaries clear, the speaker would have to create endless names to represent variation in minute shades of meaning within concepts. When the speaker uses a name to represent a concept, he or she may only intend to evoke one part of the concept. We will call this feature of the use of names the “partiality of the use of names.” For instance, APPLE consists of various attributes such as a shape, colour, size, taste and smell. The name ‘apple’ in English or ‘ringe’ in Japanese can evoke the shape and colour of APPLE for painting and the taste and smell of APPLE for eating.

3.1.1.3 Concept and basic shapes

Concepts of basic shapes are generally dealt with as abstract notions in geometry, and are often used in the speaker’s everyday life. For example, SQUARE is a concept which can be geometrically defined as a shape with four sides that are all the same length and four corners that are all right angles, and this concept may be evoked for a speaker when he or she sees a flat open space in a town or city.

By using concepts of basic shapes the speaker represents many objects or events, and, at the same time, he or she extends concepts of basic shapes to other concepts. For example, a speaker represents a mountain or a pyramid by using TRIANGLE, and extends TRIANGLE to A LOVE TRIANGLE. The former is attributable to the iconic relationship between a concrete object and a concept, while the latter is supported by an iconic metaphorical extension between two concepts.¹

As with other concepts, the linguistic information assigned to basic shapes consists simply of names (or labels). Naming basic shapes in this way allows the speaker to refer to

¹ For a discussion of iconic relationships, see 2.1.4.1 and 2.3.1.2.
concepts of basic shapes and to share them in a given language or culture community. The partiality of the use of names does hold true in concepts of basic shapes. A name assigned to a particular basic shape can represent both one part of the concept of that basic shape and one part of concepts related to that basic shape. The English word (name) ‘Circle’, for instance, can be used to evoke particular parts of the concept CIRCLE: one part of a geometrically defined shape (a shape consisting of a curved line completely surrounding an area, a symmetrical shape consisting of a curved line) and metaphorically (or metonymically) extended properties (a round flat piece or area of something, a group of people meeting each other regularly, an area of seats of the upper floor in a theatre).

If names for a certain basic shape in two languages (e.g. ‘circle’ in English and ‘maru’ in Japanese) are both used to express a concept defined in the science of geometry (e.g. CIRCLE defined as a shape consisting of a curved line completely surrounding an area), we can make use of the names in order to compare cognitive processes associated with the basic shape in the two languages. Geometric definitions must overlap considerably, even if the linguistic forms used for these definitions differ between two languages.

3.1.2 Concept formation

In this section we examine how speakers form concepts and what the structure of concept formation is. These questions are broadly based on the speaker’s everyday life. The processes of neurochemistry or neurophysiology involved are beyond the scope of this study. We would like here to consider therefore the speaker’s involvement with the environment, mainly through metaphorical extensions.²

In this section, we deal with how metaphorical extensions contribute to concept formation by looking at processes of categorisation and lexicalisation. Then, we consider the structure of concept formation which consists of one conceptual metaphor and utilises iconicity to link two existing concepts.

3.1.2.1 Basis of concept formation

² We discussed metaphorical extensions in metaphorical understanding (see 2.3). We consider iconic metaphorical extensions in concept formation later in this section (see 3.1.2.2).
To consider concept formation is to consider the processes which operate to form such concepts. Concept formation, in our opinion, consists of two processes, viz. categorisation and lexicalisation. One categorises an object or event in the real world, and then names it. In other words, concept formation stabilises the representation of the chaotic real world through categorisation and lexicalisation. These two processes take place in the speaker’s mental space, and one important point to note is that they are based on the speaker’s everyday life. A (new) concept is created in a given context, and the concept and the name assigned to it are necessarily affected by the context (Bartsch 1998: 49). Concepts are formed in certain contexts, so that the way in which the speaker is involved in the environment is projected onto concept formation. Take the concept BIRD for example. BIRD may have a robin or a pigeon as its prototype. Or it may evoke the concept of poultry. BIRD may also include a bat in certain contexts. These possibilities all depend on the speaker’s cultural context. The differences in context can have a great influence on concept formation.

Before we consider the processes of categorisation and lexicalisation, it will be useful to discuss the grounds for concept formation. Concept formation is largely based on the connection of two (or more) existing concepts which are already stored in the mental space. Bartsch (1998: 33) argues that what is important in connecting concepts is the similarities or differences between those concepts. According to her view, concept formation is a reconstruction of properties in the real world, and, in order to make this reconstruction, the speaker must pay attention to similarities (or differences) between existing concepts. This leads to concept formation through metaphorical extensions. In metaphorical extensions, existing concepts are connected by similarity and analogy between them. Of course, there are other ways of concept formation. For instance, pre-linguistic infants form the concept DOG when they first encounter a dog. This appears to be based on their direct experience. However, the formation of this concept is probably assisted by concepts they may already have such as CARER as a living creature, and STUFFED TOY ANIMAL as a furry object. In the case of adults, they usually form new concepts by using existing concepts together with their direct experience. In this section, we restrict our concern to concept formation based on metaphorical extensions, rather than that based on direct experience. It is neither easy nor fruitful to precisely distinguish
concept formation based on direct experience from that based on metaphorical extensions, as they are closely related.

Consider now the process of categorisation. Concepts are categories (see 3.1.1.1) and thus the process of concept formation is the process of categorisation. Categorisation, to put it simply, is to divide the environment into various classes in which particular members can be dealt with as though identical (Medin 1983, Rosch et al. 1976). These classes are not stable, and the members can change from class to class. Remember that categories are intrinsically flexible and that their boundaries are ambiguous. There is a great deal of variety in classification, so we must consider what causes this variety. The answer is the speaker’s context. In a particular context, which is sufficient to form particular categories, the speaker deals with particular members as identical. For example, English speakers normally form the category (or concept) BIRD when they see a creature with feathers and wings in the environment, and distinguish it from MAMMAL or FISH. Some speakers produce ROBIN on seeing a small brown bird with a red throat and breast. POULTRY is formed when the speakers need the concept BIRD for certain kinds of birds that are eaten, and it includes CHICKEN, which is one of the most popular types of POULTRY, and TURKEY, which is served as typical Christmas dinner.

Lexicalisation here means naming concepts with the aim of better categorisation. Lexicalisation contributes to the stabilisation of shifting concepts and to the formation of clearer boundaries between concepts at a particular time and place. In the above example, the concept ROBIN can be referred to by the name ‘robin’ and the name allows the speaker to call to mind that concept. How, then, does the speaker label new concepts?

The speaker has names for many of his or her concepts. For applying names to new concepts, we suggest that there are three main strategies. First the names of already existing concepts can be used. For instance, the English word ‘water bird’ consists of the combination of ‘water’ which is the name of WATER and ‘bird’ which is the name of BIRD. Likewise, the Japanese word ‘mizutori’ (water bird) is the combination of ‘mizu-’ (water) which is the name of WATER and ‘-tori’ (bird) which is the name of BIRD. Second, new names can be invented or borrowed for new concepts. For example, the word

---

3 The word ‘mizutori’ is a native Japanese word.
‘poultry’ is a borrowed name meaning BIRD for certain kinds of birds that are eaten in English. In Japanese, ‘kakin’ (poultry) is a borrowed name for BIRD for certain kinds of birds that are eaten. Finally, the names of existing concepts can be assigned. In British and Australian English, for instance, ‘bird’ and ‘chick’ both denote the concept YOUNG WOMAN, and a single name (‘bird’, ‘chick’) can represent a new concept as well as existing concepts (YOUNG WOMAN as well as A (YOUNG) CREATURE WITH FEATHERS AND WINGS).

3.1.2.2 Structure of concept formation through iconic metaphorical extensions

What do we mean when we say that one concept is similar to another? This question necessarily leads us to consider how two concepts are connected to each other in concept formation. The investigation and comparison of linking two concepts guides us into the study of similarity (or difference) between the two concepts. Combining concepts is an important feature of human thinking and metaphor is one of the most effective ways of combining concepts (Gärdenfors 2000:130). In metaphor, we will consider only the unidirectional way of linking concepts. The unidirectional way allows the speaker to form concepts through metaphorical extensions. Focusing on the unidirectional linking in metaphorical extensions, in this section we will discuss iconic metaphorical extensions in which both particular properties and the whole image or scene to which the properties belong extend from the source to the target.

The basic structure of a metaphorical extension is embodied in conceptual metaphors which are represented by the form X IS Y in many cases. By representing the combination of two concepts as X IS Y, we can grasp the various and complex structures underlying metaphorical extensions. Let us consider for a moment the implications of the basic structure proposed by conceptual metaphors. For instance, in the metaphorical expression ‘She is a rose’, we assume that there is one conceptual metaphor BEAUTY IS A ROSE.

This conceptual metaphor succeeds in representing an extension from the whole image or scene of A ROSE to the whole image or scene of BEAUTY. However, that conceptual

---

4 The English word ‘poultry’ is originally derived from the Middle French word ‘pouleterie’ which consists of ‘poule’ (hen), ‘-et’ (diminutive) and ‘-ery’ (class or kind) (Oxford English Dictionary).
5 The word ‘kakin’ is a Sino-Japanese word and consists of ‘ka-’ (house) and ‘-kin’ (bird).
metaphor does not state what property extends from the source to the target. BEAUTY may include properties about her appearance or attitude, and A ROSE may include properties such as a rose bud or a rose with a particular colour. Under BEAUTY IS A ROSE, there can be various combinations of properties between the source A ROSE and the target BEAUTY. Different speakers provide different combinations in different contexts.

As discussed in 2.3.1.2, “iconic metaphorical extensions” are supported by the whole (the whole images or scene) and partial (one or more properties) connections between the source and the target. In the metaphorical expression ‘She is a rose’, a speaker will have in mind properties of different aspects of the concept A ROSE which are connected to the linguistic form ‘a rose’, and likewise the speaker will have in mind properties of different aspects of the concept BEAUTY which are connected to the linguistic form ‘she’. The properties in A ROSE or BEAUTY constitute the whole image or scene of A ROSE or BEAUTY. The metaphorical extension of one (or more) property and that of the whole image or scene from the source A ROSE to the target BEAUTY establish an iconic metaphorical extension. Figure 3.1, as shown below, displays an iconic metaphorical extension in concept formation.
Figure 3.1 Iconic metaphorical extension in concept formation 1

Figure 3.1 shows an iconic metaphorical extension from Concept A to Concept B. No extension between linguistic forms (‘a’ and ‘b’) exists, and each linguistic form is connected to a given property in each concept (a-2 and b-2).Extensions, both between the two properties and between the whole images or scenes which consist of the related properties, establish an iconic metaphorical extension from Concept A to Concept B. Take the metaphorical expression ‘She is a rose’ again. Under this expression, there is an iconic metaphorical extension from A ROSE to BEAUTY which consists of two extensions. One is between a particular property in the source (e.g. the red colour of a rose) and another particular property in the target (e.g. attractiveness), and the other is between the whole image or scene of the source A ROSE and the whole image or scene of the target BEAUTY. In the source, there may be various properties (e.g. the red colour of a rose, a fat rose bud and a bunch of roses) which constitute the whole image or scene of A ROSE, connecting to the linguistic form ‘a rose’. In the target, likewise, there may be many properties (e.g.
attractiveness, loveliness and brightness), which built up the whole image or scene of BEAUTY, connecting to the linguistic form ‘she’.

3.1.3 Existence of two kinds of concepts

Concept formation is based on the speaker’s everyday life, more precisely on the speaker’s everyday language. However, the linguistic forms assigned to concepts are merely ‘names’. Names are only connected to mental pictures, and cannot evoke metaphorical extensions. Although this claim of ours seems to state that linguistic forms do not contribute to concept formation, in practice, the speaker forms concepts making full use of linguistic forms. How, then, does the speaker use linguistic forms and related mental pictures in concept formation?

In this section, we posit the existence of two kinds of concepts, i.e. concepts with linguistic forms and concepts without linguistic forms. Concepts without linguistic forms are mental pictures, while linguistic forms assigned to concepts serve not only as names but also as indicators of mental pictures. The existence of two kinds of concepts will reveal the structure of concept and the process of concept formation through iconic metaphorical extensions.

In this section, we define what we have so far called “properties” of different aspects of a concept (e.g. the red colour of a rose of the concept A ROSE) as being identical to “mental pictures” of different aspects of a concept (e.g. [the red colour of a rose] of the concept A ROSE). The whole image or scene which consists of related properties is thus equal to a group of related mental pictures.

3.1.3.1 Two kinds of concepts: unlabelled concepts and labelled concepts

In this study, we regard concepts without linguistic forms and concepts with linguistic forms as unlabelled concepts and labelled concepts respectively. For instance, pre-linguistic infants first have mental pictures of their mothers’ faces in the mental space. These mental pictures are part of the concept MOTHER. As the infants grow older, they acquire linguistic forms, and combine them with the related mental pictures. Thus, children
acquire unlabelled concepts first, and then assign linguistic forms to the concepts (or some modification of concepts), creating labelled concepts. Take the concept CAT, for example. When pre-linguistic infants form CAT, it is natural to have the mental picture [cat] first because they do not have the linguistic form ‘cat’. We suggest that, as with infants, adults form mental pictures first. Of course, when the linguistic form ‘cat’ is presented to adults, the linguistic form provokes one (or more than one) related mental picture in the mental space. In practice, however, the linguistic form can only help the speaker to recall a mental picture which already exists in the mental space. Labelled concepts follow unlabelled concepts, and cannot exist without a prior and related unlabelled concept.

The relationship between concepts and the linguistic forms assigned to them has already been discussed in 3.1.1.2. Whenever a speaker uses a linguistic form, or a hearer hears a linguistic form, the speaker or hearer selects one mental picture associated with that linguistic form. This view leads to preliminary definitions of an unlabelled concept and a labelled concept as shown below:

1) An unlabelled concept is a mental picture which is not fixed but is mutable and has an ambiguous boundary.
2) A labelled concept consists of one linguistic form and one mental picture, where the use of a linguistic form at a particular time and place indicates one particular mental picture.
3) Multiple mental pictures which are evoked by the use of a linguistic form at different times and places form a group. This group represents the whole image or scene of the mental pictures.

In the above example, the concept CAT is associated with various mental pictures (e.g. [a small, furry animal], [a black cat] and [a tiger]) which in turn are linked to other concepts. These other concepts may be associated with linguistic forms (e.g. ‘a small, furry animal’, ‘a black cat’ and ‘a tiger’), in which case they are labelled concepts, or they may have no associated simple linguistic form, in which case they are unlabelled concepts. When a speaker uses the linguistic form ‘cat’ at a particular time, he or she may call to mind one mental picture [a capricious animal] associated with the concept CAT. That is, he or she may call the labelled concepts A CAPRICIOUS ANIMAL and CAT both to mind. Mental
pictures such as [a small, furry animal], [a black cat], [a tiger] and [a capricious animal] which are associated with the linguistic form ‘cat’ form a group. This group represents the whole image or scene [CAT]. These relationships are displayed in Figure 3.2 below.

![Figure 3.2 Labelled concept 1](image.png)

In Figure 3.2, four mental pictures ([a-1] to [a-4]) constitute a group of the related mental pictures. The linguistic form ‘a’ indicates one of the mental pictures [a-2], and the connection produces a labelled concept.

Bartsch (1998: 70-78, 93) claims that concepts consist of two levels, i.e. an experiential, innate and unconscious level on the one hand, and a theoretical, formal and conscious level on the other. The former develops into the latter, finally creating a concept, and only the latter has linguistic forms. In this view, the two levels constitute a hierarchical structure, and the linguistic forms are given to the developed level. Our view is similar to this view in that a concept is divided into two kinds of concepts and in that pre-linguistic infants start with a mental picture before acquiring its related linguistic form. In our view, however, the two kinds of concepts, unlabelled and labelled concepts, can be placed parallel to each other. For example, a given mental picture (e.g. [a small, furry animal with a tail, whiskers, and sharp claws]) exists in a given group of related mental pictures. The connection of this mental picture and the linguistic form ‘cat’ produces a labelled concept, and the mental
picture remains in the same group without changing its position. Although an unlabelled concept (a mental picture) is part of a labelled concept, the unlabelled concept (the mental picture) does not develop into the labelled concept, but these concepts exist in parallel in the mental space.

In the following two sections, we discuss unlabelled concepts and labelled concepts in more detail.

3.1.3.2 Unlabelled concepts and concept formation

A mental picture is an image or scene which is based on an object or event in the real world. The mental picture is not stable but is mutable. A speaker can freely move from thinking of one mental picture [a small and furry animal] to another [a mewing pet]. Related mental pictures combine together to form a group which is the whole image or scene of the mental pictures. We suggest that mutability in mental pictures is a key factor in considering both what an unlabelled concept and what concept formation are. A speaker can grasp an object or event in the real world through images based on direct experience, and may also comprehend abstract notions through images extended from direct experience (Yamanashi 2000: 139-140). We also suggest that mutability in mental pictures plays a crucial role in understanding both concrete objects and abstract notions. It is mutability in mental pictures that enables different speakers to have different ways of understanding the real world.

As mentioned above, a mental picture is based on the speaker’s experience. All mental pictures result from the speaker’s experience. For instance, infants form the mental picture [mother] or [carer] directly through seeing their mothers’ faces, hearing their voices, smelling and tasting their mothers’ milk, or touching their bodies. This case is one in which direct experience provides an unlabelled concept. In adults, not only direct experience but also indirect experience plays a vital role in forming unlabelled concepts. When producing the concept A LOVE TRIANGLE, adults do not necessarily need to have direct experience of a love triangle. Indirect experience in the form of hearsay, novels or movies about a love triangle is sufficient to produce various mental pictures (e.g. [a group of three people who are each in love with at least one other person in the group], [She is in love with two men
and cannot decide which one to choose] and [He is married but is also having a love affair]). We emphasise the point that the (adult) speaker capitalises on indirect experience in order to form unlabelled concepts. Indirect experience increases the number of mental pictures available and increases the complexity of particular mental pictures. Although direct experience can produce some mental pictures, the direct experience of a single speaker necessarily restricts the mental pictures to a very narrow range.

3.1.3.3 Labelled concepts and concept formation

The most important feature of a labelled concept is that it has a linguistic form which at a particular time can be used by the speaker or the hearer to call to mind a particular mental picture. At a later time, the same linguistic form may evoke in the speaker or the hearer a similar mental picture. In other words, having a linguistic form attached to a mental picture stabilises the picture, that is, the concept.

The stabilisation of mental pictures by linguistic forms provides for the communalisation of both the mental pictures and the linguistic forms. All mental pictures exist in the speaker’s mental space and are thus intrinsically individual. Linguistic forms themselves cannot be shared by speakers in any meaningful way if they are not connected with any mental picture. When a particular mental picture has a connection to a particular linguistic form, and when speakers share that connection, the speakers can share both the mental picture and the linguistic form. This is the communalisation of the mental pictures and the linguistic forms. However, this communalisation cannot be complete. Shared linguistic forms can only provoke similar, not identical, mental pictures in different speakers’ mental spaces, since mental pictures are based on individual direct and indirect experience.

In concept formation through iconic metaphorical extensions, what aspects of the formation do the above features of labelled concepts influence? First, a particular linguistic form of the source stabilises a particular mental picture which extends to another mental picture of the target. In the metaphorical expression ‘She is a rose’, for example, the linguistic form of the source ‘a rose’ indicates a particular mental picture (e.g. [the red colour of a rose]) at a particular time and place. In the target, however, it is not necessary
to give a particular linguistic form (e.g. ‘beautiful’) to provoke a particular mental picture (e.g. [She is attractive]). Second, speakers who share connections between particular linguistic forms and particular mental pictures in a given language community can share the metaphorical extensions which include the connections. In English (and Japanese), for instance, the linguistic form ‘a rose’ is connected to a particular mental picture (e.g. [the red colour of a rose]). This connection serves to establish the metaphorical expression ‘She is a rose’ which means ‘She is beautiful’. If the linguistic form ‘a rose’ is connected to another mental picture (e.g. [the thorny stems of a rose]) in a given language community, this connection leads to the metaphorical expression ‘She is a rose’ which represents ‘She is severe’.

In concept formation through iconic metaphorical extensions, linguistic forms do not seem to play a major role. This is because the things which can extend between labelled concepts are not linguistic forms but mental pictures and groups of related mental pictures. However, labelled concepts are important in that the use of linguistic forms indicate mental pictures required for particular metaphorical extensions. These points are displayed in Figure 3.3.
In Figure 3.3, the mental picture [a-2] extends to the mental picture [b-2], and, at the same time, the group of related mental pictures to which [a-2] belongs extends to the group of related mental pictures to which [b-2] belongs. The mental picture [a-2] is indicated by the linguistic form ‘a’ and both of them establish a labelled concept in the source. Likewise, [b-2] is indicated by the linguistic form ‘b’ and they build up another labelled concept in the target. This results in the basis for an iconic metaphorical extension in concept formation.

3.1.4 Concept formation and repetition

Lakoff (1993) states that repetition of particular metaphorical expressions may support concept formation within a generation and that the repetition by one generation (or more) may affect the thought of the next generation. We here shed light on Lakoff’s first claim.
When a speaker repeatedly uses a particular metaphorical expression at different times and places, does its underlying metaphorical extension change in order to support concept formation through metaphorical extensions? To answer this question, we first consider what repetition is, comparing the repetition of mental activities such as imagining with that of physical activities such as eating. Then we discuss repetition in concept formation.

3.1.4.1 Repeated action in everyday life

To repeat an action is to do it again. This is common to human activities. However, repetition of physical activities (e.g. eating) appears to differ from that of mental activities (e.g. imagining). We here discuss three aspects of repetition - what it is, who carries it out, and what effect it has.

Repetition connects the past with the present. In order to repeat an action, the past in which the action was performed must be linked to the present in which the action is performed again. “I am eating,” for example, describes an action in the present. However, even if I eat something new at a new restaurant, I may call to mind a past experience (e.g. similar foods (appearance, smell, taste, etc.), the order and manner of eating). “To imagine” is similarly connected to a past action. When someone imagines something, his or her imagination must be based on past experience and knowledge.

An actor repeats an action. The action does not recur by itself. The actor repeats it both consciously and unconsciously. Even when the actor repeats an action unconsciously (e.g. eating something while watching television, or daydreaming about something), it is not provided for the actor but is performed by him- or herself. One important point to note here is that the actor has a body. The actor repeats an action through bodily experience and the five senses. “Eating,” including “eating” in the past, is a physical activity, and is iterated directly through the actor’s bodily experience. “Imagining” is a mental activity and is repeated in the mental space within the body. The past experience and knowledge which support the present action of “imagining” have been accumulated through the actor’s bodily experience. Through that experience, the actor connects the past with the present in repeating an action.

6 In this section, an actor indicates an animate object, in particular, a human being.
As a result of repeating an action, the actor obtains not only direct and concrete outcomes (e.g. nutrition or satisfaction by eating something, and ideas and answers through imagination), but also knowledge, methods, and the cognitive abilities which synthesise this knowledge and these methods. In the above example, the actor knows the names and ingredients of particular dishes, ways to eat them, and the special tableware they require through the action of “eating.” In the case of “imagining,” the actor obtains logical thinking through the action of considering that each step must be true if the step before it is true. These kinds of knowledge, methods and cognitive abilities increase in proportion to the frequency of repetition.

3.1.4.2 Repetition in concept formation

The features of repetition discussed above hold true in the two mental activities of connecting a linguistic form and a mental picture and extending mental pictures from the source to the target. In both these mental activities, mental pictures play decisive roles in connecting the past with the present. In any connection of a linguistic form and a mental picture, that mental picture is based on the speaker’s direct and indirect experience in the past. Both when the speaker connects a linguistic form with a mental picture and when he or she connects a mental picture with a linguistic form, his or her direct or indirect experience in the past is related to the mental picture.

In any extension of mental pictures from the source to the target, mental pictures in both the source and the target are based on the speaker’s direct and indirect experience in the past. Although the speaker cannot directly experience the past, he or she can call to mind, think about, and refer to the past by connecting the past with the present through metaphorical, metonymical and other extensions.

The connection of the past and the present immediately raises the issue of the passage of time in concept formation. In a particular labelled concept, a linguistic form is connected to one of several mental pictures for an instant. The passage of time does not allow the speaker to have multiple connections at the same instant, and connections change over time. In a particular metaphorical extension, one of the mental pictures in the source and another in the target are connected for an instant. Again, the passage of time does not
enable the speaker to have multiple metaphorical extensions at the same instant, and extensions change over time.

In addition to the passage of time, we must consider the movement of space. Between the past and the present, there is usually movement in space as well as the passage of time. A linguistic form is connected with a mental picture at a particular place, and the source extends to the target at a particular place. Gibbs (1994: 203) claims that metaphorical extensions are the “products of our bodily experience in interaction with the physical environment and other people.” He (1999: 156) develops this idea, stating that the use of metaphorical extensions is “re-experience” of interaction between the speaker’s body and the environment. The speaker necessarily moves over time, since he or she has a body. In different environments, the speaker has different bodily experiences. Different bodily experiences give rise to different mental pictures and different metaphorical extensions in the mental space.

At different times and at different places, the connection of a linguistic form and a mental picture or an extension of mental pictures from the source to the target is repeated, and the repetition gradually forms a labelled concept or a metaphorical extension. Although it is possible to imagine forming a labelled concept through a single connection at a single time, or establishing a metaphorical extension through a single extension at one single time, it is unlikely. In general, a given concept will be stabilised through repetition. We here propose that the concept will be modified and will develop through repetition. The repetition of a connection of a linguistic form and a mental picture or an extension of mental pictures from the source to the target stabilises the labelled concept or the metaphorical extension.7

3.2 Paths in concept formation

In this section we propose that concept formation can be viewed as path formation in the mental space. In concept formation based on metaphorical extensions, a new concept is created by combining two or more existing concepts. A metaphorical extension leaves a kind of path in the mental space, and, conversely, the path implies the existence of the

7 We shall reconsider this idea using models of concept re-formation in Chapter 6.
metaphorical extension. The relationship between the metaphorical extension and the path may resemble the relationship between people walking through a forest and a path through the forest; the one generally implies the existence of the other.

What paths exist in metaphorical extensions? Are there simple or complex paths, or, short or long paths? While there are a great variety of paths, and it is difficult to draw paths from metaphorical extensions, it is useful to study paths because this leads us to consider not only what the target and the source in each metaphorical extension are but also what the relationship between the source and the target is and how far the source is from the target.

3.2.1 Paths in the mental space

Path formation in metaphorical extensions is necessarily invisible, because metaphorical extensions take place in the mental space. Even if we could see paths, they would appear, and disappear in an instant, because they are processes, not products in concept formation. However, it is possible that there may be traces of paths in metaphorical expressions. Namely, between the source and the target in a metaphorical expression, there must be some traces of the metaphorical extension involved in connecting the source and the target, and thus of the path between them.

Now, in the real world, paths have direction and distance. We suggest that these attributes of paths in the real world are a useful means for understanding metaphorical extensions from the source to the target. We propose that the paths connecting the source and the target in the mental space, also have direction and distance. In this section, we consider what this direction and distance are and how they work in concept formation.

3.2.1.1 Path formation through metaphorical extensions

Part of path formation in the mental space is based on metaphorical extensions. Connections of the source and the target create paths. Turner (1993) proposes that a concept which has already been stored in the mental space can be regarded as “a positioned entity” and that “a positioned entity” holds a certain position in a given domain. If concepts are “positioned entities,” we can speculate that both the source and the target have positions in metaphorical extensions. To connect two positions inevitably leads to
the formation of a path.

There are various paths in metaphorical extensions. Different metaphorical extensions have different relationships between the source and the target. Metaphorical extensions in the mental space are not visible, but they do actually leave some traces in the mental space. How do we recognise these traces? We suggest that commonality of a particular metaphorical extension in a language or culture involves the recognition of the traces and indicates kinds of paths. For example, when we hear the metaphorical expression ‘She is a rose’, we make sense of this expression by hypothesising the target BEAUTY and the source A ROSE. We assume that the metaphorical extension from A ROSE to BEAUTY is a simple and short path because this extension is commonly found in English (and Japanese) culture. In the same example, the metaphorical extension from A ROSE to SHARPNESS may be imagined. This extension is readily recognisable in given cultures, but, in English (and Japanese) culture, we assume that the extension forms a more complex or longer path than the extension from A ROSE to BEAUTY. The relationship between A ROSE and SHARPNESS is uncommon in English (or Japanese) culture. In order to recognise the relationship, a given context in which she is sharp or severe because roses have thorny stems must be provided.

Thus, some paths in metaphorical extensions are simple and short, while others are complex and long. Like paths in the real world, these paths in the mental space have direction and distance. What direction and distance correspond to in the mental space is discussed in the following three sections.

3.2.1.2 Directions of paths

Direction in metaphorical extensions is determined by the relationship between the target and the source in the mental space. We shall use the term ‘direction’ here to denote the unidirectional extension from the source to the target. Metaphorical extensions from the source to the target are always unidirectional. Sweetser (1990: 30) claims that unidirectional extensions create metaphor.\(^8\) For example, underlying the metaphorical

\(^8\) Sweetser argues that metaphorical extensions regarding emotions are “motivated by correlations between our external experience and our internal emotional and cognitive states” and that metaphorical extensions are intrinsically based on unidirectional relationships between the source and the target.
expression ‘He was roundly defeated’ is the conceptual metaphor COMPLETENESS IS ROUNDNESS. The extension has to be from ROUNDNESS to COMPLETENESS because the linguistic form ‘roundly’ is used in the metaphorical expression. A unidirectional extension from ROUNDNESS to COMPLETENESS allows the speaker to understand the meaning ‘He was completely defeated’, and the reverse (from COMPLETENESS to ROUNDNESS) would not lead to that meaning.

We suggest that there may be three kinds of path in metaphorical extensions, i.e. simple paths, complex paths, and indeterminate paths. A simple path is where the line from the source to the target is direct; a complex path is where the path goes in different directions by way of mediating concepts before reaching the target; an indeterminate path is one where the speaker does not know if there are any mediating concepts. These three types of paths are displayed in Figure 3.4 below.

![Figure 3.4 Three hypothesised patterns of paths in metaphorical extensions](image)

First, in the metaphorical expression ‘a love triangle’, we can assume the conceptual metaphor THE POSITIONS OF THREE PEOPLE IN LOVE IS TRIANGULARITY. We propose that this represents a simple path (1 in Figure 3.4) because THE POSITIONS OF THREE PEOPLE IN LOVE can be seen as the three points of TRIANGULARITY. Second, complex paths hold one or more mediating concepts between the source and the target (2a in Figure 3.4). In a complex path, we mean that, between the source and the
target, two paths of different directions are connected by a given mediating concept. Mediating concepts appear in order to bridge a gap between the two domains, when the gap cannot be filled by direct extensions alone. For instance, the two conceptual metaphors CONVENTIONALITY IS NO DEVIATION and NO DEVIATION IS STRAIGHTNESS would underlie the metaphorical expression ‘a very straight woman’. The mediating concept NO DEVIATION succeeds in connecting CONVENTIONALITY to STRAIGHTNESS. Interestingly, mediating concepts sometimes make it possible to change directions of paths, providing different metaphorical expressions. In the above example, NO DEVIATION can extend to HETEROSEXUALITY and brings about the metaphorical expression ‘a straight male’. Mediating concepts can be “forks” in metaphorical extensions and always play a dual role as source and target.

More interestingly, complex paths can be made into simple ones. Two successive paths of different directions can be synthesised into one path (2b in Figure 3.4). The connection of two paths is made so often that speakers do not necessarily think of mediating concepts. For example, the two paths from STRAIGHTNESS to NO DEVIATION and from NO DEVIATION to CONVENTIONALITY can be synthesised into the path from STRAIGHTNESS to CONVENTIONALITY. Likewise the paths from STRAIGHTNESS to NO DEVIATION and from NO DEVIATION to HETEROSEXUALITY are combined into the path from STRAIGHTNESS to HETEROSEXUALITY. One important point to note here is that conceptual metaphors, simple or complex, show possible paths in metaphorical extensions. Conceptual metaphors, which appear to faithfully represent particular paths, can be analytically discovered and reconstructed (see 2.3.2.2).

Finally, the path in the metaphorical expression ‘They have faced the situation squarely’ is indeterminate. Although it is based on a clear target and source (DIRECTNESS and SQUARENESS), it is difficult to choose definite mediating concepts from various possible ones (e.g. RIGHT-ANGLEDNESS, STRAIGHTNESS, FRONT).

It is difficult to compare metaphorical extensions by utilising only the directions of paths, both between different languages and within one particular language. This is because directions in metaphorical extensions may be based on different combinations of the source and the target. In order to use paths as tools for comparing certain metaphorical extensions, we must choose metaphorical extensions which are based on the same source or the same
target. We can view these as paths which have the same starting point or the same goal.

3.2.1.3 Distances of paths

Distance in metaphorical extensions represents the degree of iconicity between the source and the target. For example, it seems intuitively clear that the relationship between ROUNDNESS and COMPLETENESS is strongly iconic; an unbroken Circle is complete. We consider this strong iconicity “short distance.” A short distance between the source and the target shows that the source is more similar to the target in the metaphorical sense, while a long distance means that the source is less similar to the target. Obviously we cannot measure the distance between two concepts because it is not physical. However, distance can be a parameter for measuring the degree of iconic relationship between the source and the target.\(^9\)

As with direction, it is difficult to recognise distance, because there is no unit of measurement for iconicity. Furthermore, it is impossible for the iconicity to be fixed between the source and the target. Namely, a speaker can use the same metaphorical expression in different contexts, but may have different mental pictures in mind for the source and the target in each context. These mental pictures may differ as to how similar they are, and hence groups of the related mental pictures may differ as to how analogous they are. Thus, the iconicity between the source and the target, even in one metaphorical expression, can change according to the speaker’s cultural context or existing knowledge. We conceive of this change in iconicity as a change in distance between the source and the target.

If the starting point and the goal are clear, it does not require much mental effort to deduce the direction of the path. However, the more different psychologically the source and the target are, the greater the mental effort to connect the source and the target is, just as travelling a long distance takes more physical effort than travelling a short distance. We suggest that the higher the iconicity between the source and the target is, the shorter the distance between them is. For instance, the distance between THE POSITIONS OF

---

\(^9\) Smith (2002) explains conceptual distance in the polysemy of the German pronominal ‘es’. His conceptual distance is based on the subordinate relationships between the senses.
THREE PEOPLE IN LOVE and TRIANGULARITY in the metaphorical expression ‘a love triangle’ is (psychologically) short, because the iconicity between them is high through the geometric feature ‘with three straight sides and three angles’. This is shown in Figure 3.4 by 1. In the metaphorical expression ‘a very straight woman’, the iconicity between CONVENTIONALITY and STRAIGHTNESS is lower than in the above example, because CONVENTIONALITY and STRAIGHTNESS may have mediating concepts such as NO DEVIATION (2a in Figure 3.4). Even if such mediating concepts do not exist (2b in Figure 3.4), the relationship between CONVENTIONALITY and STRAIGHTNESS is indirect in that there are no decisive geometric features which can readily connect the two concepts. Finally, indeterminate distance can be observed in the metaphorical expression ‘They have faced the situation squarely’. The iconicity between SQUARENESS and DIRECTNESS is not clear-cut (3 in Figure 3.4).

Direction and distance of paths in metaphorical extensions are interrelated. As with direction, it is not easy to compare metaphorical extensions by drawing on distance, even within one language. It is intrinsically difficult to compare distances which have no unit of measurement. In this study, however, we would like to use distance as a tool to compare metaphorical extensions. For this, the metaphorical extensions to be compared must have the same source or the same target so that the distances have the same starting point or the same goal.

Such an investigation into direction and distance is carried out in Chapter 5, where we report on the findings from two association tasks which we conducted in order to investigate metaphorical extensions with the same source or target. One task requires the participants to associate words with particular basic shapes (e.g. ‘complete’ with Circle), examining metaphorical extensions with the same source (e.g. Circle). The other requires them to associate basic shapes with particular words (e.g. Square with ‘tidy’), examining metaphorical extensions with the same target (e.g. ‘tidy’).

3.2.1.4 Path formation and two kinds of concepts

Metaphorical extensions between mental pictures form paths. Cognitive flexibility in unlabelled concepts is the basis for the possibility of creating various directions and distances between the source and the target. As discussed in 3.1.3.2, an unlabelled concept
has no form and consists of a mental picture. Extensions of mental pictures between the
source and the target form a metaphorical extension, and, at the same time, also form a
path. How are these basic ideas in metaphorical extensions crystallised in path formation?

In the metaphorical expression ‘a love triangle’, for example, there is a path between
TRIANGULARITY and THE POSITIONS OF THREE PEOPLE IN LOVE. The path
has simple direction and short distance (1 in Figure 3.4). Various mental pictures both in
the target (e.g. [She is in love with two men and cannot decide which one to choose] or [He
is married but is also having a love affair]) and the source (e.g. [a isosceles triangle], [a
right-angled triangle] or [a equilateral triangle]) create simple and short paths between the
two concepts, and support the metaphorical expression ‘a love triangle’.

Next, the metaphorical expression ‘a very straight woman’ has paths of complex
direction and long distance. This is because, between the target CONVENTIONALITY
and the source STRAIGHTNESS, the mediating concept NO DEVIATION may appear.
Again, various mental pictures in each concept help constitute these complex and long
paths (2a in Figure 3.4). STRAIGHTNESS may incorporate [a line which continues in the
same direction] or [a line which does not bend]. NO DEVIATION may include [things
which are not different from each other] or [something without change], and
CONVENTIONALITY may imply [She is normal in her opinions] or [She is conservative
in the way she lives]. The mediating concept NO DEVIATION may be left out of the
paths. In this case, the path is simpler and shorter (2b in Figure 3.4). The metaphorical
expression ‘a very straight woman’ is supported by these paths.

Finally, the path between SQUARENESS and DIRECTNESS in the metaphorical
expression ‘They have faced the situation squarely’ is indeterminate. The path has
indeterminate direction and indeterminate distance (3 in Figure 3.4). Although
SQUARENESS and DIRECTNESS may incorporate [a square shape] and [They have
faced the situation head-on] respectively, it is very difficult to connect them. Nevertheless,
SQUARENESS and DIRECTNESS are regarded as being equivalent in a metaphorical
sense. The way in which indeterminate paths give rise to a metaphorical expression and the
reason why the two concepts can be regarded as equivalent, is not clear at the moment.
These will be important points in discussing models of concept formation through
metaphorical extensions further on in this study.
3.2.2 Concept formation through path formation

This section considers how path formation leads to concept formation. Path formation based on metaphorical extensions in the mental space contributes to concept formation in various ways. First, we discuss the environment surrounding path formation. Path formation is more or less influenced by the speaker’s cultural context. Next, we consider the economy of path formation. The formation of simple and short paths requires less time and less effort than that of complex and long paths. Finally, we discuss the influence of path formation on a speaker. When the speaker forms paths within his or her cultural context, he or she obtains ways of forming concepts.

3.2.2.1 Environment of path formation

The environment in which path formation occurs is the language or culture community to which a speaker belongs. The speaker forms paths in everyday life, whether he or she is aware of them or not. The speaker’s individual character and ability aside, the language or culture community is a decisive factor in path formation.

The speaker learns through experience how he or she can form paths in everyday life. The speaker’s experience is a set of various factors, and Lakoff and Johnson (1980: 81) call the set an “experiential gestalt.” In an “experiential gestalt,” the whole of a speaker’s experience is greater than the total factors in it. It is of great value to distinguish each factor from the whole, presumably because they affect path formation separately. Consider the speaker’s climatic environment, for example. Given that the speaker is an organism, climatic environment is a prerequisite for all experience. Some speakers live in the tropics and others are in frigid climates. Some live by the seaside and others are in the desert. It is safe to say that all these aspects control the speaker’s experience as a whole. At the same time, each type of weather phenomenon (e.g. rain, a storm, and drought) has a direct influence on the speaker’s life experience.

Even though mental pictures associated with a particular concept may be similar between different languages and cultural communities, factors which form the concept are not always similar. Take an example of one sociocultural environment. In English, MELLOWSNESS IS ROUNNESS underlies the metaphorical expression ‘the well
rounded flavour of the wine’, is derived from a sociocultural background in which people ordinarily drink wine. This expression is often used for aged wine. In Japanese, the expression ‘maroyaka na (aji no) sake’ (the mellow (flavoured) rice wine) would be based on MELLOWSNESS IS ROUNDNESS as well. However, sake (Japanese rice wine) is generally drunk soon after it is brewed, and its MELLOWSNESS has nothing to do with a ripening period, as it does in some wine-drinking societies. Although the mellow flavour of wine is similar to that of sake, the factors connected to MELLOWSNESS are different.

Culture also affects path formation, and conversely it is probable that paths, once created in the mental space, have some influence on culture. The relationship between path formation and the environment is interactive. In a given culture, a speaker makes sense of an object or event in the real world through particular paths in the mental space. By sharing these paths, the speaker can share the object or event itself with other speakers in that culture.

3.2.2.2 Economy of path formation

Generally, it takes more time and more effort to travel complex and long paths. We propose that the formation of complex and long paths requires a greater cognitive effort and makes less cognitive effect. Cognitive effort relates to how much mental burden the formation of a given path imposes. Cognitive effect relates to how much mental efficacy the formation of a given path gives rise to. Simplifying paths allows the speaker to form concepts more effortlessly and more effectively.

The difference between short distance (e.g. in ‘a love triangle’) and long distance (e.g. in ‘a very straight woman’) is psychological and accordingly it is not evident whether real differences of distance exist. In metaphorical expressions such as ‘a very straight woman’, is it necessary for the speaker to have in mind mediating concepts (e.g. NO DEVIATION) in metaphorical understanding? Admittedly, in the metaphorical expression ‘They have faced the situation squarely’ which has indeterminate direction and indeterminate distance, some mediating concepts (e.g. SOLIDNESS or RIGHT-ANGLEDNESS) may exist. Nonetheless, the speaker appears not to rely on any extension from the source to the

\[^{10}\text{‘Maroyaka na’ (mellow) derives from ‘maro’ which is an old form of ‘maru’ (circle).}\]
target (from SQUARENESS to DIRECTNESS). These examples may indicate that metaphorical extensions, based on complex and long paths, or on paths of indeterminate direction and indeterminate distance, result in one simple unit of metaphorical extension in which the source simply and directly extends to the target.

As discussed above, metaphorical extensions are supported by iconic relationships between the source and the target. In a metaphorical extension based on a complex and long path, the iconic relationship between the source and the target is weak. The iconic relationship will require the speaker to take longer processing time and it will impose a greater cognitive effort. By contrast, in a metaphorical extension based on a simple and short path, the iconic relationship between the source and the target is strong. The iconic relationship will require the speaker to take shorter processing time and it will impose a less cognitive effort. The speaker usually uses more economical methods in concept formation and instinctively avoids ways that involve long processing time and extra cognitive effort. Metaphorical extensions based on simple and short paths provide the speaker with more economical ways of concept formation.

The speaker learns the economy of path formation through experience, rather than as rules. In “usage based models” which are advocated by Langacker (1987, 1990, 1991), grammar is claimed to have structures which consist of conventionalised units of concrete and natural language and to be a set of schemata for categorising words and sentences. He regards language as a multidimensional and dynamic network, which is produced through the conventionalisation of concrete examples, rather than as a closed system of rules. This view holds true not only in grammar but also in concept formation through metaphorical extensions. The economy of path formation is based on the speaker’s direct and indirect experience. Here, we focus attention on repetition of experience. It is reasonable to suppose that, by repetition of experience, a complex direction turns into a simpler one and a long distance turns into a shorter one. For example, when encountering the metaphorical expression ‘a very straight woman’ first, most speakers probably grasp an iconic relationship between STRAIGHTNESS and CONVENTIONALITY by utilising the mediating concept NO DEVIATION. By reiterating the expression, the expression becomes established in the speaker’s mental space, and, at the same time, the path between the source and the target becomes simplified by skipping the mediating concept.
The economy of path formation is based on “usage-based models” in metaphorical extensions. It results in making the relationship between the source and the target more iconic. Although what is established and conventionalised in the mental space tends to be considered as a kind of rule, we can suggest that it is a kind of model or pattern which has developed through repetition over a long time in a certain language or culture.

3.2.2.3 Repetition of path formation

Path formation using metaphorical extensions between two concepts not only forms a new concept, but also enables the speaker to learn ways of making sense of an object or event in the real world. The speaker creates his or her own models or patterns in the mental space mainly by repeating path formation which is influenced by his or her cultural context and existing knowledge.

Path formation is a cognitive process for forming concepts. Repetition of this process is usually necessary for forming a new concept. For instance, the path from TRIANGULARITY to THE POSITIONS OF THREE PEOPLE IN LOVE underlying the metaphorical expression ‘a love triangle’ can be easily established in the mental space, because the path is simple and short, based on an iconic relationship between the two concepts. Forming a path from SQUARENESS to DIRECTNESS in the metaphorical expression ‘They have faced the situation squarely’ requires repetition because there is a less iconic relationship between the two concepts, where the path has indeterminate direction and indeterminate distance.

As discussed in 3.1.4.2, a metaphorical extension from the source to the target is repeated at different times and at different places. Repetition of path formation is the re-occurrence of patterns of metaphorical extensions in different situations. This view necessarily leads to “usage based models” as mentioned in the preceding section. It is the speaker’s experience that can establish and conventionalise particular metaphorical extensions in a given language or culture. The speaker cannot have totally identical experiences, since all experience exists in different contexts (Akaba 1998b: 72). Furthermore, Akaba states that a unit of the repeated is brought about by repetition. That is, no stable metaphorical extensions exist at the start. To repeat metaphorical extensions in various contexts is to stabilise metaphorical extensions and to form paths in the mental
Repeated use of metaphorical expressions turns complex and long paths into simple and short paths in any metaphorical extension. Thus repeated use of metaphorical expressions with paths of indeterminate direction and indeterminate distance (e.g. ‘They have faced the situation squarely’) leads to simplifying the relationship between the source and the target, creating idiomatic expressions. The simplification is also observed in metaphorical expressions which start out with simple and short paths. For instance, the researcher can see an iconic relationship between the source and the target in the metaphorical expression ‘a love triangle’. However, continued use of the expression may make the speaker oblivious to this iconic relationship which he or she made use of when first using or hearing the expression ‘a love triangle’.

Concept formation through metaphorical extensions is involved with the iconic relationship between the source and the target. In order to consider this view, we focus on mental pictures. In the early stage of concept formation, each group of related mental pictures probably incorporates various kinds of mental pictures. This is because, in this stage, these mental pictures create various possible iconic relationships, which can form necessary and sufficient paths for particular metaphorical extensions. In the course of repeating the metaphorical extensions, these relationships converge on one or more stable relationships in which each group has one or more stable mental pictures. Finally, a limited number of iconic relationships come to connect the two groups. For example, when a speaker first encounters the metaphorical expression ‘the well rounded flavour of the wine’, various mental pictures (e.g. [a round shape], [not angular] or [a symmetrical shape] in the source, and [something ripe], [something balanced] or [something full-flavoured] in the target) can appear and make possible iconic relationships in the speaker’s mental space. Repetition of the expression integrates these relationships into fewer and stable ones (e.g. the relationship between ROUNDNESS and BALANCE) which are supported by stable mental pictures for the speaker (e.g. [a balanced shape] and [something full-flavoured]).

Finally, concept formation by path formation allows the speaker to learn ways to make sense of an object or event in the real world. The speaker seems to be aware of the object or event, and in doing so, he or she attempts to know how to make sense of the object or
event (Schön 1993). Path formation through metaphorical extensions enables the speaker to create a substitute for the object or event itself in the mental space, reflecting the speaker’s involvement with the environment. Based on this idea, several descriptive and experimental investigations are carried out in Chapters 4 and 5, and in Chapter 6, we shall extend the idea of path formation through metaphorical extensions to explain how a speaker controls metaphorical extensions by changing the direction and distance of the paths.

3.3 Polysemy and concept formation

In the preceding sections, we discussed the importance of economy and repetition of path formation in concept formation, and this is related to the creation of polysemous words. In this section, we consider polysemy, polysemous networks, and concept formation through polysemous network formation. Polysemy is assumed to be a way of holding a concept effectively in the mental space. New concepts do not always acquire new linguistic forms. Rather, the new concepts often appear under existing linguistic forms. This is not surprising because, when the target (e.g. BEAUTY) is seen as equivalent to the source (e.g. A ROSE) in a metaphorical extension, a linguistic form of the source (e.g. ‘a rose’ in ‘She is a rose’) is often used for representing the target. Polysemy is the relationship between one linguistic form and its corresponding set of meanings. The study of polysemy leads us to examine another aspect of concept formation through metaphorical extensions.

In some of the meanings of a polysemous word, underlying metaphorical (or metonymical) extensions between the meanings are transparent, while in others they are opaque. Even in the transparent cases, it is not easy to trace their metaphorical (or metonymical) extensions, mainly because of a lack of etymological evidence. However, we must look for evidence to justify positing extensions between the meanings. Positing extensions without evidence does not result in usable data.

3.3.1 Polysemy

The recognition that polysemy is partly motivated by metaphorical (or metonymical)
extensions helps us to study cognitive relativity. Sweetser (1990: 8) claims that polysemy reflects the speaker’s linguistic and cultural backgrounds through metaphorical (or metonymical) extensions. In polysemy, there must be some reflection of cognitive processes of a particular language or culture. There are two ways to study the relationship between polysemy and the speaker’s linguistic and cultural backgrounds. One is to investigate the structure of each polysemous word. We view multiple meanings under one linguistic form as a polysemous network. Some connections among the meanings are transparent, while others are opaque. The other way is to examine the historical changes which brought about a given polysemous network. Every connection has its own history. Some historical changes are easy to trace, while others are difficult, and often impossible to trace.

Polysemous networks are often products which have been in existence for a long time in a given language or culture community. Although it is not easy to investigate structure and historical change in polysemous networks, it would be a significant development for studying concept formation through metaphorical extensions if even some aspects of them could be clearly identified.

3.3.1.1 Polysemous networks

To help us answer the question of what polysemy is, it will be useful to consider two polysemous words. Table 3.5 shows the senses belonging to the entries ‘circle’ in the Collins COBUILD English Dictionary (CED) and ‘maru’ (circle) in the SHIN-JIRIN (Dictionary) (SJD).
The CED gives 9 senses to ‘circle’, while the SJD gives 8 senses to ‘maru’ (circle). At a glance, the connections among the 9 senses in the CED seem to be clearer than those among the 8 senses in the SJD. Can we say that there are some clear (or vague) connections among senses belonging to a polysemous word? Lakoff (1987: 316) defines polysemy in the following way: “Polysemy occurs when a single word has more than one meaning - and when these meanings are systematically related.” Each sense must be systematically connected to at least one other sense, although not all senses necessarily connect to one another. Lakoff (1987: 344) further explains that “The generalizations governing polysemy can only be described and explained in terms of conceptual organization.” What connects
senses in a polysemous word is a kind of cognitive process such as a metaphorical extension. To determine what polysemy is, we must consider the underlying cognitive processes which build up connections between the senses.

We shall represent the senses of a single word which are systematically connected to one another as a network, and we shall call this network a “polysemous network.” Two important aspects of the polysemous network are: the number of senses belonging to one linguistic form and the structure of the connections among these senses. To begin with, the number of senses must be more than one, and there may be indefinitely many senses. It is impossible to know how many senses belong to one linguistic form. There are two reasons for this. First, the senses are not stable. Over time, some senses may be added to a polysemous network, while others may be deleted from the network. Second, there is personal polysemy as well as social polysemy. In social polysemy, there will be a set of senses which are conventionally associated with a linguistic form, and which are thus shared among many people. In personal polysemy, each individual may add one or more of his or her own senses to the shared set of senses in social polysemy to suit his or her convenience, and may fail to acquire one or more of the senses.

The second point concerns the structure of a polysemous network. The senses belonging to one linguistic form are often placed in positions, radiating from one or more primary senses. Some connections among the senses are strong, building meaning groups, while others are weak, separating the senses from one another. Gibbs (1992) proposes the idea that most of these connections are based on metaphorical extensions through “family resemblance.” Consider a set of items of the form AB, BC, CD and DE. Each item has one or more factors in common with one or more other items, but none or very few of these factors are common to all items. Such family resemblance is helpful in understanding the structure of polysemous networks, because, even if some senses in a polysemous network appear to be separated from the primary senses, they invariably have something to do with one or more of the senses. In Table 3.5, for instance, the English senses 5 (to move round in a circle in the air) and 8 (a group of people as a circle when they meet each other regularly), which are not seen to link directly to the first sense (a shape consisting of a curved line completely surrounding an area), are assumed to be connected to 4 (to form a circle around an object or place) and 3 (a group of objects or people arranged in the shape
of a circle) respectively.

In polysemous networks, some connections are transparent, and others are opaque. This does not seem to be a serious problem to the speaker, because he or she does not always pay attention to these connections. Moreover, the speaker does not seem to add senses randomly even in individual polysemy. There must be some restrictions which assist in avoiding complicating the structures of polysemous networks. In the following section, we consider rules or principles in polysemous network formation.

### 3.3.1.2 Polysemous network formation and metaphorical extensions

The number of senses in a polysemous network is not stable and is able to change freely. In order to consider this phenomenon, we must address the question of how a polysemous network is formed. Senses exist in a particular network which is stable in a certain language or culture (Geeraerts 1985). In polysemous network formation, rules or principles must exist so that the particular network can be stable in the language or culture. As polysemous network formation relies mainly on metaphorical extensions, we will seek the rules or principles governing metaphorical extensions.

An investigation of polysemous network formation requires attention to be paid to the conceptual metaphors which are thought to underlie metaphorical extensions. Although conceptual metaphors must exist in all metaphorical extensions, it is not always easy to recognise what they are, in particular when they are deeply embedded or when more than one conceptual metaphor constitutes a metaphorical expression. Take ‘rounded’ and ‘marui’ (round or rounded) for example. The second sense of ‘rounded’ (adjective) in the CED is ‘balanced, with no single aspect or characteristic dominating the others’, while, the third sense of ‘marui’ (adjective) in the SJD is ‘calm and peaceful’. Underlying these senses are the conceptual metaphors BALANCE IS ROUNDESS and CALMNESS IS ROUNDESS respectively. Whereas both conceptual metaphors are based on geometric features, the two ROUNDESSes are different. The former ROUNDESS probably relies on the whole shape of Circle, while the latter derives from the whole shape and/or its

11 The first sense of ‘rounded’ (adj) in the CED is ‘curved in shape, without any points or sharp edges’. The first sense of ‘marui’ (adj) in the SJD is ‘shaped like a circle or sphere’ and the second sense is ‘curved in shape’.
curved parts. We must also pay attention to the type of the extensions. The extension from ROUNDNESS to BALANCE seems to be simpler and more direct than that from ROUNDNESS to CALMNESS, since, between ROUNDNESS and CALMNESS, there must be a mediating concept such as SOFTNESS.

Conceptual metaphors are of some use in investigating metaphorical extensions, but conceptual metaphors must be analytically discovered and reconstructed (see 2.3.2.2). When we study rules or principles in polysemous network formation, we must be careful not to oversimplify the concept of the conceptual metaphor. In fact, there is a great variety of kinds and a wide range of degrees of metaphorical extensions which form polysemous networks.

3.3.1.3 Historical changes

One linguistic form may have a number of senses. These senses may change over time. New senses can be added, while existing senses can become obsolete. These phenomena are attributable to “historical changes” which occur in metaphorical extensions. According to Bartsch (1998: 100), this issue in polysemous network formation can be divided into two parts. One part deals with the existence of a number of senses under one linguistic form, and the other deals with the reconstruction or changes of these senses over time. It is credible for polysemous networks to be formed through long historical changes, and for existing polysemous networks to be based on diachronic semantic changes (Michaelis 1996). To learn about diachronic semantic changes necessarily leads to etymological studies. Alverson (1991) states that in dictionaries, polysemous networks mainly result from past metaphorical extensions, and that it is possible to trace these extensions partly by taking a close look at the relations among the various senses. If we can grasp these past metaphorical extensions even in part, some rules or principles which control polysemous network formation in a given language or culture may be revealed.

Etymological studies give us not only clues to past metaphorical extensions but also the reasons why these extensions were produced in a language or culture (Györi 1995). Because metaphorical extensions are used for concept formation, examining past metaphorical extensions will enable us to understand past styles of concept formation
which might be the bases of present concept formation. Etymological studies are thus not only descriptive studies, but also play a vital role in the study of concept formation.

However, it is very difficult to conduct an etymological investigation, not only into polysemous network formation, but also, generally, into the origin of a word or an expression. In particular, it is extremely difficult to investigate the origin of abstract words, because metaphorical extensions in these words are often deeply embedded. Etymological investigations in English are assisted by a large body of etymological work, including the creation of a dictionary whose aim is “to present in alphabetical series the words that have formed the English vocabulary from the time of the earliest records down to the present day, with all the relevant facts concerning their form, sense-history, pronunciation, and etymology” (The Oxford English Dictionary. 1989. vol.1, page vii.). The senses in the OED are ordered to show the historical development of senses, with the aim of showing their “rational or logical development.” Such a dictionary does not exist for Japanese. If we compare the definitions for the English words ‘round’ and ‘rounded’ in the OED, and the Japanese words ‘marosi’, ‘marusi’ and ‘marui’ (round or rounded) in two large Japanese dictionaries, the difference becomes clear.

‘round’  
1.a. A spherical or globular body; a sphere, globe, planet.  
(Examples 14c)

2.a. An object of a circular form. (Examples 15c)  
3.a. A rung or rundle of a ladder. (Examples 16c)  
4.a. A piece of sculpture or statuary executed in the round.  
   (Examples 17c)

‘rounded’  
1.a. Of persons or their heads: Tonsured, Shorn, cropped  
1.b. Of the hair: closely cut or trimmed. (Examples 15c)

6.a. Brought to a full, complete, finished, or perfect state; showing no back or defeat (Examples 18c)  
   (Oxford English Dictionary)

‘marosi’  
1. Being a round shape (Examples 14c)  
2. Calm or peaceful in someone’s character (Examples 17c)
‘marusi’  
1. Being a round shape (Examples 17c)  
2. Calm or peaceful in someone’s character (Examples 18c)  
3. Managing a matter successfully (Examples 18c)  

(Kadokawa Kogo Dai-jiten)\(^\text{12}\)

‘marui’  
1. Being a round shape (Examples 17c)  
2. Curved (unknown)  
3. Managing a matter peacefully (Examples 17c)  
4. Soft (pleasant to touch) and peaceful in someone’s character (Examples 17c)  
5. Plump (unknown)  

(Nihon Kokugo Dai-jiten)\(^\text{13}\)

In English, the lexical entry for ‘round’, from which ‘rounded’ is derived, displays clear historical changes in the development of senses. In ‘rounded’, we recognise that the first sense ‘Of persons or their heads...’ started to be used from at least the 15 century and that the sense ‘Brought to a full, complete, finished, or perfect state...’ started from at least the 18 century. From the viewpoint of historical changes of senses, it is not unreasonable to suppose that there is a metaphorical extension from the sense related to someone’s head to the sense to represent a general state. In Japanese, ‘marosi’ is the old form of ‘marusi’, and ‘marusi’ is the old form of ‘marui’ (round or rounded). Unfortunately, we cannot see when their forms changed. However, the periods in which examples exist suggest that the sense ‘Being a round shape’ precedes the sense ‘calm or peaceful in someone’s character’, and, at the same time, these examples imply the existence of the metaphorical extension from ROUNDNESS to CALMNESS.

Etymological studies in polysemous network formation are important, and we discuss some etymological findings about basic shapes in 4.3. However, since it is not easy to investigate the historical changes of the senses of one linguistic form, the scope of the investigations is limited.

3.3.2 Polysemous network formation and concept formation

\(^{12}\) Kadokawa Kogo Dai-jiten (Kadokawa Classical Japanese Dictionary)  
\(^{13}\) Nihon Kokugo Dai-jiten (Japanese Language Dictionary)
Polysemous network formation is part of concept formation, both of which are based partly on metaphorical extensions. A new concept which is formed through metaphorical extensions between two existing concepts may obtain a linguistic form, by using the existing linguistic form associated with one of the two existing concepts. This is indeed polysemous network formation, whereby one linguistic form can represent at least more than one sense. A polysemous network consists of more than one labelled concept.

We suggest that the relationships between one linguistic form and its multiple senses are supported by both the stability and the flexibility with which a labelled concept is intrinsically endowed. The labelled concept, which is composed of one connection between a linguistic form and a mental picture, creates a stable relationship between a linguistic form and a sense in a polysemous network. The whole polysemous network is built up using more than one labelled concept. What allows one linguistic form to have more than one sense is the flexibility in mental pictures.

In this section, we discuss the relationship between polysemous network formation and concept formation by looking at stability and flexibility in labelled concepts.

3.3.2.1 Cognitive stability in polysemous network formation

In any given language, it is natural for native speakers of that language to understand and use a vast number of polysemous words. Most native speakers recognise that the relationships between one linguistic form and its multiple senses are stable. This stability is brought about by the cognitive stability of underlying metaphorical (or metonymical) extensions between the senses under the linguistic form. We hold that cognitive stability exists in cognitive processes which enable speakers to best make sense of an object or event in the real world. In a given language or culture, the cognitive processes in which each speaker makes sense of the object or event are various and individual, but, at the same time, most speakers immersed in the same language and culture share similar cognitive processes. Patterns or regularities of cognitive processes in a language or culture dictate the way speakers categorise and understand concepts, and they also aid in stabilising concepts in the language or culture.
In the stabilisation of concepts, a speaker relies on language. More precisely, linguistic forms help the speaker to stabilise concepts. Senses under a particular linguistic form, like mental pictures, are indeterminate, and it is mainly when they are connected to the linguistic form that the senses are stabilised in the mental space.

There are many kinds of, and various degrees within, cognitive stability because it is based on various extensions (e.g. metaphorical or metonymical), reflecting the speaker’s cultural context and existing knowledge. Patterns and regularities of metaphorical extensions show how concepts are stabilised in a language or culture. In polysemous network formation, patterns and regularities are crystallised in the combination of a linguistic form and its related senses.

To sum up, there are two main relationships of polysemous network formation which support cognitive stability. One is the relationship between a particular linguistic form and a particular sense (e.g. ‘circle’ and the first sense (or the second sense) in the above English example). The other is the relationship between two (or more) senses conveyed by a linguistic form (e.g. the first and second senses in the above English example). These two relationships constitute polysemous networks.

3.3.2.2 Cognitive flexibility in polysemous network formation

Polysemous network formation allows the flexibility to add new senses into existing linguistic forms. This flexibility stems from the way mental pictures can freely extend to other mental pictures, depending on metaphorical (or metonymical) extensions. Remember that only mental pictures can extend from the source to the target (see 3.1.3.2). In order to investigate cognitive flexibility in polysemous network formation, we must look at metaphorical (or metonymical) extensions between the mental pictures.

The polysemous English word ‘circle’ is associated with both metonymical and metaphorical extensions. The senses ‘a round shape’ and ‘a ring of objects or people’ of the polysemous English word ‘circle’ link to the mental pictures [a round shape] and [a ring of objects or people] respectively, which in turn are linked by a metonymical extension. Between ‘a ring of objects or people’ and the third sense of the word ‘a group of people sharing the same interests’, there is a metaphorical extension of mental pictures.
from [a typical shape of gathered objects or people] to [people sharing the same interests come together in a group].

These three senses do not co-occur with a single Japanese linguistic form. ‘Maru’ (circle), while polysemous, lacks both the senses ‘a ring of objects or people’ or ‘a group of people sharing the same interests’. ‘Wa’ (ring) shows only the metonymical extension from [an object or substance that is in the shape of a circle] to [a typical shape of gathered objects or people]. The third sense ‘a group of people sharing the same interests’ is expressed by ‘saakuru’ which is a loanword from the English word ‘circle’, which can also mean ‘a round shape’. While there might be a metonymical extension of mental pictures between [a round shape] and [a group of people sharing the same interests], there is probably a mediating picture [the typical shape of gathered objects or people] which elsewhere is expresses by the linguistic form ‘wa’ (ring).

Cognitive flexibility, which is based on metaphorical (or metonymical) extensions between mental pictures, constitutes polysemous networks in some cases (e.g. the linguistic form ‘circle’ and the above three senses in English), however it does not lead to polysemous network formation in others (e.g. the three linguistic forms ‘maru’, ‘wa’ and ‘saakuru’ and the above three senses in Japanese).

3.4 Summary and points to be investigated

In this chapter, we have considered concept formation, paths of concept formation, and polysemy. Basically, one linguistic form and one mental picture make a labelled concept, and extensions of mental pictures between the source and the target form new concepts. We have used the term of a path to describe concept formation, and have argued that some important properties of paths, direction, distance, economy and repetition of path formation, are useful in describing concept formation. Finally, we have treated polysemy as the result of concept formation through metaphorical extensions. Under one linguistic form, two or more senses produce polysemous networks, in which some metaphorical extensions are transparent and others are opaque.

14 There are two senses of ‘saakuru’ (circle) in the SJD: ‘a circle or circumference’ and ‘a group of people as a circle when they meet each other regularly because they are friends or because they belong to the same performance or share the same interests’.
In the following chapters, we test the proposals made here about concept formation through iconic metaphorical extensions. We report the results of surveys we carried out to investigate concept formation linguistically and, in part, psychologically, by using basic shapes and their related linguistic forms in English and Japanese. Below are the points which will be investigated.

1) Structure of metaphorical extensions in polysemous words
2) Existence of labelled concepts which consist of linguistic forms and mental pictures
3) Degrees of iconicity between two concepts by considering direction and distance in metaphorical extensions

Chapter 4 contains a study of vocabulary denoting basic shapes in dictionaries, focusing on polysemous networks and historical extensions of the senses in English and Japanese. In Chapter 5, we report on several experimental investigations regarding iconic metaphorical extensions with native speakers of English and Japanese. We examine the existence of labelled concepts and the relationship between the linguistic forms and mental pictures contained within them, and consider direction and distance in investigating the degree of iconicity between two existing concepts in metaphorical extensions.
4 Vocabulary denoting basic shapes

In Chapter 2, the study of concept formation through iconicity was considered as a study of cognitive processes in the mental space. We posited two points: the speaker’s metaphorical understanding of an object or event in the real world, and the existence of conceptual metaphors underlying all metaphorical extensions. We argued that the kind of semantic domain in which concept formation could be fruitfully examined would be one in which the members were likely to be recognised by all human beings, and which had high iconicity. We proposed that basic and simple shapes constituted such a domain.

In Chapter 3, we proposed that concept formation is the building up of paths between mental pictures through metaphorical extensions. We regarded polysemy as the result of concept formation through metaphorical extensions.

In this chapter, we lay the groundwork for our study of concept formation in the domain of basic shapes by examining the entries for lexical items denoting basic shapes in dictionaries. If a lexical item (a word) has more than one sense we assume that the relationship between the senses is not arbitrary, but motivated by principled extensions.

In order to consider polysemy of lexical items denoting basic shapes, we investigate the following three features by scrutinising several dictionaries.

1) Entries and their related senses regarding particular basic shapes, with attention to the similarities (or differences) between English and Japanese
2) Polysemous networks which represent the relationship among the senses
3) Historical extensions which show principled extensions among the senses in the past

In this chapter, most judgements about semantic relationships such as the correspondence of senses between English and Japanese, the relationship between the senses in polysemous networks, and the historical extensions between senses are based on the author’s intuition as a native speaker of Japanese.

4.1 Entries and their related senses in dictionaries

Most words for basic shapes are polysemous. As the discussion of the English word ‘circle’ and the Japanese ‘maru’ (circle) in Chapter 3 showed, some senses of linguistic
forms denoting similar basic shapes are similar in both English and Japanese. In this section, we investigate the similarities (or differences) in entries and their related senses between English and Japanese, comparing two dictionaries, i.e. the CED and the SJD.¹

4.1.1 Outline

From the CED in English and the SJD in Japanese, we looked at the entries for words denoting six basic shapes: Circle, Triangle, Square, Curved Line, Straight Line and Angle/CNR. For the comparisons between English and Japanese, we investigated the correspondences between the two languages. We posited a hypothesis that, although the basic shapes are based on simple and limited geometric features, there would be great differences in the related senses under particular entries, apart from the shared geometric senses of a linguistic form, between the two languages.

4.1.2 Method

Below is the list of main entries for the six basic shapes.

¹ The CED (Collins COBUILD English Dictionary) is based on “the Bank of English,” a huge corpus of everyday English, while the SJD (SHIN-JIRIN (Dictionary)) is based on the DAI-JIRIN (Dictionary) which is one of the most practical large dictionaries in Japanese.
From the above main entries and their related senses, we compiled tables which show the correspondence between English and Japanese.  

4.1.3 Results

All data collected for both main entries and their related senses for the six basic shapes are represented in Appendix 1. Table 4.1 is provided as a sample.

---

2 The correspondences between the English and Japanese words are judged by the author as a native speaker of Japanese.
<table>
<thead>
<tr>
<th>No</th>
<th>ENTRY</th>
<th>PS</th>
<th>SENSE</th>
<th>No</th>
<th>ENTRY</th>
<th>PS</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>circle (L)</td>
<td>n</td>
<td>a shape consisting of a curved line completely surrounding an area: Every part of the line is the same distance from the centre of the area.</td>
<td>2</td>
<td>en</td>
<td>n</td>
</tr>
<tr>
<td>2</td>
<td>n</td>
<td></td>
<td>a round flat piece or area of something</td>
<td>1</td>
<td>en</td>
<td>n</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1</td>
<td>maru saakuru (circle) n</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>n</td>
<td></td>
<td>a group of objects or people arranged in the shape of a circle</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>vt/vi</td>
<td></td>
<td>to form a circle around an object or place</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>vi/vt</td>
<td></td>
<td>for an aircraft or a bird to move round in a circle in the air</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>vi/vt</td>
<td></td>
<td>to move around someone or something</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>vt</td>
<td></td>
<td>to draw a circle around something on a piece of paper</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>n</td>
<td></td>
<td>a group of people meeting each other regularly because they are friends or because they belong to the same profession or share the same interests</td>
<td>2</td>
<td>saakuru (circle) n</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>n</td>
<td></td>
<td>an area of seats on the upper floor in a theatre or cinema</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>No</th>
<th>ENTRY</th>
<th>PS</th>
<th>SENSE</th>
<th>No</th>
<th>ENTRY</th>
<th>PS</th>
</tr>
</thead>
<tbody>
<tr>
<td>1(1)</td>
<td>maru (NJ)</td>
<td>n</td>
<td>a shape consisting of a curved line completely surrounding an area: Every part of the line is the same distance from the centre of the area.</td>
<td>2</td>
<td>circle</td>
<td>n</td>
</tr>
<tr>
<td>1(2)</td>
<td></td>
<td>n</td>
<td>a correct mark (a tick in English)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1(3)</td>
<td></td>
<td>n</td>
<td>money (informal)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1(4)</td>
<td></td>
<td>n</td>
<td>a walled area inside a castle</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1(5)</td>
<td></td>
<td>n</td>
<td>a punctuation mark (a period in English)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1(6)</td>
<td></td>
<td>n</td>
<td>a whole</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2(1)</td>
<td></td>
<td>pre</td>
<td>full</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2(2)</td>
<td></td>
<td>pre</td>
<td>whole</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>marumaru (NJ)</td>
<td>vi</td>
<td>to curl up, to roll up</td>
<td>4</td>
<td>round</td>
<td>n</td>
</tr>
<tr>
<td>1</td>
<td>marumeru (NJ)</td>
<td>vt</td>
<td>to move in a curve past the edge or corner of a place or obstacle</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>vt</td>
<td></td>
<td>to shave someone's head</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Notes:
1) **No/Entry** The numbers and entries are the same as those in the CED in English and the SJD in Japanese.
   In the SJD, some numbers are divided into detailed numbers (e.g. 1(1) ~ 1(6) *maru*').
   (Origin) L: Latinate, NJ: Native Japanese
2) **PS**: Part of Speech
3) **SENSE**: The senses are summarized from the CED in English and the SJD in Japanese.
4) On the right hand side of the tables, the numbers, entries and parts of speech show the correspondences of all senses for Circle between English and Japanese. The correspondences are based on the author's intuition as a native speaker of Japanese. In the blanks, no correspondence is seen, and the absence of an entry means that the senses are expressed in each language by unrelated words.

**Table 4.1 Main entries and their related senses for Circle**
In the CED, the order of the related senses is based on frequency of occurrence, with the senses of a word arranged from the most common to the least common. In the SJD, no explanation of the grounds for the order of the related senses is given. Furthermore, in the CED, some entries consist of a single part of speech (e.g. ‘round’: n, ‘round’: adj and ‘round’: vt), while others are composed of different parts of speech (e.g. ‘circle’: n, vt and vt/vi). In this regard, the SJD in most cases has a single entry for each separate part of speech.

A glance at Table 4.1 and Appendix 1 will reveal the following points:

1) In both English and Japanese, the first sense given for most entries is a geometric description.
2) Some senses are shared by both English and Japanese, while others are not. Some of the shared senses are geometrical, and others are metaphorical (or metonymical).
3) A single sense under a particular entry in one language may correspond to multiple entries in the other language (e.g. The second sense ‘a round flat piece or area of something’ in ‘circle’ in English corresponds to the senses under the entries, ‘en’ (circle), ‘maru’ (circle) and ‘saakuru’ (circle) in Japanese.).
4) In English, many Latinate loanwords are found within all six basic shapes.
5) In Japanese, many English loanwords are found within all six basic shapes.
6) In both English and Japanese, some of the forms are analytic (e.g. ‘tri-angle’ in English, ‘san-kak-kei’ (triangle) and ‘si-kak-kei’ (square) in Japanese).

Latinate loanwords in English are influenced by the Greek tradition of geometry (Euclidean geometry) on folk taxonomies of shapes, and the words seem to fundamentally incorporate geometric senses. In Japanese, no native Japanese words represent basic shapes such as Triangle and Square. By adopting Sino-Japanese words (e.g. ‘sankaku’ (triangle) and

---

3 In most Japanese dictionaries, the order of the related senses is conventionally based on the derivation, in which the senses of a word are arranged from what the lexicographer takes to be the basic sense through the derived senses.
4 In the SJD, a few entries have different parts of speech (e.g. ‘maru’ (circle): n and prefix).
5 ‘En’: a circle or a sphere, ‘maru’: a circle or a round flat piece or area, ‘saakuru’ (an English loanword): a circle
‘sikaku’ (square)), Japanese seems to obtain some geometric senses. The modern folk taxonomies for basic shapes in both English and Japanese are significantly affected by the need for a preferred and common set of terms to refer to concepts of basic shapes generally.

Let us now consider the main entries and their related senses for each shape.

**Circle**: Other than the correspondences based on geometric senses, we see six correspondences in which the corresponding words in Japanese are all English loanwords (e.g. ‘circle’ in English to ‘saakuru’ (circle) in Japanese in the sense ‘a group of people meeting regularly’, ‘round’ in English to ‘raundo’ (round) in Japanese in the sense ‘one of the periods during which the boxers or wrestlers fight’ and ‘(in golf) one game’).

The senses with no correspondences are many and varied. Some senses seem to be based on metonymical extensions (e.g. ‘an area of seats on the upper floor in a theatre or cinema’ in ‘circle’ in English, and ‘money’ in ‘maru’ (circle) in Japanese), while others are based on metaphorical extensions (e.g. ‘forcefully or by many people, or completely’ in ‘roundly’ in English, and ‘calm, harmonious, peaceful’ in ‘marui’ (round) in Japanese).

**Triangle**: English has only one linguistic form to express the senses of ‘triangle’, and that form itself is a borrowing from Latin analysable as “three angles.” The geometric senses are expressed in Japanese in a similar analytic way, by Sino-Japanese borrowings, ‘sankaku’ (triangle): ‘san’ (three) + ‘kaku’ (angle), and ‘sankakkei’ (triangle): ‘sankak’ (= ‘sankaku’) + ‘kei’ (shape). Japanese borrows the English form ‘triangle’ for the sense ‘a musical instrument’. No metaphorically extended senses such as ‘a group of three people’ in ‘triangle’ are seen in Japanese.

**Square**: The first geometric sense of the English word ‘square’, which is an unanalysable borrowing from Latin, corresponds in Japanese to four Sino-Japanese compounds, several of which involve the word ‘kaku’ (angle). ‘Sikaku’ (‘si’ (four) + ‘-kaku’ (angle)) is the most commonly used form and denotes any Rectangle including Square. ‘Sikakkei’ consists

---

6 Chinese characters for forming Sino-Japanese words had been introduced with Buddhism since the sixth century.

7 In folk sign language, ‘maru’ (circle) which is formed with the thumb and the forefinger is a sign for money (coin) in Japanese.
of ‘sikak-’ (= ‘sikaku’) and ‘-kei’ (shape) and means more precisely a flat shape with four sides. To denote Square rather than Rectangle, ‘masikaku’ (‘ma-’ (native Japanese prefix (precise)) + ‘-sikaku’) is used, or, in the study of geometry, ‘seihoo’ (‘sei-’ (correct and precise) + ‘-hoo’ (a shape with four corners)) and ‘seihookei’ (‘seihoo-’ + ‘-kei’ (shape)) are used.8

Japanese has also borrowed the English word ‘square’ as ‘sukuea’ with two senses, a geometric sense equivalent to ‘sikakkei’ (a flat shape with four sides), and an architectural sense (a flat open area in a town).

**Curved Line:** Some corresponding senses other than the geometric senses are based on metaphorical extensions (e.g. ‘bend’ in English and ‘mageru’ (bend: vt) in Japanese in the senses ‘to believe or do something different’ and ‘to interpret rules or laws in a way that allows you to do something they would not normally allow you to do’). Other senses, which do not exactly correspond to each other, are also the results of metaphorical extensions (e.g. ‘bent’ in the sense ‘dishonest or doing illegal things’ and ‘magaru’ (bend: vi) in ‘to be twisted, to be crooked’). Notice that in both English and Japanese, the senses of ‘bend’, ‘magaru’ and ‘mageru’ have negative connotations, by and large.

The English loanword ‘kaabu’ means ‘(baseball) a curve ball’, and it is normally used in Japan where baseball is very popular.

**Straight Line:** ‘Straight’ corresponds to ‘massugu’ (straight) which is native Japanese and consists of ‘mas-’ (precise) and ‘-sugu’ (straight). In Japanese, the English loanword ‘sutoreeto’ (straight) has the sense ‘honest and frank’. Unlike the senses in Curved Line, some senses based on metaphorical extensions have positive connotations (e.g. ‘honest and frank’ and ‘normal and conventional’ in ‘straight’, and ‘honest and frank’ in ‘massugu’ (straight) and ‘sutoreeto’ (straight)).

The loanword ‘sutoreeto’ means ‘(baseball) a fastball’ and it does not correspond to ‘straight’. This is Japanese English and normally used in Japan.

**Angle/Cornor:** In Japanese, ‘kaku’ is mostly used for denoting shapes created by angles, ‘sankaku’ (triangle, ‘san-’ (three) + ‘-kaku’ (angle)) or ‘sikaku’ (square, ‘si-’ (four) + ‘-kaku’ (angle)). ‘Kaku’ is thus dealt with under Angle/Cornor, not under Square, in spite of

---

8 ‘Tyoohookei’ represents Rectangle, and consists of three parts: ‘tyoo-’ (long), ‘-hoo-’ (a shape with four corners) and ‘-kei’ (shape).
the fact that ‘kaku’ has the geometric sense ‘a shape with four corners such as square or rectangle’.  

All the correspondences listed have something to do with geometric senses. Between English and Japanese, we see different senses which have different underlying metaphorical extensions (e.g. ‘to make someone offer something to one without asking for it openly and directly’ in ‘angle: vi’, ‘places that are far away or difficult to get to’ and ‘to force someone to speak to you when they are trying to avoid you’ in ‘corner’ in English, and ‘a difficult argumentative personality’ in ‘kado’ (corner), ‘to be unfriendly or reserved’ in ‘kadobaru’ (to stick out), and ‘to take a serious or formal attitude’ in ‘kakubaru’ (to be square-shaped) in Japanese).

To summarise the descriptive investigation of the main entries and their related senses in the six basic shapes, most English words and many Japanese words are of foreign origin. In English, we assume that Latinate words were presumably introduced as learned words, and that the popularisation of the study of geometry has an influence on the spread of the Latinate words such as ‘circle’, ‘triangle’ and ‘square’. These words have become everyday words.

In Japanese, there are some native Japanese words representing basic shapes such as ‘maru’ (circle), ‘magari’ (bend) and ‘massugu’ (straight). Sino-Japanese words, some of which were introduced along with their compounds (e.g. ‘sankakkei’ (triangle) and ‘seihookei’ (square)), were introduced as learned words, like Latinate words in English, and have become everyday words. Native Japanese and Sino-Japanese words mostly cover the geometric senses in the six basic shapes. English loanwords have both geometric and non-geometric senses. Although both senses are commonly used, we assume that most English loanwords were imported for introducing non-geometric rather than geometric senses (e.g. ‘saakuru’ (circle: a group of people meeting each other regularly), ‘toraianguru’ (triangle: a musical instrument)). In everyday speech, native Japanese and Sino-Japanese words are used for geometric senses, and English loanwords are used for non-geometric senses.

---

9 ‘Kakubaru’ (to be squared-shaped), which consists of ‘kaku-’ (angle) and ‘-baru’ (to spread out), is also dealt with under Angle/Corner.
4.2 Polysemous networks

Based on the data of senses given under the main entries for the six basic shapes, polysemous networks may be produced. In polysemous networks, the senses are connected with one another according to principled underlying extensions.

4.2.1 Outline

By utilising iconicity, networks of the senses may be built up. We proposed a hypothesis that polysemous networks would be significantly particular to English or Japanese, reflecting the differences in the data of senses given in the preceding section.

4.2.2 Method

Some researchers (e.g. Allan 2001, Saeed 1997) claim that, in polysemy, one meaning is a core meaning and its related meanings surround it, and that most meanings are semantically connected to each other. Others (e.g. Abe et al. 1994, Lamb 1998) state, using neural network models, that a semantic network is based on the relationship between concepts which are linked to the lexical data in the mental space.\(^\text{10}\) We combine these ideas and make an assumption that the linkage between mental pictures which are connected to particular linguistic forms constitutes a polysemous network whereby one mental picture may be a core mental picture.

It is not always easy to determine the type of iconicity that creates a motivated relationship between senses. Here we classify the iconic relationship into three types in order to simplify polysemous networks.\(^\text{11}\)

1) Strong relationships: based on clear extensions (metaphorical, metonymical or other)
2) Weak relationships: based on conceivable extensions (metaphorical, metonymical or other)

\(^{10}\) Veale and O’Donoghue (2000) and Véronis and Ide (1995) present similar ideas based on computational models of metaphors.

\(^{11}\) These three relationships are part of a continuum of the iconic relationship between the senses, and there are many other intermediate relationships.
3) Indeterminate relationships: based on extensions whose motivation is impossible for a researcher to determine

4.2.3 Results

The polysemous networks which are composed of the senses are shown in Appendix 2. Before looking at each polysemous network, we must consider how the polysemous networks were formed. Since the polysemous networks were based on the author’s intuitions as a native speaker of Japanese, they were partly influenced by the author’s cultural context and existing knowledge. Generally, in dictionaries, the relationships between the senses under a given lexical entry and objects or events in the real world are established by the definition, along with particular linguistic forms. Moreover, the lexical entry may contain reference to linguistic forms which are synonymous or antonymous, and may classify the kind of relation between senses as ‘figurative’ or not. In order to consider the relationships between the objects or events, however, we need to use mental pictures which the linguistic forms evoke.\(^{12}\)

In building up polysemous networks, I first considered my mental pictures for each sense under a given entry, then compared these mental pictures, and finally considered whether or not any connections might exist among them.\(^{13}\) Although polysemous networks consist of linguistic forms and some kinds of lines which indicate connections among the various senses, they all depend on my mental pictures and their connections in the mental space.

In polysemous networks consisting of five or more senses, I often arranged the geometric senses at the centre of the network and the other senses at the periphery. I used the centre-periphery relation to represent the idea that the geometric senses underlie all the

---

\(^{12}\) Anttila (1989: 181) states that the issue of polysemy is attributable to “psychological reality or awareness of the speaker.” This idea shows that particular conceptual representation (particular mental pictures) related to an object or event in the real world plays an important role in forming polysemous networks.

\(^{13}\) For example, under the entry ‘circle’, there are three senses: ‘a shape consisting of a curved line completely surrounding an area’, ‘a group of objects or people in the shape of a circle’ and ‘a group of people meeting each other regularly’. With these senses, I conjured up mental pictures such as [something round], [a group of children arranged in the shape of a circle] and [someone grouped round a centre of interest], and compared them. On that basis, I propose strong relationships both between the first picture and the second, and between the second and the third.
other senses. The polysemous networks in ‘circle’, ‘ring’, and ‘square’ in English, and ‘maru’ (circle) and ‘koonaa’ (corner) in Japanese fall under these types. Figure 4.2 shows those for ‘circle’ and ‘maru’ (circle).
### Circle (L)

1. a shape consisting of a curved line completely surrounding an area (n)

2. a round flat piece or area of something (n)

3. a group of objects or people in the shape of a circle (n)

4. to form a circle around an object or place (vt/vi)

5. (aircraft/bird) to move around something (vi/vt)

6. to move around something (vi/vt)

7. to draw a circle around something on a piece of paper (vt)

8. a group of people meeting each other regularly (the same profession/interests) (n)

9. an area of seats on the upper floor (theatre/cinema) (n)

---

### maru (NJ)

1(1). a shape consisting of a curved line completely surrounding an area (n)

1(2). a correct mark (a tick in English) (n)

1(3). money (n)

1(4). a walled area inside a castle (n)

1(5). a punctuation mark (a period in English) (n)

1(6). a whole (n)

2(1). full (prefix)

2(2). whole (prefix)

---

**Notes:**

1) (Origin) L: Latinate, NJ: Native Japanese

2) The numbers are the same as those in the CED in English and the SJD in Japanese.

3) The senses are summarised from the CED and the SJD.

4) Strong relationships (solid lines), weak relationships (broken lines), and indeterminate relationships (no lines) are hypothesised in the dictionaries both by the author as a native speaker of Japanese, and by some native speakers of English and Japanese.

---

**Figure 4.2 Polysemous networks of ‘circle’ and ‘maru’**

In ‘maru’ (circle), the geometric sense ‘a shape consisting of a curved line completely surrounding an area’ is surrounded by the other senses. Some of the senses are connected to the geometric sense and to each other by strong relationships (solid lines) and weak relationships (broken lines). For example, the relationship between ‘a correct mark (a tick
in English)’ and ‘a shape consisting of a curved line completely surrounding an area’ is based on a clear symbolic extension, and that between ‘money’ and ‘a shape consisting of a curved line completely surrounding an area’ is based on a metonymical extension. In ‘circle’, the same geometric sense ‘a shape consisting of a curved line completely surrounding an area’ is surrounded by the other senses. One point to note here is that the geometric senses in ‘maru’ (circle) and ‘circle’ are connected to many and varied senses.

When ‘round’ is used as a noun in English, for instance, the centre is ‘a series of related events’ not ‘a circular shape’ as shown below (Figure 4.3). This is because, in the CED, the related senses of the noun are listed by the frequency of occurrence in Modern English, and then the sense ‘a series of related events’ is linked to many other related senses through strong relationships.

![Figure 4.3 Polysemous networks of ‘round’ (n)](image)

Notes: See Figure 4.2.

Although one sense cannot form a network, a single sense can be observed in some lexical entries in Appendix 2. The sense is geometric in most cases, but, for example, ‘(condemned or criticised) forcefully or by many people, or (defeated) completely’, which is not

---

14 When ‘round’ is used as an adjective the centre sense is ‘shaped like a circle or ball’ (see Appendix 2).
geometric, is a single sense of ‘roundly’ in the CED.

Thus various kinds of polysemous networks may be observed even for the limited number of entries for the six basic shapes. We can neither classify them by the number of senses under a particular entry, nor always place geometric senses at the centre of the networks formed. Even in a single polysemous network, the relationships between senses are many and varied, and different networks are produced in different ways.

To summarise, some polysemous networks for the six basic shapes in the CED and the SJD are similar between English and Japanese. In particular, polysemous networks associated with the English loanwords into Japanese are similar to those in English. Other networks show differences between English and Japanese for non-geometric senses under a given entry. The hypothesis we posited is partly confirmed. Different researchers may produce different polysemous networks, even using the same dictionaries. It should be evident, however, from the above results, that many senses other than geometric senses are particular to each language.

If we assume, as we do, that some senses under a given entry are based on metaphorical or metonymical extensions, we must investigate not only current usage but also historical extensions which are the concern of the next section.

4.3 Historical extensions

As discussed above, in English, the spread of Latinate words such as ‘circle’, ‘triangle’ and ‘square’ is probably connected to popularisation of the study of geometry. In Japanese, Sino-Japanese words play a similar role in introducing geometric senses (e.g. ‘sankakkei’ (triangle) and ‘seihookei’ (square)). However, many English loanwords were imported in order to introduce new Western concepts (e.g. ‘circle’ (a group of people meeting each other regularly)).

The present senses under a given entry are based on usages in the past. Historical extensions of the senses bring about particular relationships among them, and affect concept formation through metaphorical (or metonymical) extensions in a given language.

This section is concerned with the question of when the related senses of the six basic shapes began to be used. Examples in several dictionaries are investigated. The differences
in the periods in which particular usages existed may illustrate historical changes among the senses under a given entry and may provide some clues to examine what these changes represent.

4.3.1 Outline

The investigation is etymological only in that it focuses on the question of when the present senses under a given entry began to be used. For the six basic shapes which were dealt with in the preceding section, we now investigate the oldest examples related to each sense in the CED in English and the SJD in Japanese.

We start with two hypotheses which are:

1) In general, usages related to geometric senses are older, while non-geometric senses are more recent, because the latter are assumed to be metaphorically or metonymically extended from the former.

2) In polysemous networks, some relationships between senses under a given entry have been judged to be strong, while others are weak or indeterminate. Two senses judged to be strongly related will appear in periods close in time, but those whose relation is judged to be weak or indeterminate will appear in widely separated periods of time.

4.3.2 Method

In investigating the oldest examples of the senses in the CED in English and the SJD in Japanese, we use the following eight dictionaries.\textsuperscript{15}

\textless English\textgreater


\textsuperscript{15} This investigation is subject to the limitations of the sources. We can only claim what is known historically from dictionaries which are written records, and presume metaphorical (or metonymical) extensions between particular senses.
In English, we mainly use the OED, in which examples appear in historical order, and use the remaining three dictionaries for verification and checking consistency. In Japanese, we mainly use the NKD and the NKBD. Although, in the NKD, examples and their sources appear in historical order, there is no identification of the period of the sources. The NKBD identifies the periods when a form is used. We use the remaining two dictionaries for verification and checking consistency.

We follow Geeraerts’ suggestion (1985) of arranging and comparing related senses in parallel in order to make the diagrams simpler. The following points are to be noted:

1) Periods are shown in centuries (c).

2) Unclear examples, mainly because of differences in description of senses among dictionaries, are indicated separately in the diagrams.

3) Historical extensions between the senses are proposed by the author as a native speaker of Japanese and are also based on the sense groups in the above dictionaries.

4.3.3 Results

The centuries in which the oldest examples of each sense for the six basic shapes appear
in Appendix 1. These are represented in diagrams which map the first occurrence of the related senses under a given entry over time. Appendix 3 gives all diagrams for the six basic shapes, and, as an example, we show Figure 4.4 which represents ‘circle’ in English and ‘maru’ (circle) in Japanese.
**circle** (L)

<table>
<thead>
<tr>
<th>14c</th>
<th>15c</th>
<th>16c</th>
<th>17c</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

1. a shape consisting of a curved line (n)
2. a round flat piece or area of something (n)
9. an area of seats on the upper floor (n)
8. a group of people meeting each other regularly (the same profession/interests) (n)
4. to form a circle (vt/vi)
5. to move around in a circle (vi/vt)
6. to move around something (vi/vt)
7. to draw a circle around something on a piece of paper (vt)

**maru** (NJ)

<table>
<thead>
<tr>
<th>17c</th>
<th>18c</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

1(1). a shape consisting of a curved line (n)
1(3). money (n)
1(4). a walled area inside a castle (n)
1(6). a whole (n)
2(1). full (prefix)
2(2). whole (prefix)

**Notes:**

1) Old forms such as 'circul' for 'circle' and 'maro' for 'maru' are not considered here. The fact that the earliest citations of 'circle' in 14th century and of 'maru' in the 17th century means that the dictionaries do not record words earlier than these periods.

2) (Origin) L: Latinate, NJ: Native Japanese

3) The periods for first occurrence are taken from the OED, the NED, the ODE and the BDE in English, and the NKD, the KKD, the NKBD and the KGJ in Japanese. Definite periods for first occurrence are shown with a circle with solid line, and indeterminate periods, which are mainly attributable to the differences of first occurrence among these dictionaries, are represented with a broken line circle.

4) The numbers of the senses are the same as those in the CED in English and the SJD in Japanese. The senses are summarised from the CED in English and the SJD in Japanese.

When the dictionaries did not indicate which were the oldest examples, we omitted the sense (e.g. a group of objects or people in the shape of a circle (n) in English and '1(2). a correct mark (a tick in English) (n) in Japanese).

5) The order of the senses is mainly based on that in the above eight dictionaries, in which related senses are positioned in a given group, and the senses in the group are arranged in historical order.

6) Historical extensions between senses (broken lines) are proposed by the author as a native speaker of Japanese.

**Figure 4.4 Periods for first occurrence of the senses for ‘circle’ and ‘maru’**
First, in Figure 4.4, definite periods for first occurrence are indicated by a solid line circle, and indeterminate periods, which are mainly attributable to the differences in first occurrence among dictionaries, are indicated by a broken line circle. The numbers of senses are the same as those in the CED in English and the SJD in Japanese. When the dictionaries (other than the CED and the SJD) did not indicate which were the first examples, we omitted particular senses (e.g. ‘3. a group of objects or people in the shape of a circle (n)’ in English and ‘1(2). a correct mark (a tick in English) (n)’ in Japanese). The order of the senses is mainly based on that in the dictionaries. Related senses are positioned in a particular group, and the senses in the group are arranged in historical order. In English, the sense ‘9. an area of seats on the upper floor (n)’ is positioned between ‘2. a round flat piece or area of something (n)’ and ‘8. a group of people meeting each other regularly (n)’. Based on these conditions, we propose historical extensions which are shown by broken lines between the senses.

‘Circle’ can be a noun or a verb. Both uses (sense 1, 2 and 4) appear in the fourteenth century and were posited to be strongly related in the polysemous network in 4.2. Sense 1 and 2 of the noun (‘a shape consisting of a curved line’ and ‘a round flat piece and area of something’) appear in the fourteenth century. We posited a strong relation between these senses in the polysemous network. While sense 4 of the verb (‘to form a circle’) appears in the fourteenth century and its relation to sense 7 (‘to draw a circle around something on a piece of paper’) was posited as strong in the polysemous network, two centuries separate their first occurrence. This shows that what seems to a modern speaker to be a strong relation between the senses has little to do with the close historical sequence of appearance of the senses.

Turning now to weak relationships, we observe that sense 9 (‘an area of seats in the upper floor’) is weakly related to sense 2 (‘a round flat piece or area of something’) in the polysemous network, and appears three centuries later in the seventeenth century.

‘Maru’ can be a noun or a prefix. Those examples (sense 1(1), 1(6) and 2(2)) appear in the seventeenth century and we posited strong relationships between them in the polysemous network in 4.2. Sense 1(1) and 1(3) of the noun (‘a shape consisting of a
curved line’ and ‘money’\textsuperscript{16} appear in the seventeenth and eighteenth century respectively. Although these senses were posited to be strongly related in the polysemous network, their first occurrences are separated by one century.

In weak relationships, we see that sense 1(4) (‘a walled area inside a castle’) was weakly connected to sense 1(1) (‘a shape consisting of a curved line’) in the polysemous network, but both of them appear in the seventeenth century.\textsuperscript{17}

Figure 4.4 shows that the geometric senses appear earlier in English, and that the geometric senses and the non-geometric senses appear at close periods in Japanese. Appendix 3 shows the periods of first occurrence of the senses of words for the six basic shapes. An examination of these reveals two important findings. Words differ as to when their geometric and non-geometric senses first appear, and there is no clear-cut correlation between the closeness of relation between two senses in a polysemous network and how close in time their first occurrences are. Regarding the first finding, we classify the words into three classes. One is the class in which the geometric senses appear first, the second is that in which geometric and non-geometric senses appear at close periods, and the third is that in which non-geometric senses appear first. These are shown below.\textsuperscript{18}

1. Geometric senses appearing first:

\begin{tabular}{ll}
English & Japanese \\
circle, circular, loop, round & \textit{marumeru} (to make a ball) \\
triangle, triangular & \textit{sankaku} (triangle) \\
square & \textit{sikaku} (square) \\
bent & \textit{mageru} (to bend (vt)) \\
curve & \\
straighten & \\
angle, corner & \\
\end{tabular}

\textsuperscript{16} The shapes of coins which were circulated in the seventeenth and eighteenth century in Japan were both round shapes and square or rectangular shapes (Kadokawa Kogo Dai-jiten (Kadokawa Classical Japanese Dictionary)).

\textsuperscript{17} In the Middle Ages, the walled area inside a castle had a polygonal shape, not a round shape (Kadokawa Kogo Dai-jiten (Kadokawa Classical Japanese Dictionary)).

\textsuperscript{18} We have omitted words which have only one sense (e.g. ‘roundly’ in English, ‘\textit{sikakkei}’ in Japanese) and which consist of non-geometric senses alone (‘squarely’ in English, ‘\textit{marumaru}’ (adv) in Japanese) in Appendix 3.
2. Geometric and non geometric senses appearing in close periods:

disc, rounded  
disuku (EL/disc), en (circle), maru (circle), 
marui (round), raundo (EL/round),

ringu (EL/ring), ruupu (EL/loop),
saakuru (EL/circle), wa (circle)
toraianguru (EL/triangle)
sukuea (EL/square)
bend   
kaabu (EL/curve), magaru (to bend (vi))
straight  
massugu (straight), sutoreeto (EL/straight)
anguru (EL/angle), kado (corner),
kadobaru (for corners to stretch out),
kakubaru (to be square-shaped),
koonaa (EL/corner)

3. Non-geometric senses appearing first:

ring

In English, there are many words in the class in which the geometric senses appear first. In Japanese, most words are in the class in which the geometric and non-geometric senses appear at close periods. In particular, all English loanwords are in this class. The English loanwords, which appear in the nineteenth and twentieth centuries, were imported for introducing new Western concepts (e.g. ‘saakuru’ (circle): a group of people meeting each other regularly, ‘toraianguru’ (triangle): a musical instrument). We assume that most of these concepts were introduced as non-geometric senses. When the non-geometric senses were introduced, the geometric senses were also imported, in order to understand the non-geometric senses which were extended from the geometric senses.

Second, there does not seem to be a strong correlation between the closeness of appearance of the senses and the degree of relation between the senses in the polysemous networks. In some words (e.g. ‘disc’ and ‘straight’ in English, ‘maru’ (circle) and ‘massugu’ (straight) in Japanese), strong relationships between the senses which we
posed in the polysemous networks seem to correlate with the closeness of appearance of
the senses, while in other words (e.g. ‘circle’ and ‘square’ in English, ‘marumeru’ (to
round) and ‘kado’ (corner) in Japanese), there is no such correlation.

An important point in this investigation is that the geometric senses are generally older,
but the other senses are not always more recent. The first hypothesis partly holds true.
Regarding the second hypothesis about the relationship between two senses and the
periods in which they appear, we conclude that the data do not allow the clear
determination of a strong relationship.

The results of the above investigations in polysemy contribute to expanding existing
ideas (e.g. the structure of polysemy based on polysemous networks) and to forming new
models in concept formation through iconic metaphorical extensions (e.g. concept
formation through repetition of iconic metaphorical extensions), which we shall discuss in
Chapter 6.
5 The survey

In the preceding chapter, dictionary entries for vocabulary denoting basic shapes were examined. That was a descriptive investigation. In this chapter, we carry out several experimental investigations pertaining to iconic metaphorical extensions with native speakers of English and Japanese. Although cognitive processes in the mental space are invisible, we believe that we can study metaphorical extensions by using basic shapes and their related linguistic information. Investigation of the metaphorical extensions between different languages is necessary and valuable in that only a comparative study can provide evidence of both the similarities and the differences in the cognitive processes of speakers of different languages.

5.1 General outline

In order to study different aspects of iconic metaphorical extensions, we conducted several surveys, using questionnaires, interviews or tasks, with native speakers of English and Japanese. The primary purpose was to collect well-grounded data to build up dynamic models of concept formation through iconic metaphorical extensions.

5.1.1 Objectives

The collection of data on which to build up dynamic models of concept formation starts with questions about how metaphorical extensions organise concept formation in making use of linguistic forms and mental pictures, which metaphorical extensions provide new meanings for existing linguistic forms, and what structure metaphorical extensions have in the mental space. We address these questions by using comparative surveys between English and Japanese. The comparison of data collected from different languages can show us cognitive processes common to many languages and others specific to each language. We need to pay attention to both the similarities and the differences in the collected data. Some data which are similar may suggest common aspects of cognitive processes between the languages, and others which are different may suggest aspects specific to each language.
Models of concept formation must explain both common and specific phenomena in the metaphorical extensions in the languages under investigation.

The objective of each survey is stated in each section. Here we present three preliminary objectives which are shared by all surveys:

1) We examined the existence of labelled concepts, and the relationship between the linguistic forms and mental pictures contained within them.
2) We investigated both the process and structure of metaphorical extensions.
3) We considered the degree of iconicity between two existing concepts in metaphorical extensions.

5.1.2 Methodology

We follow Gibbs (1999: 42-44), who claims, in the study of metaphor, that metaphor in language and metaphor in thought should be separated. His view is based on the observation that the traditional study of metaphor rests heavily on the interpretation of given metaphorical expressions and downplays the cognitive processes of metaphorical extensions in the mental space. Traditional studies may consider how particular metaphorical expressions in poems and classic texts are interpreted, but do not pay attention to the question of how authors understood an object or event in the real world. This is of great significance for our surveys, in that we are aiming to build up dynamic models of cognitive processes in concept formation.

In the study of cognitive processes, Gibbs (2000) recommends examining whether any causes affect a particular phenomenon (e.g. a particular metaphorical expression). It is important to make hypotheses about likely influences on given phenomena before investigation. We need to avoid analysing the phenomena impressionistically after the investigation. Making hypotheses and testing them help us explain cognitive processes more systematically.

We combined questionnaire surveys with other tasks. Here we were concerned not only with what linguistic and non-linguistic information is, but also with how people represent linguistic and non-linguistic information and what is the background to them. Thus the questionnaires were designed to collect both linguistic and non-linguistic information. In
the tasks, we attempted to collect linguistic and non-linguistic information on processing metaphors by asking the participants to reflect on what they were doing as they did it (Thinking Out Loud (TOL)).

Each survey was a comparative survey between English and Japanese. Both common and specific data for each language were dealt with, because one of our main purposes was to build up dynamic models which can account for both common and specific phenomena in metaphorical extensions.

Various basic shapes were employed as the subject in each survey. The six basic shapes shown here were of central importance.

These are typical basic and simple shapes with important geometric features such as “open”, “closed”, “straight”, “curved” and “angled”.

The participants in the surveys were native speakers of English and Japanese. The participants included not only university students but also workers and house keepers, and all were at least high school graduates. To ensure the validity of our data, we had a wide range of participants from a variety of occupational and educational backgrounds.

In each investigation, the number of participants was not large. In order to compensate for this, we combine several different investigations in the survey. In the study of cognitive processes, it is difficult to obtain reliable data to explain a certain mental activity from a single investigation, even if it deals with a large number of participants. We need to consider mental activity from different angles in order to make data more reliable.
Our surveys were divided into three parts. The first part examined the iconicity of basic shapes (visual pictures), by using two association tests, that is, associations between a particular basic shape and the linguistic forms that it evokes, and between a particular basic shape and similar or opposite basic shapes. In the second part, we investigated how speakers deal with metaphorical extensions. We did this by analysing the speakers’ explanations about associations between particular basic shapes and the linguistic forms that denote them. We shed light on the kind and degree of iconicity which underlies each metaphorical extension by looking at the combinations of linguistic forms related to particular basic shapes. Finally, we investigated, through a cross-linguistic examination, the influence of existing metaphorical extensions on the understanding of new metaphorical expressions. We investigated the iconicity of basic shapes again through an association test between a given linguistic form and the basic shapes that it evokes, as a follow-up survey.

5.2 Iconicity in basic shapes

We suggested that basic shapes, which are visual pictures, have high iconicity (see 2.1.4.2). We examine which shapes have higher iconicity and how high iconicity affects the speaker’s production of linguistic forms. Using questionnaires, we first investigate associations between a given basic shape and its associated words, and then other associations between a given basic shape and similar or opposite basic shapes.

5.2.1 From visual pictures to linguistic forms

With any basic shape, various words will be associated through the high iconicity of that shape.\(^1\) The way words are associated with particular basic shapes rests on metaphorical (or metonymical) extensions. Some extensions may be common to English and Japanese, while others may be peculiar to each language.

---

\(^1\) The method here employed is based on some psycholinguistic studies for association tests (e.g. Gibbs and O’Brien 1990, Kess 1991, Lupker 1985).
5.2.1.1 Outline

This investigation explored the participants’ associations derived from eight basic shapes. The data collection was intended to answer the following three questions:
1) When presented with a particular basic shape, which and how many words does each participant conjure up?
2) When we examine all the associations between the shape and the words from all participants, which words emerge more frequently?
3) When we compare all the associations, how many associations are shared between English and Japanese and how many are specific to each language?

Based on the idea that basic shapes had high iconicity, we posited the following two hypotheses:
1) The associated words are many and varied. Some words are specific to individuals, some are shared or specific to the participants of one language, and others are shared among the participants of both languages.
2) Associations specific to each language are observed more frequently than those shared by the two languages, because the high iconicity of basic shapes allows participants to associate many and varied things in their culture.

5.2.1.2 Method

- Participants

The participants were 19 native speakers of English (9 females and 10 males), with a mean age of 34 years, and 22 native speakers of Japanese (14 females and 8 males), with a mean age of 33 years. They were all volunteers in London, Sydney and Tokyo. The English participants included 3 undergraduate students from the University of Sydney, 11

<table>
<thead>
<tr>
<th>Age range</th>
<th>English</th>
<th>Japanese</th>
</tr>
</thead>
<tbody>
<tr>
<td>20s</td>
<td>10</td>
<td>10</td>
</tr>
<tr>
<td>30s</td>
<td>6</td>
<td>7</td>
</tr>
<tr>
<td>40s</td>
<td>N/A</td>
<td>4</td>
</tr>
<tr>
<td>50s</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>60s-</td>
<td>2</td>
<td>N/A</td>
</tr>
</tbody>
</table>
office workers and 5 others, and the Japanese included 17 office workers and 5 others.\(^3\) With regard to educational level, 13 of the 19 English speakers and 15 of the 22 Japanese speakers were either studying at university or were university graduates. With regard to language knowledge, 6 of the English speakers had studied Japanese for 2 or 3 years at university, while all the Japanese speakers had studied English for 6 years at junior-high and high school, and 11 had continued to study it for 2 or 4 years at university. No fully bilingual speakers of English and Japanese participated.

- **Materials**

The questionnaire employed was divided into three parts, personal information followed by two questions. The first question is discussed in this section, and the second in the next section. Information included participants’ gender, age, first language, religion, and educational background, and incorporated a question as to whether the participants had studied semiotics and/or symbolism. This question was included in case the participants’ religion and educational background had some influence on their associations with basic shapes.\(^4\) The questionnaire sheets are shown in Appendix 4. In this investigation, eight basic shapes were used as shown below.

---

\(^3\) 5 others (English): 1 academic staff member from the University of Sydney
2 administrative staff members from the University of Sydney
2 retirees

5 others (Japanese): 1 academic staff member from the University of Sydney
3 government workers
1 high school teacher

\(^4\) No participants had studied semiotics and/or symbolism. We did not find any influence of participants’ religion or educational background.
The following instructions were given to the participants:

“What do the following shapes bring to mind or symbolise for you?
Write down as many as possible of your ideas.”

Procedure

The questionnaires were kept by the participants to complete over a maximum two-week period. The data from the completed questionnaires were dealt with in the following three ways:

1) We counted the number of times that particular words were given as an association for a particular shape, and used the number to rank the shapes in descending order.

2) We defined “primary words” as those which constituted four per cent or more of the total number of words associated with a particular basic shape and were proffered by three or more participants. For each shape, we calculated the percentage of primary words compared to all associated words.

3) We classified associations into associations shared by English and Japanese and those
specific to each language. Then, for each shape, we calculated the percentage for all associations.

5.2.1.3 Results

We begin by looking at the number of individual words given as an association for a particular shape. Table 5.1 shows the average number of associated words produced by the participants for each shape. All associations collected are shown in Appendix 5.

<table>
<thead>
<tr>
<th>English Shape</th>
<th>AN</th>
<th>Japanese Shape</th>
<th>AN</th>
</tr>
</thead>
<tbody>
<tr>
<td>Circle</td>
<td>6.6</td>
<td>Circle</td>
<td>8.5</td>
</tr>
<tr>
<td>(equilateral) Triangle</td>
<td>5.7</td>
<td>(equilateral) Triangle</td>
<td>6.6</td>
</tr>
<tr>
<td>Square</td>
<td>5.6</td>
<td>Square</td>
<td>6.4</td>
</tr>
<tr>
<td>X</td>
<td>5.2</td>
<td>X</td>
<td>5.4</td>
</tr>
<tr>
<td>Straight Line</td>
<td>4.8</td>
<td>Straight Line</td>
<td>4.6</td>
</tr>
<tr>
<td>Incomplete Circle</td>
<td>3.7</td>
<td>Incomplete Circle</td>
<td>3.9</td>
</tr>
<tr>
<td>Right Angle</td>
<td>3.3</td>
<td>Curved Line</td>
<td>3.6</td>
</tr>
<tr>
<td>Curved Line</td>
<td>3.1</td>
<td>Right Angle</td>
<td>3.5</td>
</tr>
<tr>
<td>Overall Average</td>
<td>4.8</td>
<td>Overall Average</td>
<td>5.3</td>
</tr>
</tbody>
</table>

Notes:
1) **R**: Ranking
2) **AN**: Average number of associated words (per person)

**Table 5.1 Average number of associated words**

Table 5.1, displaying the average number of associated words, demonstrates three findings. First, there was a great difference in the average number of associated words (more than double) between the first and the last shape in both English and Japanese. If the number of associated words that a participant can conjure up for a basic shape is a good measure of how many things that participant can imagine as similar to that basic shape, then it can be seen as a measure of the iconicity of that shape for the participant. It follows from this that the average number of words associated with a basic shape is a measure of the iconicity of that shape for participants in a language community. If this is a good measure, then shapes such as Circle, (equilateral) Triangle and Square had higher iconicity than others such as Right Angle and Curved Line. Second, the rankings in English and Japanese were very similar to each other. Except for Right Angle and Curved Line, the rankings were
identical. Finally, for all shapes except for Straight Line, the average number in Japanese exceeded that in English. In particular, the top three shapes (Circle, (equilateral) Triangle and Square) showed relatively large differences (0.9 - 1.9).

We turn now to “primary words,” those which were produced by three or more participants, and which constitute at least four per cent of the total number of associated words. In the free format questions, answers were often varied, making classification difficult. However, some associations were readily discernible. Table 5.2 shows the primary words and their percentages of the total associated words.
<table>
<thead>
<tr>
<th>Shape</th>
<th>L</th>
<th>P</th>
<th>Primary words</th>
</tr>
</thead>
<tbody>
<tr>
<td>Circle</td>
<td>E</td>
<td>37</td>
<td>moon / continuity, eternal, infinite / sun / encompassing, enclosing / ball / circle / correct</td>
</tr>
<tr>
<td></td>
<td>J</td>
<td>35</td>
<td>moon / sun / good, success / ball / (round) face / circle 1 / soft, flexible, gentle</td>
</tr>
<tr>
<td>Curved Line</td>
<td>E</td>
<td>14</td>
<td>curve / smooth</td>
</tr>
<tr>
<td></td>
<td>J</td>
<td>41</td>
<td>curve / river / hair, eyebrow, eyelash / (curved) road / ascent/descent / halfway / gentle, soft</td>
</tr>
<tr>
<td>Incomplete Circle</td>
<td>E</td>
<td>42</td>
<td>broken, incomplete / horseshoe / broken/incomplete circle / moon / not good enough, unfulfilled</td>
</tr>
<tr>
<td></td>
<td>J</td>
<td>33</td>
<td>halfway, incomplete, lack / eye examination (chart) / moon / c (alphabet)</td>
</tr>
<tr>
<td>Right Angle</td>
<td>E</td>
<td>37</td>
<td>right angle, 90 degrees / corner / sharp / tick /</td>
</tr>
<tr>
<td></td>
<td>J</td>
<td>45</td>
<td>corner / roof / bracket / sharp / painful / key / (street) corner, turn</td>
</tr>
<tr>
<td>Square</td>
<td>E</td>
<td>30</td>
<td>box / square / window / television / picture frame</td>
</tr>
<tr>
<td></td>
<td>J</td>
<td>30</td>
<td>box / rigid, hard / building / window / area, district / enclosure</td>
</tr>
<tr>
<td>Straight Line</td>
<td>E</td>
<td>45</td>
<td>road / flat / horizon / (straight) line / straight / boring / infinite, unending</td>
</tr>
<tr>
<td></td>
<td>J</td>
<td>45</td>
<td>horizon (on the land) / horizon (on the sea) / straight / (straight) line / road / border</td>
</tr>
<tr>
<td>(equilateral) Triangle</td>
<td>E</td>
<td>36</td>
<td>triangle / pyramid / geometry, mathematics / balance / hierarchy / mountain</td>
</tr>
<tr>
<td></td>
<td>J</td>
<td>44</td>
<td>triangle / pyramid / mountain / pointy, sharp / (triangular) rice ball / not so good, not good enough</td>
</tr>
<tr>
<td>X</td>
<td>E</td>
<td>49</td>
<td>incorrect, wrong / no entry, stop / crossroads, intersection / cross / forbidden / mistake / no, negativity</td>
</tr>
<tr>
<td></td>
<td>J</td>
<td>45</td>
<td>batu (incorrect mark), wrong / useless, no good, hopeless / dead end, stop (sign) / negation, rejection</td>
</tr>
</tbody>
</table>

Notes:
1) L: Language, E: English, J: Japanese
2) P: Percentage of the primary words to the total of all associated words
3) Primary words: Primary words are produced by three or more participants, and constitute at least four per cent of the total number of associated words. The primary words are classified into groups separated by slashes, because one association is lexicalised by a single word and another is lexicalised by more than one word which produces a set of synonyms or a set of related words. **Bold words** indicate common to English and Japanese
4) Circle 1 is 'maru' (a circle or a sphere) in comparison with 'en' (a circle or a round flat piece or area).

Table 5.2 Primary words

For example, ten primary words for Circle were given by the English participants. They made up 37 per cent of the total of all associated words. Only two primary words were

---

5 These ten primary words are classified into seven groups here and in Appendix 5, because one association is lexicalised by a single word (e.g. ‘moon’) and another is lexicalised by more than one word, producing a set of synonyms or a set of closely related words (e.g. ‘continuity’, ‘eternal’ and ‘infinite’). This classification is based on the author’s judgement.

By “English participants” in the survey, we mean those who participated in investigations as native speakers of English regardless of nationality. (By “Japanese participants” we mean those who participated in investigations as native speakers of Japanese with Japanese nationality.)
given by the English participants for Curved Line. These constituted 14 per cent of the total. This means that the remaining 86 per cent included many other words which were produced by fewer than three participants and constituted at most 3 per cent of the total. By contrast, the English participants gave eleven primary words for X, comprising 49 per cent of all associated words.6

The primary words common to English and Japanese were mainly geometric (e.g. ‘curved’ in Curved Line). These words are easily associated with a particular shape. In Straight Line, there were four common words (‘road’, ‘horizon’, ‘(straight) line’ and ‘straight’) which represented 4 out of the 7 primary words in English and 4 out of 6 in Japanese.7

Next, we turn to the results of the percentage of associations shared by English and Japanese and those specific to each language. Table 5.3 shows the average percentage of shared and specific associations.

<table>
<thead>
<tr>
<th>Shape</th>
<th>Association</th>
<th>English</th>
<th>Japanese</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Shared (%)</td>
<td>Specific (%)</td>
<td>Shared (%)</td>
</tr>
<tr>
<td>Circle</td>
<td>50</td>
<td>50</td>
<td>52</td>
</tr>
<tr>
<td>Curved Line</td>
<td>31</td>
<td>69</td>
<td>34</td>
</tr>
<tr>
<td>Incomplete Circle</td>
<td>42</td>
<td>58</td>
<td>29</td>
</tr>
<tr>
<td>Right Angle</td>
<td>54</td>
<td>46</td>
<td>45</td>
</tr>
<tr>
<td>Square</td>
<td>57</td>
<td>43</td>
<td>52</td>
</tr>
<tr>
<td>Straight Line</td>
<td>59</td>
<td>41</td>
<td>61</td>
</tr>
<tr>
<td>(equilateral) Triangle</td>
<td>43</td>
<td>57</td>
<td>56</td>
</tr>
<tr>
<td>X</td>
<td>61</td>
<td>39</td>
<td>61</td>
</tr>
<tr>
<td>Average</td>
<td>51</td>
<td>49</td>
<td>51</td>
</tr>
</tbody>
</table>

Table 5.3 Average percentage of shared and specific associations

In Table 5.3, the average percentage of shared and specific associations includes associations which single participants gave, as well as those from more than one participant. The percentage of shared and specific associations in English and Japanese was almost equal: 51% for shared associations and 49% for specific associations in both English and Japanese. The identical percentages for the two languages were pure accident.

Turning to the average percentage in each basic shape, those in Circle, Curved Line,
Straight Line and X were similar between English and Japanese, while those in Incomplete Circle differed significantly. In Straight Line and X, the percentages for shared associations outnumbered those for specific associations.\textsuperscript{8} In Curved Line and Incomplete Circle, the percentages for specific associations were larger than for shared associations.\textsuperscript{9}

To summarise, we found the following two points from the association test.

1) The words evoked by a particular basic shape were many and varied. They ranged from direct geometric descriptions (e.g. the names of the shapes, ‘circle’ or ‘square’) to indirect and extended descriptions (e.g. ‘boring’ for Straight Line in English and ‘not so good’ for (equilateral) Triangle in Japanese). The eight basic shapes had high iconicity, and the first hypothesis about the variety of the associated words has been supported.

2) The average percentage of associations shared between English and Japanese on the one hand and those specific to each language on the other was almost half-and-half, although different shapes showed different average percentages. We need to modify the second hypothesis. For some basic shapes (e.g. Curved Line and Incomplete Circle), specific associations are observed more frequently than shared ones.

Each basic shape was connected with many words. It cannot reasonably be assumed that the participants associated all words in a single way. Some words (e.g. the names of the shapes, ‘circle’ and ‘square’) were directly and clearly linked to the shape, while others (e.g. ‘boring’ for Straight Line in English and ‘not so good’ for (equilateral) Triangle in Japanese) appeared to be connected in various ways. There were various extensions between the basic shapes and their associated words. These claims lead to the proposal that basic shapes, which are visual pictures, are taken into the speaker’s mental space as mental pictures, and that then these mental pictures extend to other mental pictures which may be connected to particular linguistic forms. We need to investigate the extensions of these mental pictures in the mental space.

5.2.2 Features of iconicity in basic shapes

\textsuperscript{7} We here consider ‘horizon (on the land)’ and ‘horizon (on the sea)’ in Japanese as identical.

\textsuperscript{8} As shared associations, for example, we see ‘road’, ‘flat’, ‘horizon’ and ‘line’ in Straight Line, and ‘incorrect, wrong’, ‘no entry, stop’, ‘crossroads, intersection’ and ‘cross’ in X.

\textsuperscript{9} As specific associations in Curved Line, for instance, we see ‘corner’, ‘deictic, this/that’ and ‘messy, untidy’ in English, and ‘river’, ‘ascent/descent’ and ‘gentle, soft’ in Japanese. In Incomplete Circle, we observe ‘horse shoe’, ‘container’ and ‘escape’ in English, and ‘eye examination (chart)’, ‘c (alphabet)’ and ‘bag’ in Japanese.
In the preceding section, we examined high iconicity in eight basic shapes through an association test between the basic shapes and the associated words denoting them. Here, we investigate the features of iconicity in basic shapes, asking what features the participants emphasised when they regard particular basic shapes as similar or opposite to one another.

5.2.2.1 Outline

Using questionnaires, we examined what shapes the participants chose as similar or opposite to particular shapes (Circle, Square and Straight Line) and why they chose them. In the data analysis, we examined the following three questions:
1) When presented with a particular basic shape, which and how many shapes does each participant choose as similar or opposite to it?
2) When we examine all the chosen shapes from all participants, what shapes emerge more frequently?
3) In all the chosen shapes, what parts or factors do participants pay attention to?

We thought that, in the comparison of two or more basic shapes, participants would rely heavily on geometric features, and we proposed as a hypothesis that the English and Japanese participants would be aware of similar geometric features and would choose similar shapes, because the geometric features of basic shapes are simple and limited.

5.2.2.2 Method

- Participants

The participants were the same as in 5.2.1.2.

- Materials
The second part of the same questionnaire as in 5.2.1 was used for this investigation (see Appendix 4). The three basic shapes employed are shown below.

(Circle)   (Square)    (horizontal) Straight Line

Note: The linguistic forms in brackets do not appear in the questionnaire.

The following instructions were given to participants:

“Which shape do you think is similar to the following shape? Choose the shapes out of the shapes in the square at the bottom of the page. (You can choose more than one. Don’t choose the same shape as in the question.) Why do you think so?”

“Which shape do you think is opposite to the following shape? Choose the shapes out of the shapes in the square at the bottom of the page. (You can choose more than one. Don’t choose the same shape as in the question.) Why do you think so?”

The shapes as they were presented in the questionnaire sheets are shown in Appendix 4.

• Procedure

The questionnaires were kept by the participants to fill in over a maximum two-week period. The data collected from the questionnaires were dealt with in the following three ways:

1) We counted the number of times that particular shapes were given as similar or opposite to the shape in question, and used the number to rank the shapes in descending order.

2) We defined “dominant shapes” as those which gained the top three positions in the ranking. For each shape, we then calculated a percentage of the dominant shape with respect to all shapes chosen.

---

10 Note that in these instructions, expressions such as ‘geometrically similar or opposite’ do not appear.
3) We summarised reasons why the dominant shapes were assigned as similar or opposite to the shape in question. For each reason, we then calculated a percentage of the reason to all reasons given.

5.2.2.3 Results

A variety of shapes were chosen as similar or opposite to the three basic shapes Circle, Square and Straight Line. Table 5.4 shows the proportions of “dominant shapes” which were assigned as similar or opposite to the three shapes. For making comparisons, all shapes and their rankings are shown in Appendix 6.
### Table 5.4 Dominant shapes

In Table 5.4, we see that the English and Japanese participants chose the same shapes as being similar to Straight Line. For all other comparisons there was at least one difference between the English and Japanese. The most striking agreement between participants as to similarity is seen in the 41% of the Japanese participants who gave Circle as opposite to Square, and the 38% of the Japanese participants who gave X as opposite to Circle. Keeping these phenomena in mind, we turn to the reasons for the choice of the dominant words, which are shown in Table 5.5.
<table>
<thead>
<tr>
<th>R</th>
<th>Shape</th>
<th>Reasons</th>
<th>R</th>
<th>Shape</th>
<th>Reasons</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Three Circles</td>
<td>3 of circle (50/6), others (50/6)</td>
<td>1</td>
<td>Incomplete Circle</td>
<td>a curved line (62/9), the same but incomplete shape as circle (38/5)</td>
</tr>
<tr>
<td>2</td>
<td>Incomplete Circle</td>
<td>the same but incomplete shape as circle (57/4), others (43/3)</td>
<td>2</td>
<td>Three Circles</td>
<td>3 of circle (67/8), others (33/4)</td>
</tr>
<tr>
<td>3</td>
<td>Curved Line</td>
<td>curved (50/2), others (50/2)</td>
<td>3</td>
<td>Pentagon</td>
<td>like circle with the sides squashed in (33/2), others (67/4)</td>
</tr>
<tr>
<td>Opposite to Circle</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>Square</td>
<td>straight lines (29/2), not going around like Circle (29/2), others (42/3)</td>
<td>1</td>
<td>X</td>
<td>incorrect (circle; correct 58/11), others (42/8)</td>
</tr>
<tr>
<td>2</td>
<td>(equilateral) Triangle</td>
<td>straight lines (38/3), angles/edges (25/2), others (37/3)</td>
<td>2</td>
<td>Cross</td>
<td>straight lines (29/2), not enclosed (29/2), others (42/3)</td>
</tr>
<tr>
<td>3</td>
<td>Cross</td>
<td>not enclosed (43/3), angular, sharp (29/2), others (28/2)</td>
<td>3</td>
<td>Square</td>
<td>corners (60/3), others (40/2)</td>
</tr>
<tr>
<td>3</td>
<td>Right Angle</td>
<td>edgy, sharp (40/4), others (60/6)</td>
<td>3</td>
<td>Star</td>
<td>pointy, angular (100/4)</td>
</tr>
<tr>
<td>Similar to Square</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>X</td>
<td>4 points/corners (86/6), others (14/1)</td>
<td>1</td>
<td>Pentagon</td>
<td>angular/corners (50/12), closed/enclosed (21/5), others (29/7)</td>
</tr>
<tr>
<td>2</td>
<td>(equilateral) Triangle</td>
<td>enclosed (20/3), others (80/12)</td>
<td>2</td>
<td>Right Angle</td>
<td>angular/corners (50/3), others (50/3)</td>
</tr>
<tr>
<td>3</td>
<td>Pentagon</td>
<td>angular/corners (50/2), others (50/2)</td>
<td>2</td>
<td>(equilateral) Triangle</td>
<td>angular/corners (50/5), others (50/5)</td>
</tr>
<tr>
<td>3</td>
<td>Right Angle</td>
<td>perpendicular (50/2), others (50/2)</td>
<td>2</td>
<td>Star</td>
<td>angular/corners (22/2), like square with the sides squashed in (22/2), others (56/5)</td>
</tr>
<tr>
<td>Opposite to Square</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>Circle</td>
<td>no straight lines (33/4), no corners, no edges (33/4), others (34/4)</td>
<td>1</td>
<td>Circle</td>
<td>round, no corners, not pointy, not angular (78/14), others (22/4)</td>
</tr>
<tr>
<td>1</td>
<td>Incomplete Circle</td>
<td>round, no corners, no angles (33/4), no straight lines (17/2), incomplete (17/2), others (33/4)</td>
<td>2</td>
<td>Incomplete Circle</td>
<td>no corners, not angular (38/3), others (62/5)</td>
</tr>
<tr>
<td>3</td>
<td>Curved Line</td>
<td>no corners (44/4), others (56/5)</td>
<td>3</td>
<td>Cross</td>
<td>not enclosed (100/4)</td>
</tr>
<tr>
<td>Similar to Straight Line</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>Cross</td>
<td>two straight lines (73/8), others (27/3)</td>
<td>1</td>
<td>Cross</td>
<td>straight lines (86/12), others (14/2)</td>
</tr>
<tr>
<td>2</td>
<td>Curved Line</td>
<td>a line (60/3), others (40/2)</td>
<td>2</td>
<td>X</td>
<td>straight lines (70/7), others (30/3)</td>
</tr>
<tr>
<td>3</td>
<td>Right Angle</td>
<td>two straight lines (38/3), others (62/5)</td>
<td>3</td>
<td>Curved Line</td>
<td>a line (57/4), others (43/3)</td>
</tr>
<tr>
<td>3</td>
<td>X</td>
<td>two straight lines (80/4), others (20/1)</td>
<td>3</td>
<td>Right Angle</td>
<td>two straight lines (75/6), others (25/2)</td>
</tr>
<tr>
<td>Opposite to Straight Line</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>Circle</td>
<td>not straight, round (50/5), others (50/5)</td>
<td>1</td>
<td>Curved Line</td>
<td>a curved line (78/7), others (22/2)</td>
</tr>
<tr>
<td>1</td>
<td>Three Circles</td>
<td>elaborated, multiple (40/4), curved (30/3), others (30/3)</td>
<td>1</td>
<td>Circle</td>
<td>a curved line (44/4), not enclosed (22/2), others (22/2)</td>
</tr>
<tr>
<td>3</td>
<td>X</td>
<td>to stop, to forbid (straight line: to proceed, forward movement) (66/4), others (34/2)</td>
<td>3</td>
<td>Three Circles</td>
<td>round (57/4), others (43/3)</td>
</tr>
</tbody>
</table>

Notes:
1) R: Ranking
2) Reasons (50/6) = (50% / 6 participants): (the percentage of a particular reason to the total reasons given / the number of participants who gave the reason) The total number of participants who gave the reasons in a particular chosen shape is not always related to the ranking, since some participants gave no reasons, some gave a single reason, and others gave more than one reason. Underlined reasons are other than geometric reasons.

Table 5.5 Reasons for the choice of dominant shapes
In Table 5.5, we show the reasons, the percentage of a particular reason to the total reasons given, and the number of participants who gave the reason within a particular chosen shape. At first glance, most of the reasons are based on geometric considerations. We now consider each part of Table 5.5.

**Similar to Circle:** Three shapes (Three Circles, Incomplete Circle and Curved Line) in English and two shapes (Incomplete Circle and Three Circles) in Japanese were linked to Circle through the whole-part relationship, whereby Circles constitute Three Circles, and Incomplete Circle or Curved Line is a part of Circle. Pentagon is in the third position in Japanese, but not in English, suggesting that the idea of distorted enclosure was important for the Japanese participants.

**Opposite to Circle:** The English participants paid attention to geometric features (e.g. ‘straight lines’ and ‘angular’) in choosing the shapes. They cited ‘straight lines’ as the reason for choosing Square (29%) and (equilateral) Triangle (38%). The Japanese participants, however, chose X as the first shape for other than geometric reasons. X scores 58% of the total reasons because X means incorrect in Japanese, contrasting with Circle which means correct. In Japanese, a Circle is equivalent to a tick in English. Hence the choice was conditioned by a non-geometric reason. In the second and third shapes the Japanese participants were consciously aware of geometric features (e.g. ‘straight lines’ in Square).

An interesting point to note here is that, even if the English and Japanese participants chose the same shapes, they were aware of different geometric features. The English participants cited ‘straight lines’ (29%) and ‘not going around like circle’ (29%) as the reasons for choosing Square, while the Japanese cited ‘corners’ (60%) as the reason.11 This is perhaps also the reason why the Japanese participants but not the English chose Star as opposite to Circle. In Cross, the reason ‘not closed’ was given by the English participants (43%) and the Japanese (29%), and, in English, the reason ‘angular, sharp’ (29%) was cited, and ‘straight lines’ (29%) was given in Japanese.

**Similar to Square:** The English participants cited ‘4 points/corners’ (86%) as the main

11 ‘Sikaku’ is the most common Japanese word for ‘square’ and consists of ‘si’- (four) and ‘-kaku’ (angle). ‘Kaku’ also represents ‘a shape with four corners such as Square or Rectangle’ (see 4.1.3). In Japanese, there seems to be a basic division between ‘kaku’ shapes with corners and ‘maru’ (circle) shapes without corners.
reason for choosing the first shape X. In Japanese, although the difference of the percentages between the first shape Pentagon and the second shapes Right Angle, (equilateral) Triangle and Star is noticeable, the Japanese participants gave ‘angular/corners’ as the main reason for choosing these four shapes. Both the English and the Japanese participants focused on the geometric feature ‘angular/corners’ as a feature of Square, but the English participants considered X as having this feature whereas the Japanese did not.

**Opposite to Square**: The geometric feature ‘no corners’ was given as the main reason for choosing most shapes in both English and Japanese (33% in Circle, 33% in Incomplete Circle, and 44% in Curved Line in English, and 78% in Circle, 38% in Incomplete Circle and 60% in Three Circles in Japanese). However, the English participants gave ‘no straight lines’ as the reason for choosing Circle (33%) and Incomplete Circle (17%). The Japanese participants cited ‘not enclosed’ (100%) as the reason for choosing Cross.

**Similar to Straight Line**: The shapes are similar in both English and Japanese. Both the English and the Japanese participants were aware of ‘(two) straight lines’ or ‘a line’ for choosing the shapes.

**Opposite to Straight Line**: Circle and Incomplete Circle are common shapes in English and Japanese. In choosing the first shape Curved Line, the Japanese participants gave ‘a curved line’ (78%) as the reason, which was the same reason for choosing Circle and Three Circles. English participants cited other than geometric reasons ‘to stop, to forbid’ (66%) for choosing X.

In our hypothesis, we assumed that the geometric features of the three basic shapes were limited, and that, in choosing shapes similar and opposite to a given shape, both the English and the Japanese participants would profile similar geometric features. As shown, however, the English and Japanese participants did not always choose the same shape, and, even if they chose the same shape, they were sometimes responding to different geometric features. By contrast, they sometimes paid attention to what was apparently the same geometric feature (e.g. ‘angular/corners’ as a feature of Square), but cited different shapes as examples of it (e.g. X as similar to Square in English, Pentagon in Japanese). Thus the hypothesis was not completely supported. On the other hand, features other
than geometric ones appeared in only two instances (X in Opposite to Circle in Japanese and X in Opposite to Straight Line in English). Interestingly, features other than geometric ones were given to describe the opposite of a given shape, but not for similar shapes. This is because the two shapes concerned constituted a symbolic pair in which two opposite senses are seen: Circle (a correct mark) and X (an incorrect mark) in Japanese and Straight Line (to proceed) and X (to stop) in English. Equally interestingly, these features were cited in relation to X. As a basic shape composed of two straight lines, X is, at the same time, established as a symbol which means ‘negative’, ‘incorrect’ or ‘to forbid’ in both English and Japanese.

5.3 Metaphorical extensions

In this section, we examine the nature of metaphorical extensions in the mental space. We apply two methods of investigation: getting the participants to reflect on what they are doing as they do it and asking the participants to arrange cards on which words associated with a particular shape are written.

5.3.1 Metaphorical extensions in Thinking Out Loud (TOL)

By using Thinking Out Loud (TOL), we addressed the question of how participants deal with associations between basic shapes and their associated words (see 5.2.1), by collecting data on the participants’ on-going treatment of metaphorical extensions.

5.3.1.1 Outline

The associations between basic shapes and their associated words are based on various kinds of extension. In order to examine how the participants deal with and understand these extensions, we need to investigate their cognitive processes.

Thinking Out Loud (TOL) is an important tool for investigating cognitive processes such as metaphorical or metonymical extensions. A speaker verbalises his or her thoughts out loud, to explain the cognitive processes which produce those thoughts. Steen (1994:
107) claims that TOL plays a crucial role in the study of metaphorical extensions. He used TOL in the study of understanding metaphor in literature, where the participants explained rhetorical metaphorical expressions in their own language. We made use of TOL in the study of metaphorical extensions underlying associations between basic shapes and their related words. In our study, the participants explained metaphorical extensions in their own words. It should here be noted that TOL is the ability to recognise, estimate, and monitor one’s cognitive processes. We need to take into consideration the fact that different participants had different levels in that ability.

In the context of an interview, the participants were asked to explain their ideas about extensions in particular associations between four basic shapes and their associated words, based on the investigation in 5.2.1.

We proposed the following two hypotheses:

1) If both the English and the Japanese participants are familiar with a particular association, their explanations of the underlying metaphorical extensions between a particular shape and its associated word will be similar. This is because geometric features in basic shapes are simple and limited.

2) Participants will not be able to explain some of the underlying metaphorical extensions clearly. Deeply underlying metaphorical extensions will evoke unclear explanations or may not lead to any explanation at all.

5.3.1.2 Method

- Participants

The participants were 10 native speakers of English (6 females and 4 males), with a mean age of 38 years, and 10 native speakers of Japanese (8 females and 2 males), with a mean age of 30 years.\(^{12}\) They were all volunteers in Sydney. The English participants

\(^{12}\) Age range

<table>
<thead>
<tr>
<th></th>
<th>English</th>
<th>Japanese</th>
</tr>
</thead>
<tbody>
<tr>
<td>20s</td>
<td>4</td>
<td>7</td>
</tr>
<tr>
<td>30s</td>
<td>3</td>
<td>1</td>
</tr>
<tr>
<td>40s</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>50s</td>
<td>1</td>
<td>N/A</td>
</tr>
<tr>
<td>60s-</td>
<td>1</td>
<td>N/A</td>
</tr>
</tbody>
</table>
included 5 undergraduate students from the University of Sydney, 3 office workers and 2 others, and the Japanese included 6 postgraduate students from the University of Sydney, 3 office workers and 1 other.\textsuperscript{13} Regarding academic level, 8 of the 10 English speakers and 9 of the 10 Japanese speakers were either studying in university or were university graduates. Regarding language knowledge, 3 of the English speakers had studied Japanese for 2 or 3 years at university, while all the Japanese speakers had studied English for 6 years at junior-high and high school, and 9 had continued to study it for 2 or 4 years at university. No fully bilingual speakers of English and Japanese participated. Regarding previous participation, all the English and Japanese speakers had participated in the questionnaire survey in 5.2. There was an interval of about four months between this task and the survey in 5.2.

- Materials

Ten cards with both the particular basic shape and its associated word were prepared, as shown below.

\textsuperscript{13} 2 others (English): 1 college teacher
\hspace{1cm} 1 retiree
\hspace{1cm} 1 other (Japanese): 1 academic staff member from the University of Sydney
Notes:
1) In 5.3.1, the words in capital letters represent linguistic forms, not concepts.
2) The part of speech in a particular English word is not always consistent with that in the corresponding Japanese word (e.g. COMPLETE (adj or vt) / KANSEI (n)).
3) (E): produced mainly by English participants, (J): produced mainly by Japanese participants and translated into English, (E/J): produced by both English and Japanese participants

This classification is based on the source of a particular combination in the data collected in 5.2.1.
The indications in brackets did not appear on the cards which were presented to the participants.

From the data collected in 5.2.1, we chose these ten combinations of four basic shapes and their ten related words, which represent abstract notions or adjectives of state. The combinations consist of three groups, being combinations produced mainly by (a) English

---

14 The correspondences between the English and Japanese words are judged by the author as a native speaker of Japanese.
participants, (b) both English and Japanese, and (c) Japanese. This classification is based on the source of a particular combination in the data collected in 5.2.1.

- Procedure

First, the participants were asked to provide the same personal information as in the earlier questionnaire (5.2.1.2).\textsuperscript{15} Next, they were presented with ten cards, one by one, with the following three questions:

(1) “Do you think there is a relationship between this shape and this word?”
    If ‘Yes’, then answer question (3).
    If ‘No’, then answer question (2).

(2) “Some people thought there was a relationship between this shape and this word. Do you think it is possible?”
    If ‘Yes’, then answer question (3).

(3) “Could you explain to me why?”

The ten cards were presented in random order. All utterances were tape-recorded. The data from the recorded tapes were dealt with in the following two ways:

1) We counted the number of times ‘Yes’ and ‘No’ appeared in questions (1) and (2).
   For each combination, the percentage was calculated.

2) We classified the words, phrases and sentences in the explanations into three types: geometric, non-geometric and mixed.

5.3.1.3 Results

Table 5.6 shows the results of questions (1) and (2), and the results of examination of the existence of a particular word in the CED and the SJD.

\textsuperscript{15} We did not find any influence of participants’ religion or educational background. No participants had studied semiotics and/or symbolism.
<table>
<thead>
<tr>
<th>No</th>
<th>Shape</th>
<th>English word / Japanese word</th>
<th>Q(1) Yes (%)</th>
<th>Q(2) No (%)</th>
<th>CED Yes (%)</th>
<th>No (%)</th>
<th>SJD</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Circle</td>
<td>‘CALM’ / ‘ODAYAKA NA’</td>
<td>Q(1) 50</td>
<td>Q(2) 50</td>
<td>60</td>
<td>40</td>
<td>Y</td>
</tr>
<tr>
<td>2</td>
<td>Circle</td>
<td>‘COMPLETE’ / ‘KANJI’</td>
<td>Q(1) 90 (Y)</td>
<td>Q(2) 10</td>
<td>40</td>
<td>60 (Y)</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Circle</td>
<td>‘CORRECT’ / ‘TADASHI’</td>
<td>Q(1) 70</td>
<td>Q(2) 0</td>
<td>100</td>
<td>0</td>
<td>Y</td>
</tr>
<tr>
<td>4</td>
<td>Circle</td>
<td>‘HAPPY’ / ‘SIWASE’</td>
<td>Q(1) 60</td>
<td>Q(2) 40</td>
<td>60</td>
<td>40</td>
<td>N</td>
</tr>
<tr>
<td>5</td>
<td>Circle</td>
<td>‘HARMONY’ / ‘TYOOWA’</td>
<td>Q(1) 70</td>
<td>Q(2) 20</td>
<td>80</td>
<td>20</td>
<td>N</td>
</tr>
<tr>
<td>6</td>
<td>X</td>
<td>‘WRONG’ / ‘MATIGAI’</td>
<td>Q(1) 100</td>
<td>Q(2) 0</td>
<td>100</td>
<td>0</td>
<td>Y</td>
</tr>
<tr>
<td>7</td>
<td>Square</td>
<td>‘BORING’ / ‘TAIKUTU NA’</td>
<td>Q(1) 50</td>
<td>Q(2) 20</td>
<td>10</td>
<td>90</td>
<td>N</td>
</tr>
<tr>
<td>8</td>
<td>Square</td>
<td>‘RELIEVED’ / ‘ANSIN NA’</td>
<td>Q(1) 0</td>
<td>Q(2) 20</td>
<td>30</td>
<td>70</td>
<td>N</td>
</tr>
<tr>
<td>9</td>
<td>Square</td>
<td>‘RIGID’ / ‘KATAI’</td>
<td>Q(1) 70</td>
<td>Q(2) 20</td>
<td>60</td>
<td>40 (Y)</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>Straight line</td>
<td>‘BORING’ / ‘TAIKUTU NA’</td>
<td>Q(1) 80</td>
<td>Q(2) 20</td>
<td>30</td>
<td>70</td>
<td>N</td>
</tr>
</tbody>
</table>

Notes:
1) Q(1): Question (1): 'Do you think there is a relationship between this shape and this word?'
   Q(2): Question (2): 'Some people thought there was a relationship between this shape and this word. Do you think it is possible?'
2) Yes / No  Question (1): 'Yes' + 'No' = 100 (%) (10 participants)
   Question (2): 'Yes' + 'No' = Percentage of 'No' in question (1).
3) CED / SJD
   Y means that the CED or the SJD has the word as a sense in the entry indicating a particular shape.
   (Y) means that the CED or the SJD has the word as part of a sense in the entry indicating a particular shape
   N means that the CED or the SJD has no word as a sense in the entry indicating a particular shape.

Table 5.6 Percentage of associations between basic shapes and their associated words

In Table 5.6, the total sum of ‘Yes’ and ‘No’ responses in question (1) is always one hundred per cent, while the total sum of ‘Yes’ and ‘No’ responses in question (2) is the percentage of ‘No’ responses in question (1).

From the results of question (1) three important patterns emerge. First, in both English and Japanese, the associations between particular basic shapes and their associated words are random in the combinations Circle/CALM and Circle/HAPPY. Second, some associations are random in one language but significant in the other language; for example, there are significant associations in Circle/COMPLETE in English and Circle/CORRECT in Japanese, and there is significant lack of associations in Square/RELIEVED in English and...
Square/BORING in Japanese. Finally, in both English and Japanese, there are significant associations in X/WRO

We now consider the effect of the existence of a particular word as a sense in the CED or the SJD. If the word exists as a sense under a particular entry, the percentage of ‘Yes’ responses in question (1) is high, indicating a close association between a given shape and the associated word (e.g. Circle/COMPLETE in English, and Circle/CORRECT in Japanese). However, even some combinations in which no word can be found as a sense in the CED or the SJD show a high percentage of ‘Yes’ responses (e.g. Circle/HARMONY in Japanese, and Straight Line/BORING in English). The existence of the word as a sense in the CED or the SJD is not always consistent with close relationships between basic shapes and their associated words.

It is not important if the percentage of ‘Yes’ responses is high in question (2). This is because most participants can imagine or guess the relationships between particular basic shapes and their associated word. However, it is important if the percentage of ‘No’ responses is high. This is the case in Square/BORING and Straight Line/BORING in Japanese, and Square/RELIEVED in English.

The explanations given in question (3) are now examined. Examples of participants’ utterances for the explanations, which were tape-recorded, are transcribed in Appendix 7, and all explanations are shown in Appendix 8. Before examining the explanations in each combination, we consider how the participants produced words and sentences in TOL. There are six points to note, as shown below.

1) Most participants spoke the word indicating the basic shape concerned at the beginning of their explanations (e.g. ‘circle’ in the combination Circle/CALM, ‘square’ in Square/BORING). The participants used the word as the starting point of their explanations.

2) Some participants produced a list of partially synonymous words and phrases (e.g. ‘a relaxing feeling’, ‘peace’, ‘completeness’ and ‘calmness’ in Circle/HAPPY in English, ‘warm’, ‘a soft feeling’ and ‘not bitter’ in Circle/SIWAWE (HAPPY) in Japanese).

---

16 In Circle/CORRECT in English, the percentage of ‘Yes’ responses is high (70%). This is attributable to the influence of Japanese as we shall see later in this section.
3) Some participants used words and phrases to develop an argument (e.g. ‘not sharp edged, not pointy’, ‘smooth’ and ‘comfortable looking’ in Circle/HAPPY in English, ‘angular’, ‘rough, careless’ and ‘taciturn’ in Square/TAIKUTU NA (BORING) in Japanese). If these words and phrases have connecting mental pictures, the mental pictures may shift from one to another.

4) Some participants produced a set of words and phrases in which geometric factors, non-geometric factors, and the mixed factors mingled (e.g. ‘no intersection’, ‘no stress’, ‘inclusive’ and ‘working together in a circle’ in Circle/HARMONY in English, ‘no corners’, ‘happy’, ‘encompassed’ and ‘peaceful’ in Circle/TYOOWA (HARMONY) in Japanese).

5) Some participants used the associated words concerned in the middle of their explanations (e.g. ‘never ending’, ‘COMPLETE’ and ‘no start, no finish’ in Circle/COMPLETE in English, ‘good’, ‘OK’, ‘COMPLETE’ and ‘done’ in Circle/KANSEI (COMPLETE) in Japanese). If the words preceding and following the associated words have connecting mental pictures, the associated words may play a role in mediating between the two mental pictures.

6) Some participants repeated the same word (e.g. ‘a straight line’, ‘not interesting’ and ‘(a) straight line’ in Square/BORING in English, ‘not pointy’, ‘not harmful’, and ‘not pointy’ in Circle/ODAYAKA NA (CALM) in Japanese). Repetition of the same word suggests that the particular mental picture connected with the word was important.

Explanations given by the participants in answering question (3) are now examined for each combination.

**Circle/CALM**: Three Japanese participants cited ‘not pointy’ as geometric factors, and two of them gave ‘not harmful’ and ‘a soft feeling’ as non-geometric factors.

Non-geometric factors: two Japanese gave ‘TYOOWA’ (HARMONY), which was one of the words associated with Circle in this task, indicating associations specific to Japanese: one concerns homophones (‘wa’ (wheel) and ‘wa’ (peace, calmness) in TYOOWA (HARMONY)) and the other concerns shared ideographs (‘en’ (circle) in TYOOWA (HARMONY)) and the other concerns shared ideographs (‘en’ (circle) in...
‘enman’ (HARMONY, peace).\textsuperscript{17}

Mixed factors: three English participants cited ‘COMPLETE(NESS)’ which was one of the words associated with Circle in this task.

**Circle/COMPLETE:** Three English and four Japanese participants gave similar geometric factors (e.g. ‘The line which constructs it is joined’ and ‘no breaks’).

Non-geometric factors: three Japanese cited ‘CORRECT’ which was one of the words associated with Circle in this task.\textsuperscript{18}

Mixed factors: four English participants gave ‘no start, no finish’ and ‘endless(ness)’.

**Circle/CORRECT:** Most explanations in both English and Japanese were non-geometric. Four of the five English participants who gave explanations said that the association was influenced by knowledge of Japanese culture.\textsuperscript{19} Seven English participants answered ‘Yes’ in question (1). It is reasonable to suppose that at least three of them had knowledge of the association between Circle and CORRECT in Japanese culture.\textsuperscript{20} The remaining three participants who answered ‘No’ in question (1) also answered ‘No’ in question (2). This means that the association was not usual in English culture. All the ten non-geometric factors in Japanese were ‘educational’ or ‘conventional’. Four Japanese participants explicitly mentioned the words ‘CALM’, 'COMPLETE', ‘HAPPY’ and ‘HARMONY’, which were the words associated with Circle in this task.

**Circle/HAPPY:** Most explanations given by the English participants were non-geometric. Five English participants cited ‘face’. This is possibly because Circle was connected to the smiley face icon 😊. In Japanese, four participants gave ‘no corners’ or ‘not angular’ as geometric factors. As non-geometric factors, the Japanese participants cited various words and phrases, and no major patterns of explanation emerged apart from the associations about homophones (‘wa’ (wheel) and ‘wa’ (peace, calmness)) in *TYOOWA* (HARMONY) and shared ideographs ‘en’ (circle) in ‘enman’ (HARMONY, peace)) mentioned under

\textsuperscript{17} The Chinese characters 和 (‘wa’ (peace, calmness)) of the word 和 (‘TYOOWA’ (HARMONY)) and 輪 (‘wa’ (wheel)) are homophones.

The Chinese character 圓 (‘en’ (circle)) is found in the word 圓滿 (‘enman’ (HARMONY, peace)).

\textsuperscript{18} Two of the participants gave ‘CORRECT’ and the remaining one cited ‘good’, ‘OK’ and ‘done’ which were based on the relationship between Circle and ‘CORRECT’ in Japanese.

\textsuperscript{19} The remaining non-geometric factor given was ‘to highlight, to bring forward, to emphasise the area’.

\textsuperscript{20} Three of the ten English participants had studied Japanese for 2 or 3 years at universities, and they must have learned the association between Circle and CORRECT, because that is one of the most basic facts of Japanese culture.
Circle/CALM: The English participants cited many geometric factors (e.g. ‘not straight line’, ‘symmetrical’, ‘not angular’ and ‘no crossing points’), while only two geometric factors (‘round’ and ‘no corners’) were given by two Japanese.

Non-geometric factors: eight Japanese participants cited various factors, and three of them gave associations about homophones (‘wa’ (wheel) and ‘wa’ (peace, calmness) in TYOOWA (HARMONY)) mentioned under Circle/CALM and Circle/HAPPY.

Mixed factors: three English participants mentioned ‘COMPLETE’, which was one of the words associated with Circle in this task.

X/WRONG: This association was symbolic for both the English and Japanese participants. Most explanations, in both English and Japanese, were non-geometric, and included ‘educational’ or ‘conventional’. Two English and two Japanese participants gave a plausible explanation that crossing two sticks meant ‘Don’t come’.

Square/BORING: In both English and Japanese, no major patterns of explanation emerged.

Square/RELIEVED: Only two English participants gave explanations, and no points worth noting were seen. Three Japanese participants gave ‘stable’ and two other cited ‘in a container’, ‘in a house’ or ‘being in a square’ as the mixed factors.

Square/RIGID: Geometric factors in English included ‘corners, edged’, ‘straight, not round’ and ‘solid’. All geometric factors in Japanese were ‘corners, angles’.

Straight Line/BORING: Four English participants cited ‘no variation’, ‘not flexible’ or ‘not changing’. No other points worth noting were made.

From the observations above, some factors were very important to establish particular associations between basic shapes and words. In some associations, geometric factors predominated (e.g. Square/RIGID in both English and Japanese). In most associations, however, non-geometric factors and mixed factors played important roles in the associations. Some of the associations were closely involved with particular geometric factors, while others had nothing to do with them. For example, some associations were symbolic (e.g. Circle/CORRECT in Japanese, X/WRONG in both English and Japanese).

21 See Footnote 17.
The relationship between the shape and its associated word was ‘conventional’ and/or ‘educational’. In Japanese, some associations were based on homophones and/or shared ideographs (e.g. Circle/ODAYAKA NA (CALM) and Circle/SIAWASE (HAPPY)).

The first hypothesis, about the similarity in participants’ explanations of familiar associations, must be revised. Even though both the English and the Japanese participants were familiar with a particular association, they often provided different explanations of underlying metaphorical extensions between a shape and its associated word. As mentioned above, both the English and the Japanese participants cited different factors, not only in non-geometric factors and mixed factors but also in geometric factors which were generally limited in basic shapes.

The second hypothesis about vagueness of participants’ explanations is supported. Some participants showed difficulty in explaining (deeply) underlying metaphorical extensions. Even taking individual ability in Thinking Out Loud into account, we can assume that the association between a shape and its associated word is not always stable but shifting within a certain range.

5.3.2 Relationship between two words related to basic shapes

In the preceding section, we observed that associations between particular basic shapes and words were supported by various geometric and non-geometric associations. We proposed that these associations are partly based on differences of degree in the underlying metaphorical extensions.

In this section, we attempt to grasp the relationship between two words in metaphorical (or metonymical) extensions. The task used was to ask the participants to arrange, on a sheet of paper, cards on which words associated with a particular shape were written. We then investigated the number of participants offering a given word and the distance between the arranged cards.

5.3.2.1 Outline

In 5.2.1, it was demonstrated that a particular shape provoked various words and that
the relationship between a particular shape and its associated word appeared to be unstable and to shift within a certain range in 5.3.1. How do we investigate the relationship between shapes and their associated words? We cannot address this question by looking at a single relationship, because the relationships between the shapes and their related words are relative, not absolute. Comparing multiple relationships should assist in understanding the differences in the relationships.

The task used was to ask the participants to use their intuition to arrange cards on which words associated with a particular shape were written. We investigated the number of participants offering a given word and the distance between the cards.

We posited the hypothesis that, when the participants thought that two words were closely related they placed the words close together.

5.3.2.2 Method

- Participants

The participants were the same as in 5.3.1.2.

- Materials

Three sets of 20 cards and three sheets of paper were used. On the 20 small cards (up to 3.0 x 6.0 cm) which had different forms and sizes, ‘CIRCLE’ (‘SQUARE’ or ‘STRAIGHT LINE’) and 19 other words related to Circle (or Square or Straight line) were written with one short sentence (or phrase) to identify each word. These words were based mainly on the data collected in 5.2.1. Five of the 20 words were produced only by English participants, the other five were produced only by Japanese, and were translated into English. The remaining ten were produced by both English and Japanese. These 20 words are shown below and in Appendix 9.

---

22 In 5.3.2, the words in capital letters represent linguistic forms, not concepts.
23 The correspondences between the English and Japanese words are judged by the author as a native speaker of Japanese.
24 For Circle, five of the twenty words were produced only by English participants, the other four were produced only by Japanese, and were translated into English. The remaining eleven were produced by both English and Japanese.
<table>
<thead>
<tr>
<th>No</th>
<th>Circle</th>
<th>E/J</th>
<th>Square</th>
<th>E/J</th>
<th>Straight line</th>
<th>E/J</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>CYCLE / SAIKURU</td>
<td>E</td>
<td>BLOCK / BUKOKU</td>
<td>E</td>
<td>BASE / DODAI, KISO</td>
<td>E</td>
</tr>
<tr>
<td>2</td>
<td>ENCOMPASS / TORIKAKOMU</td>
<td>E</td>
<td>BORING / TAIKUTU NA</td>
<td>E</td>
<td>BORING / TAIKUTU NA</td>
<td>E</td>
</tr>
<tr>
<td>3</td>
<td>ETERNITY / EIJEN</td>
<td>E</td>
<td>CONSERVATIVE / Hosuteki NA</td>
<td>E</td>
<td>DETERMINED / KESSINSITEIRU</td>
<td>E</td>
</tr>
<tr>
<td>4</td>
<td>GROUP / GURUUPU</td>
<td>E</td>
<td>FRAME / GAKU</td>
<td>E</td>
<td>DIRECT / TYOKUSU NO</td>
<td>E</td>
</tr>
<tr>
<td>5</td>
<td>WORLD / SEKAI</td>
<td>E</td>
<td>OLD-FASHIONED / KOHUU NA</td>
<td>E</td>
<td>NORMAL / HUTUU NO, TUUZYOO NO</td>
<td>E</td>
</tr>
<tr>
<td>6</td>
<td>BALL / BOORU</td>
<td>E/J</td>
<td>ANGULAR / KADOBATTA</td>
<td>E/J</td>
<td>BORDER / KYOOKAI(SE)</td>
<td>E/J</td>
</tr>
<tr>
<td>7</td>
<td>BRIGHT / AKARUI</td>
<td>E/J</td>
<td>BALANCED / BARANSETU NO TORETA</td>
<td>E/J</td>
<td>CONTINUITY / ZIZOKUSEI</td>
<td>E/J</td>
</tr>
<tr>
<td>8</td>
<td>CALM / ODAYAKA NA</td>
<td>E/J</td>
<td>BOX / HAKO</td>
<td>E/J</td>
<td>DIRECTION / HOOKOO</td>
<td>E/J</td>
</tr>
<tr>
<td>9</td>
<td>CIRCLE / EN, MARU</td>
<td>E/J</td>
<td>ENCLOSURE / KAKOWARETA BASYO</td>
<td>E/J</td>
<td>FLAT / TAIKUNA</td>
<td>E/J</td>
</tr>
<tr>
<td>10</td>
<td>COMPLETE / KANSEISITA</td>
<td>E/J</td>
<td>HARSH / TOGETOGESII</td>
<td>E/J</td>
<td>HORIZON / TESSHU or</td>
<td>E/J</td>
</tr>
<tr>
<td>11</td>
<td>CORRECT / TADASII</td>
<td>E/J</td>
<td>NEATLY / KITYOOMEN</td>
<td>E/J</td>
<td>INFINITY / MUGEN NO</td>
<td>E/J</td>
</tr>
<tr>
<td>12</td>
<td>HAPPY / SIAWASE NA</td>
<td>E/J</td>
<td>RIGID / KATAI</td>
<td>E/J</td>
<td>NEATLY / KITYOOMEN</td>
<td>E/J</td>
</tr>
<tr>
<td>13</td>
<td>HARMONY / TYOOWA</td>
<td>E/J</td>
<td>SQUARE / SEIHookei</td>
<td>E/J</td>
<td>ROAD / MITI</td>
<td>E/J</td>
</tr>
<tr>
<td>14</td>
<td>MONEY / KANE</td>
<td>E/J</td>
<td>STRONG / GANZYOO NA</td>
<td>E/J</td>
<td>STEADY / ANTEISITA</td>
<td>E/J</td>
</tr>
<tr>
<td>15</td>
<td>ROLL / KOROGARU</td>
<td>E/J</td>
<td>STUBBORN / GANKO NA</td>
<td>E/J</td>
<td>STRAIGHT LINE / TYOKUSEN</td>
<td>E/J</td>
</tr>
<tr>
<td>16</td>
<td>SMOOTH / NAMERAKA NA</td>
<td>E/J</td>
<td>BLOCKS / TUMIKI</td>
<td>J</td>
<td>HONEST / SYOOSHIKU NA</td>
<td>J</td>
</tr>
<tr>
<td>17</td>
<td>HOLE / ANA</td>
<td>J</td>
<td>RELIEVED / ANSIN NA</td>
<td>J</td>
<td>LOGICAL / RIRONTEKI NA</td>
<td>J</td>
</tr>
<tr>
<td>18</td>
<td>PLUMP / HUKUYOKA</td>
<td>J</td>
<td>ROOM / HEYA</td>
<td>J</td>
<td>MONOTONY / TANTYOO</td>
<td>J</td>
</tr>
<tr>
<td>19</td>
<td>POND / IKE</td>
<td>J</td>
<td>SERIOUS / MAZIME</td>
<td>J</td>
<td>STRAIN / KINTYOO</td>
<td>J</td>
</tr>
<tr>
<td>20</td>
<td>SOFT / YAWARAKAI</td>
<td>J</td>
<td>TIGHT / KYUUKUTU NA</td>
<td>J</td>
<td>TIME / ZIKAN</td>
<td>J</td>
</tr>
</tbody>
</table>

Notes:
1) **Word**: The words are mainly adopted from the data collected in 5.2.1.
2) **E/J**: the origin of the word (E: produced by English participants only, J: produced by Japanese participants only and translated into English, E/J: produced by both English and Japanese participants)

The above twenty words were placed on an A3 sheet, which was divided into two adjacent frames (22.8 x 29.7 cm (about A4) and 22.8 x 8.0 cm for the margin). The instructions given to the participants were as follows:
“There seem to be lots of words associated with a shape. These are some of them, and on each card only one word is written with a related short sentence.”

Indicating a basic shape (Circle, Square, or Straight Line) and showing the set of twenty cards, “Concerning this shape, would you put and arrange these cards on this sheet according to your intuition? You don’t need to use all the cards. Put unused cards in the margin.”

- Procedure

After receiving the above instructions, the participants placed the cards on the three sheets. After they had placed all the cards for all three shapes, the participants were asked to explain their arrangements of the cards for each shape, and all their utterances were tape-recorded. The cards were pasted onto the sheets then and there. The kinds of cards used, the number of participants who used particular cards, and the distance between each card ‘CIRCLE’ (‘SQUARE’ or ‘STRAIGHT LINE’) and the other cards on the grid were investigated. The participants were only told beforehand that we were interested in the associations between a particular shape and words. The participants had not previously been told that they would be called upon to explain their arrangement of cards.

5.3.2.3 Results

First, we refer briefly to the participants’ behaviour in arranging the cards. Because the instructions were simple, most participants appeared to have no idea what to do at the beginning of the task. However, they soon started to place the cards according to their intuition. Different participants had different ways of placing the cards. Some of them started to place them from the upper left hand corner of the sheet. Some made a string of cards. Others placed their cards radiating from a given card. Appendix 10 shows two example sheets in English and Japanese. It should be noted that many participants arranged the cards through the process of changing and replacing them again and again. They must

---

25 The order of the shapes (Circle, Square, and Straight Line) was at random and the twenty cards were jumbled up.
26 The distance between the centre points of any two cards was measured because the cards had different forms and sizes.
have had and followed their own rules or principles in arranging the cards.

Before considering the number of participants offering a given word and the distance among the arranged cards, we examined the number of word groups. Almost all the participants arranged some of the cards into groups although there were no instructions to group words together. The number of word groups is shown in Table 5.7.

<table>
<thead>
<tr>
<th>Participant</th>
<th>Circle</th>
<th>Square</th>
<th>S. Line</th>
<th>Ave</th>
</tr>
</thead>
<tbody>
<tr>
<td>English</td>
<td>6.0</td>
<td>3.5</td>
<td>4.8</td>
<td>4.8</td>
</tr>
<tr>
<td>Japanese</td>
<td>4.4</td>
<td>3.3</td>
<td>3.3</td>
<td>3.7</td>
</tr>
<tr>
<td>Average</td>
<td>5.2</td>
<td>3.4</td>
<td>4.1</td>
<td>4.2</td>
</tr>
</tbody>
</table>

Note: The number of word groups is based on participants' explanations, not on the author's count.

Table 5.7 Average number of word groups

The number of word groups for Circle averaged 5.2, and for Square averaged 3.4. For Circle and Straight Line, the English participants (6.0 in Circle and 4.8 in Straight Line) produced more groups than Japanese (4.4 and 3.3 respectively).

When we asked the participants to explain how they formed word groups, some of them had no clear explanation. Some participants claimed that they placed some words into a particular group intuitively, and others stated that if they had been informed beforehand that they would be asked to explain the reasons for arranging the cards, they would have considered it more carefully and consciously. These remarks indicate that grouping of words was in part unconscious.

Many participants classified the words into concrete objects and abstract notions, or visible and invisible items, and some of them categorised these groups into smaller groups (e.g. more concrete objects or less abstract notions). In addition, some participants arranged the order of their groups (e.g. from concrete to abstract, and from more similar to

---

27 The time taken to arrange the cards was measured, but the measurement revealed no significant differences.

<table>
<thead>
<tr>
<th>Group</th>
<th>Mean (second)</th>
<th>SD (second)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Circle</td>
<td>(E) 176.4</td>
<td>42.4</td>
</tr>
<tr>
<td></td>
<td>(J) 151.8</td>
<td>78.5</td>
</tr>
<tr>
<td>Square</td>
<td>(E) 149.9</td>
<td>51.5</td>
</tr>
<tr>
<td></td>
<td>(J) 139.3</td>
<td>55.3</td>
</tr>
<tr>
<td>Straight line</td>
<td>(E) 165.7</td>
<td>61.4</td>
</tr>
<tr>
<td></td>
<td>(J) 143.7</td>
<td>77.1</td>
</tr>
</tbody>
</table>
the basic shape in the question to less similar in metaphorical (or metonymical) sense).

We now report the words that were chosen for each shape.

**Circle:** Seventy per cent of the English participants and 60 per cent of the Japanese placed the word CIRCLE in a group with other words. In the group containing the word CIRCLE, many words representing concrete objects were placed in both English and Japanese (e.g. BALL, E: 60%, J: 40%), and some showing abstract notions were put with CIRCLE (e.g. COMPLETE, E: 30% and CORRECT, J: 30%).

**Square:** All the English participants and 90 per cent of the Japanese placed the word SQUARE with other words into a group. Many concrete objects (e.g. FRAME, BOX, BLOCK and BLOCKS), some abstract notions (e.g. ENCLOSURE, E: 50% and J: 60%) and some adjectives of state (e.g. ANGULAR, J: 55%) were included. In English, the four words BORING, CONSERVATIVE, OLD-FASHIONED, and STUBBORN tended to be separated from SQUARE.

**Straight Line:** Eighty per cent of the English participants and 90 per cent of the Japanese placed STRAIGHT LINE with other words into a group. Some concrete objects (e.g. HORIZON and ROAD) and some adjectives of state (e.g. FLAT) were included in both English and Japanese. In English, the abstract notion CONTINUITY (50%) was put with STRAIGHT LINE.

We now discuss the number of participants who offered a particular word and the distance among the arranged cards. “High number of participants” means that 60-100 per cent of participants (6-10 participants) offered a particular word, while “Low number of participants” means that 10-50 per cent of participants (1-5 participants) offered a particular word. “Distance” is the real distance between the centre of the word indicating a particular shape and the centre of the other words on the sheet. “Short Distance” means that the words were placed near CIRCLE, SQUARE, or STRAIGHT LINE and that the distances between them were shorter than the total mean for distance. “Long Distance”

---

28 Seventy per cent of the English participants means 7 participants out of 10, and 60 per cent of the Japanese means 6 out of 10. This shows that 30 per cent of the English participants (3 out of 10) and 40 per cent of the Japanese (4 out of 10) dealt with the word CIRCLE independently.

29 CORRECT (E: 10%) and COMPLETE (J: 10%) were placed with CIRCLE.
shows that the words were placed far from CIRCLE, SQUARE, or STRAIGHT LINE and that the distances between them were longer than the total mean of distance.

The combined results of the number of participants offering a given word and the distance between CIRCLE and a given word appear in Table 5.8.
### English

<table>
<thead>
<tr>
<th></th>
<th>High number of participants (60-100%)</th>
<th></th>
<th></th>
<th></th>
<th>Low number of participants (10-50%)</th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>WORD</td>
<td>Mean (cm)</td>
<td>SD (cm)</td>
<td>(%)</td>
<td>WORD</td>
<td>Mean (cm)</td>
<td>SD (cm)</td>
<td>(%)</td>
</tr>
<tr>
<td>Short Distance</td>
<td>BALL</td>
<td>10.7</td>
<td>6.5</td>
<td>100</td>
<td>BRIGHT</td>
<td>9.5</td>
<td>5.3</td>
<td>30</td>
</tr>
<tr>
<td>(&lt;=13.3 cm)</td>
<td>CALM</td>
<td>13.2</td>
<td>6.7</td>
<td>100</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>WORLD</td>
<td>11.6</td>
<td>5.6</td>
<td>90</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>HOLE</td>
<td>12.2</td>
<td>6.5</td>
<td>90</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>CYCLE</td>
<td>8.6</td>
<td>4.6</td>
<td>80</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>HAPPY</td>
<td>11.6</td>
<td>5.2</td>
<td>80</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>COMPLETE</td>
<td>12.4</td>
<td>7.6</td>
<td>80</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Long Distance</td>
<td>HARMONY</td>
<td>15.4</td>
<td>7.0</td>
<td>100</td>
<td>GROUP</td>
<td>15.3</td>
<td>4.5</td>
<td>50</td>
</tr>
<tr>
<td>(=&gt;13.3 cm)</td>
<td>POND</td>
<td>14.0</td>
<td>8.0</td>
<td>90</td>
<td>MONEY</td>
<td>15.8</td>
<td>9.3</td>
<td>50</td>
</tr>
<tr>
<td></td>
<td>SMOOTH</td>
<td>14.1</td>
<td>7.5</td>
<td>90</td>
<td>SOFT</td>
<td>17.5</td>
<td>8.7</td>
<td>50</td>
</tr>
<tr>
<td></td>
<td>ENCOMPASS</td>
<td>14.2</td>
<td>2.4</td>
<td>90</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>CYCLE</td>
<td>14.0</td>
<td>6.3</td>
<td>80</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ETERNITY</td>
<td>14.0</td>
<td>4.9</td>
<td>70</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ROLL</td>
<td>14.3</td>
<td>5.7</td>
<td>60</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>CORRECT</td>
<td>14.3</td>
<td>5.7</td>
<td>60</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>PLUMP</td>
<td>15.5</td>
<td>7.2</td>
<td>60</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*total mean=13.3cm

### Japanese

<table>
<thead>
<tr>
<th></th>
<th>High number of participants (60-100%)</th>
<th></th>
<th></th>
<th></th>
<th>Low number of participants (10-50%)</th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>WORD</td>
<td>Mean (cm)</td>
<td>SD (cm)</td>
<td>(%)</td>
<td>WORD</td>
<td>Mean (cm)</td>
<td>SD (cm)</td>
<td>(%)</td>
</tr>
<tr>
<td>Short Distance</td>
<td>BALL</td>
<td>7.6</td>
<td>3.6</td>
<td>100</td>
<td>COMPLETE</td>
<td>14.8</td>
<td>7.2</td>
<td>50</td>
</tr>
<tr>
<td>(&lt;=13.9 cm)</td>
<td>HOLE</td>
<td>8.6</td>
<td>4.4</td>
<td>100</td>
<td>MONEY</td>
<td>10.6</td>
<td>8.9</td>
<td>40</td>
</tr>
<tr>
<td></td>
<td>CORRECT</td>
<td>9.6</td>
<td>5.5</td>
<td>100</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>WORLD</td>
<td>11.3</td>
<td>8.4</td>
<td>80</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ENCOMPASS</td>
<td>9.8</td>
<td>3.3</td>
<td>70</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>CYCLE</td>
<td>13.9</td>
<td>8.6</td>
<td>70</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ETERNITY</td>
<td>13.9</td>
<td>6.5</td>
<td>70</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>GROUP</td>
<td>11.3</td>
<td>10.1</td>
<td>60</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Long Distance</td>
<td>ROLL</td>
<td>15.2</td>
<td>7.4</td>
<td>90</td>
<td>BRIGHT</td>
<td>22.0</td>
<td>7.4</td>
<td>30</td>
</tr>
<tr>
<td>(=&gt;13.9 cm)</td>
<td>HAPPY</td>
<td>16.2</td>
<td>4.4</td>
<td>80</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>HARMONY</td>
<td>17.1</td>
<td>7.0</td>
<td>80</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>CALM</td>
<td>18.9</td>
<td>7.1</td>
<td>80</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>SOFT</td>
<td>18.4</td>
<td>4.0</td>
<td>70</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>SMOOTH</td>
<td>19.6</td>
<td>6.6</td>
<td>70</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ETERNITY</td>
<td>15.8</td>
<td>6.5</td>
<td>60</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>PLUMP</td>
<td>19.2</td>
<td>8.8</td>
<td>60</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*total mean=13.9cm

**Notes:**

1) **High number of participants (60-100%)**: (60-100% / 6-10) participants offered a particular word.
2) **Low number of participants (10-50%)**: (10-50% / 1-5) participants offered a particular word.
3) **Short Distance**: Distance between the word which indicates a particular basic shape and the other words is shorter than the total mean (cm).
4) **Long Distance**: Distance between the word which indicates a particular basic shape and the other words is longer than the total mean (cm).
5) **Mean**: Mean of the distance between the word which indicates a particular basic shape and the other words (cm)
6) **SD**: Standard deviation

---

Table 5.8 Number of participants offering a given word and the distance between CIRCLE and a given word
Each table in English and Japanese is divided into four areas by two kinds of “number of participants” (high and low) and two kinds of “distance” (short and long). For example, the word BALL in English, which was used by 100 per cent of participants (10 out of 10), falls within High number of participants, and, at the same time, BALL is in Short Distance because the mean 10.7 cm, which is the average of the ten distances between CIRCLE and BALL, is shorter than the total mean 13.3 cm. In Japanese, BRIGHT falls within Low number of participants since 30 per cent of participants (3 out of 10) used it, and, it is also in Long Distance because the average of the three distances between CIRCLE and BRIGHT (22.0 cm) is longer than the total mean 13.9 cm.

Regarding the number of participants, it is seen that most of the words are in High number of participants in both English and Japanese. These words were chosen by 60 per cent or more of the participants. Secondly, in both English and Japanese, most words representing concrete objects (e.g. BALL and HOLE) are in High number of participants. In general, extensions between basic shapes and their related concrete objects are geometrical and metonymical. For Circle, the geometrical and metonymical extensions in English and Japanese are similar to each other. Regarding the relationships between Circle and the abstract notions, there may be different metaphorical extensions between the English and Japanese participants.

In terms of distance, no obvious patterns can be seen in Table 5.8, because the standard deviations are generally high, and differ widely. However, the data for distance may suggest some important points for metaphorical (or metonymical) extensions. The combined results of the number of participants offering a given word and the distance between CIRCLE and a given word will now be reconsidered using a graph.
In Graph 5.9, the 19 words in the four areas of Table 5.8 are represented as black and white dots in each language. The dots in the upper part of the graph represent words with High number of participants, while those in the lower part show those with Low number of participants. The dots towards the left side represent the words in Short Distance and those towards the right side show those in Long Distance.

Graph 5.9 shows that, in Japanese, the more participants used a given word, the shorter the distance was between CIRCLE and the word. That is, the words which were chosen by more participants are near CIRCLE, while the words which were chosen by fewer participants are far from CIRCLE. The white dots for Japanese are distributed from the upper left to the lower right. The number of participants and the distance are negatively correlated in Japanese (r=-0.47). In English, the black dots are concentrated at the centre of the grid, but we see very weak negative correlations (r=-0.19).

---

30 In the distance between CIRCLE and a given word, CIRCLE is positioned at the left end (zero distance).
31 r: Correlation coefficient distribution (an index that quantifies the linear relationship between a pair of variables) The coefficient takes values between -1 and 1, with the sign indicating the direction of the relationship and the numerical magnitude its strength. Values of -1 and 1 indicate that the simple values fall on a straight line. A value of zero indicates the lack of any linear relationship between the two variables (Cambridge Dictionary of Statistics).
We now look at the number of participants offering a given word and the distance between SQUARE and a given word. The combined results are shown in Table 5.10.

**English**

<table>
<thead>
<tr>
<th>Short Distance (&lt;13.6 cm)</th>
<th>High number of participants (60-100%)</th>
<th>Low number of participants (10-50%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>BOX</td>
<td>Mean (cm) 7.6 SD (cm) 4.8 (%) 100</td>
<td>NEATLY</td>
</tr>
<tr>
<td>FRAME</td>
<td>8.4 4.8 100</td>
<td></td>
</tr>
<tr>
<td>BLOCKS</td>
<td>12.0 6.6 100</td>
<td></td>
</tr>
<tr>
<td>BLOCK</td>
<td>8.3 5.1 90</td>
<td></td>
</tr>
<tr>
<td>ENCLOSURE</td>
<td>11.7 3.1 90</td>
<td></td>
</tr>
<tr>
<td>ROOM</td>
<td>9.7 4.5 70</td>
<td></td>
</tr>
<tr>
<td>STRONG</td>
<td>13.5 5.2 60</td>
<td></td>
</tr>
<tr>
<td>High number of participants (60-100%)</td>
<td>Low number of participants (10-50%)</td>
<td></td>
</tr>
<tr>
<td>Block</td>
<td>Mean (cm) 7.6 SD (cm) 4.8 (%) 100</td>
<td>NEATLY</td>
</tr>
<tr>
<td>FRAME</td>
<td>8.4 4.8 100</td>
<td></td>
</tr>
<tr>
<td>BLOCKS</td>
<td>12.0 6.6 100</td>
<td></td>
</tr>
<tr>
<td>BLOCK</td>
<td>8.3 5.1 90</td>
<td></td>
</tr>
<tr>
<td>ENCLOSURE</td>
<td>11.7 3.1 90</td>
<td></td>
</tr>
<tr>
<td>ROOM</td>
<td>9.7 4.5 70</td>
<td></td>
</tr>
<tr>
<td>STRONG</td>
<td>13.5 5.2 60</td>
<td></td>
</tr>
<tr>
<td>Total mean = 13.6 cm</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Japanese**

<table>
<thead>
<tr>
<th>Long Distance (&gt;13.6 cm)</th>
<th>High number of participants (60-100%)</th>
<th>Low number of participants (10-50%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>CONSERVATIVE</td>
<td>Mean (cm) 18.9 SD (cm) 7.1 (%) 100</td>
<td>BALANCED</td>
</tr>
<tr>
<td>OLD-FASHIONED</td>
<td>15.1 8.4 80</td>
<td>HARSH</td>
</tr>
<tr>
<td>RIGID</td>
<td>15.3 5.0 80</td>
<td>SERIOUS</td>
</tr>
<tr>
<td>BORING</td>
<td>17.1 7.8 70</td>
<td>ANGULAR</td>
</tr>
<tr>
<td>STUBBORN</td>
<td>19.2 9.9 70</td>
<td>TIGHT</td>
</tr>
<tr>
<td>Total mean = 14.3 cm</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Note: see Table 5.8

**Table 5.10 Number of participants offering a given word and the distance between SQUARE and a given word**

Table 5.10 shows that many words fall within High number of participants in both English and Japanese. In particular, all words indicating concrete objects (e.g. BOX and BLOCKS) are in High number of participants. This is based on the geometrical and metonymical relationships between SQUARE and the words indicating concrete objects. For SQUARE,
geometrical and metonymical extensions are similar between English and Japanese. In English, the abstract notions BORING, CONSERVATIVE, OLD-FASHIONED and STUBBORN are all in High number of participants. In Japanese, these four abstract notions are divided into two areas: CONSERVATIVE and STUBBORN in High number of participants, BORING and OLD-FASHIONED in Low number of participants. ANGULAR, which is an adjective of state, is in High number of participants in Japanese and in Low number of participants in English.

As with Circle, there are no immediately significant points to note in distance, and we reconsider the combined results of the number of participants offering a given word and the distance between SQUARE and a given word, using a graph.

Graph 5.11 clearly shows negative correlations between the number of participants and the distance ($r=-0.65$ in English and $r=-0.72$ in Japanese). In both English and Japanese, the more participants using a given word, the shorter the distance between SQUARE and the word. Thus, words which were chosen by more participants are near SQUARE, while the words which were chosen by fewer participants are far from SQUARE.
Finally, Table 5.12 shows the combined results of the number of participants offering a given word and the distance between STRAIGHT LINE and a given word.

### English

<table>
<thead>
<tr>
<th>Short Distance ( &lt;14.0 cm)</th>
<th>High number of participants (60-100%)</th>
<th>Low number of participants (10-50%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>WORD</td>
<td>Mean (cm)</td>
<td>SD (cm)</td>
</tr>
<tr>
<td>FLAT</td>
<td>9.2</td>
<td>6.6</td>
</tr>
<tr>
<td>HORIZON</td>
<td>9.3</td>
<td>3.7</td>
</tr>
<tr>
<td>ROAD</td>
<td>10.5</td>
<td>4.4</td>
</tr>
<tr>
<td>STEADY</td>
<td>11.2</td>
<td>8.0</td>
</tr>
<tr>
<td>BORDER</td>
<td>13.1</td>
<td>5.6</td>
</tr>
<tr>
<td>CONTINUITY</td>
<td>8.7</td>
<td>6.2</td>
</tr>
<tr>
<td>Long Distance ( &gt;14.0 cm)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>BORING</td>
<td>17.1</td>
<td>5.4</td>
</tr>
<tr>
<td>DIRECTION</td>
<td>16.0</td>
<td>8.2</td>
</tr>
<tr>
<td>DIRECT</td>
<td>16.9</td>
<td>8.8</td>
</tr>
<tr>
<td>MONOTONY</td>
<td>17.3</td>
<td>7.0</td>
</tr>
<tr>
<td>INFINITE</td>
<td>14.8</td>
<td>5.8</td>
</tr>
<tr>
<td>STRAIN</td>
<td>17.6</td>
<td>8.8</td>
</tr>
</tbody>
</table>

*total mean=14.0cm

### Japanese

<table>
<thead>
<tr>
<th>Short Distance ( &lt;14.2 cm)</th>
<th>High number of participants (60-100%)</th>
<th>Low number of participants (10-50%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>WORD</td>
<td>Mean (cm)</td>
<td>SD (cm)</td>
</tr>
<tr>
<td>HORIZON</td>
<td>7.9</td>
<td>5.7</td>
</tr>
<tr>
<td>ROAD</td>
<td>8.3</td>
<td>6.6</td>
</tr>
<tr>
<td>BORDER</td>
<td>9.1</td>
<td>6.5</td>
</tr>
<tr>
<td>FLAT</td>
<td>10.5</td>
<td>5.9</td>
</tr>
<tr>
<td>BASE</td>
<td>11.7</td>
<td>5.2</td>
</tr>
<tr>
<td>Long Distance ( &gt;14.2 cm)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>MONOTONY</td>
<td>17.0</td>
<td>6.4</td>
</tr>
<tr>
<td>STEADY</td>
<td>15.6</td>
<td>6.2</td>
</tr>
<tr>
<td>TIME</td>
<td>16.8</td>
<td>7.0</td>
</tr>
<tr>
<td>CONTINUITY</td>
<td>15.4</td>
<td>8.4</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*total mean=14.2cm

Note: see Table 5.8

Table 5.12 Number of participants offering a given word and the distance between STRAIGHT LINE and a given word

Table 5.12 shows that words are not concentrated in High number of participants, in particular, in Japanese, though some words indicating concrete objects (e.g. HORIZON and ROAD) and adjectives of state (e.g. FLAT) are in High number of participants. Abstract notions such as STEADY, CONTINUITY, and MONOTONY are in High
number of participants in both English and Japanese, but BORING, INFINITE and STRAIN which are in High number of participants in English are in Low number of participants in Japanese.

The combined results of the number of participants offering a given word and the distance between STRAIGHT LINE and a given word are now reconsidered using a graph.

Graph 5.13 reveals that there are negative correlations between the number of participants offering a given word and the distance between STRAIGHT LINE and a given word (r=-0.60 in English and r=-0.75 in Japanese). In both English and Japanese, the more participants using a given word, the shorter the distance between STRAIGHT LINE and the word. That is, words which were chosen by more participants are near STRAIGHT LINE, and words which were chosen by fewer participants are far from STRAIGHT LINE.

To summarise the findings of the number of participants offering a given word and the distance between CIRCLE (or SQUARE or STRAIGHT LINE) and a given word, the results show that there is a negative correlation between high numbers of participants
assigning a given word to a basic shape and how close the participants placed that word to the shape. The hypothesis which we posited is supported.

In 3.2.1, we discussed the notions of “direction” and “distance” in metaphorical extensions. Direction in metaphorical (or metonymical) extensions is the unidirectional extension from the source to the target, and is embodied in conceptual metaphors (e.g. COMPLETENESS IS ROUNDNESS: from ROUNDNESS to COMPLETENESS). Distance represents the degree of iconicity between the source and the target. A short distance shows that the source is more similar to the target in the metaphorical sense (e.g. ROUNDNESS and COMPLETENESS), while a long distance shows that the source is less similar to the target (e.g. ROUNDNESS and PEACEFULNESS).

In this task, a “direction” means the connection of the word indicating a particular basic shape and the other words (e.g. CIRCLE-BALL, CIRCLE-COMPLETE). The degree of fixedness is thought to be measured by the percentage of the number of participants assigning a given word to a basic shape. A “distance” is the real distance between the word indicating a particular basic shape and the other words.

Judging from the above findings, we suggest that direction and distance among words which are associated with Circle, Square and Straight Line exist in underlying metaphorical (or metonymical) extensions. Direction and distance in iconic metaphorical extensions are discussed later in Chapter 6.

5.4 Two follow-up surveys

Up to this point high iconicity has been investigated in basic shapes (5.2) and metaphorical extensions (5.3). We follow up on some of these investigations, focusing on the following points:
1) In connection with 4.1 and 5.3, questionnaires are used to examine participants’ use and understanding of particular metaphorical extensions in basic shapes.
2) Conversely to 5.2.1, questionnaires are used to investigate associations between a given word and its corresponding basic shapes.

5.4.1 A cross-linguistic investigation into metaphorical expressions
In 5.3.1, we reported the results of a task in which the English and Japanese participants gave various explanations of underlying metaphorical (or metonymical) extensions in associations between particular basic shapes and their associated words. In 5.3.2, we observed some correlations between the number of participants offering a given word and the distance between the word indicating a particular basic shape and the other words, in metaphorical (or metonymical) extensions. These investigations all concerned existing metaphorical (or metonymical) extensions in English and Japanese. In this section, we examine how the use or understanding of existing metaphorical extensions affects the understanding of new metaphorical extensions. The English and Japanese participants here encountered both familiar and unfamiliar metaphorical extensions.

5.4.1.1 Outline

Our two hypotheses were:

1) The use and understanding of existing metaphorical expressions have some influence on how participants interpret new metaphorical expressions. New metaphorical expressions which do not resemble existing metaphorical expressions may confuse participants, whereas existing metaphorical expressions may be understood without difficulty.

2) In the relationship between metaphorical expressions and their related basic shapes, the more frequently the participants use the metaphorical expressions, the more attention they pay to the shapes.

In order to test the above hypotheses, some existing metaphorical expressions were listed involving basic shapes in English and Japanese and one new metaphorical expression was created for this investigation. We asked both the English and the Japanese participants whether they used these expressions and what they meant by the expressions. Then we examined how much each expression was involved with a particular basic shape, using a five-point evaluation scale.

In this follow-up survey, we found that existing metaphorical extensions in both English and Japanese had a strong influence on the understanding of a new expression based on a round shape, and that English participants did not relate the expressions to the
shapes, while Japanese participants tended to relate the expressions to the shapes more frequently.

5.4.1.2 Method

- Participants

The participants were 33 native speakers of English (14 females and 19 males), with a mean age of 41 years, and 35 native speakers of Japanese (17 females and 18 males), with a mean age of 36 years. They were all volunteers in Sydney, London, Tokyo, Nagoya and Osaka. The English participants included 2 undergraduate students from the University of Sydney, 4 postgraduate students from London University, 18 office workers and 9 others, and the Japanese included 1 undergraduate student and 3 postgraduate students from the University of Sydney, 1 postgraduate student from London University, 21 office workers and 9 others. Regarding educational level, 22 of the 33 English speakers and 30 of the 35 Japanese speakers either were studying at university or were university graduates. Regarding language knowledge, 5 of the English speakers had studied Japanese for 2 or 3 years at university, while all the Japanese speakers had studied English for 6 years at junior-high and high school, and 31 of them had continued to study it for 2 or 4 years at university. No fully bilingual speakers of English and Japanese participated. Regarding previous participation, 15 of the 33 English speakers (about 45%) and 18 of the 35 Japanese speakers (about 80%) had participated in the questionnaire survey in 5.2, while 6

<table>
<thead>
<tr>
<th>Age range</th>
<th>English</th>
<th>Japanese</th>
</tr>
</thead>
<tbody>
<tr>
<td>20s</td>
<td>8</td>
<td>11</td>
</tr>
<tr>
<td>30s</td>
<td>9</td>
<td>15</td>
</tr>
<tr>
<td>40s</td>
<td>8</td>
<td>6</td>
</tr>
<tr>
<td>50s</td>
<td>4</td>
<td>N/A</td>
</tr>
<tr>
<td>60s-</td>
<td>4</td>
<td>3</td>
</tr>
</tbody>
</table>

9 others (English):
- 1 academic staff member from the University of Sydney
- 1 administrative staff member from the University of Sydney
- 2 house-keepers
- 4 retirees
- 1 self-employed

9 others (Japanese):
- 1 academic staff member from the University of Sydney
- 2 government workers
- 1 high school teacher
- 2 house-keepers
- 3 retirees
of the 33 English speakers (about 18%) and 7 of the 35 Japanese speakers (about 20%) had participated in the task in 5.3.

This questionnaire survey was conducted about eight months after the task in 5.3.

- Materials

The questionnaire consisted of three parts, personal information followed by two questions. The first question is dealt with in this section, and the second in the next section. Information included the same questions as in the first questionnaire (5.2.1.2). The information was thought in case the participants’ religion and educational background had some influence on their use and understanding of metaphorical expressions. The questionnaire sheets are illustrated in Appendix 11. The six metaphorical expressions employed in this section are shown below.

<table>
<thead>
<tr>
<th>No</th>
<th>Expression / Meaning</th>
<th>Origin</th>
<th>Shape</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>He was roundly defeated. / He was completely defeated.</td>
<td>E / (J)</td>
<td>Circle</td>
</tr>
<tr>
<td>2</td>
<td>She settled the matter roundly. / She settled the matter peacefully.</td>
<td>J</td>
<td>Circle</td>
</tr>
<tr>
<td>3</td>
<td>I spent the weekend roundly. / (no stable meanings)</td>
<td>(new)</td>
<td>Circle</td>
</tr>
<tr>
<td>4</td>
<td>He faced the situation squarely. / He faced the situation directly, without trying to avoid it.</td>
<td>E</td>
<td>Square</td>
</tr>
<tr>
<td>5</td>
<td>his or her square character / his or her conservative character (E) / his or her serious character (J)</td>
<td>E / J</td>
<td>Square</td>
</tr>
<tr>
<td>6</td>
<td>a square meal / a proper meal</td>
<td>E</td>
<td>Square</td>
</tr>
</tbody>
</table>

Note: The columns headed *Origin* and *Shape* do not appear on the questionnaire. Although there is no metaphorical expression such as ‘1.He was roundly defeated (Kare wa maruku utimakasareta)’ in Japanese, ‘maru’ (round) means ‘a whole (n), ‘full (prefix)’ and ‘whole (prefix)’ in the SJD (see 4.1). The relationship between ROUNDNESS and COMPLETENESS is not unusual in Japanese. 1 is thus dealt with as being partly of Japanese origin (J).

Expressions 1, 4, 5 and 6 were based on examples in the CED and the OED, while 2 and 5

---

34 No participants had studied semiotics and/or symbolism. We did not find any influence of participants’ religion or educational background.
were based on the SJD.\textsuperscript{35} Expression 3 was newly created for this investigation. These expressions were presented in isolation. In general, divorcing metaphorical expressions from context may have puzzled the participants in their understanding of the expressions. However, the metaphorical expressions employed were unlikely to be affected by any context, since they were highly idiomatic expressions except for 3. It was also conceivable that the participants may have established their own contexts to enable them to understand the expressions.

The above metaphorical expressions were presented in the order 1, 2, 3, 4, 5 and 6 to the English participants, and in the order 2, 1, 3, 5, 4 and 6 to the Japanese.

In the questionnaire sheets, the following questions were given to the participants:

(1) “Do you use or hear the expression (e.g. ‘He was roundly defeated’)?”
(2) If Yes, “Write down its meaning briefly. Why do you think so?”
   If No, or I DON’T KNOW, “Do you imagine its meaning? Why do you think so?”
(3) “When you hear the expression (e.g. ‘He was roundly defeated.’), does the word related to a particular shape (e.g. ‘roundly’) make you think of a particular shape (e.g. ‘a round shape’)?” [a five-point evaluation scale was used (strongly - mixed not at all)]

● Procedure

The questionnaires were kept by the participants to complete over a maximum two-week period. The data from the completed questionnaires were dealt with in the following three ways:

1) The number of ‘Yes’, ‘No’ and ‘I don’t know’ responses were counted for use of the expressions. For a particular expression, a percentage was calculated of the answers compared to all answers.
2) “Primary meanings (and reasons)” were defined as those which nine per cent or more of the participants (three participants or more) cited. For each expression, a percentage was calculated of the primary meanings (and reasons) compared to all meanings (and reasons).

\textsuperscript{35} CED: Collins COBUILD English Dictionary  OED: Oxford English Dictionary
SJD: SHIN-JIRIN (Dictionary)
3) A score was given for each of the ticks in the boxes of the five-point evaluation scale. The average score was calculated and connected to the use of the expressions.

5.4.1.3 Results

First, the use of six metaphorical expressions is examined. Table 5.14 below shows the percentage of the use of the expressions in question (1).

<table>
<thead>
<tr>
<th>No</th>
<th>Expression</th>
<th>O</th>
<th>P</th>
<th>Yes (%)</th>
<th>No (%)</th>
<th>DK (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>He was roundly defeated.</td>
<td>E / (J)</td>
<td>E</td>
<td>36.4</td>
<td>60.6</td>
<td>3.0</td>
</tr>
<tr>
<td></td>
<td></td>
<td>J</td>
<td>2.9</td>
<td>94.3</td>
<td>3.0</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>She settled the matter roundly.</td>
<td>J</td>
<td>E</td>
<td>3.0</td>
<td>97.0</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>J</td>
<td>97.1</td>
<td>2.9</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>I spent the weekend roundly.</td>
<td>(New)</td>
<td>E</td>
<td>100.0</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>J</td>
<td>91.4</td>
<td>8.6</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>He faced the situation squarely.</td>
<td>E</td>
<td>E</td>
<td>84.8</td>
<td>15.2</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>J</td>
<td>91.4</td>
<td>8.6</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>his or her square character</td>
<td>E / J</td>
<td>E</td>
<td>57.6</td>
<td>42.4</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>J</td>
<td>40.0</td>
<td>54.3</td>
<td>5.7</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>a square meal</td>
<td>E</td>
<td>E</td>
<td>90.9</td>
<td>9.1</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>J</td>
<td>97.1</td>
<td>2.9</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Notes:
1) **O**: Origin, **E**: English, **J**: Japanese
2) **P**: Participants, **E**: English, **J**: Japanese
3) **Yes/No/DK**: 'Yes', 'No' and 'I don't know' in question (1)

Table 5.14 Percentage of the use of the expression in question (1)

It was expected that the English and Japanese participants would use or hear more frequently the metaphorical expressions of their own language, but in practice they did not always do so. In 1 ‘He was roundly defeated’, the majority of English participants (60.6%) gave negative answers. In 5 ‘his or her square character’, which is of both English and Japanese origin, a small majority of English participants (57.6%) gave affirmative answers and a small majority of Japanese participants (54.3%) answered in the

---

36 Breakdown by age of numbers of participants giving negative answers of question (1), numbers 1 and 5.

<table>
<thead>
<tr>
<th></th>
<th>1(E): 60.6% (20 out of 33)</th>
<th>5(E): 57.6% (19 out of 33)</th>
<th>5(J): 54.3% (19 out of 35)</th>
</tr>
</thead>
<tbody>
<tr>
<td>20s</td>
<td>79 (6/8)</td>
<td>50 (4/8)</td>
<td>64 (7/11)</td>
</tr>
<tr>
<td>30s</td>
<td>78 (7/9)</td>
<td>56 (5/9)</td>
<td>60 (9/15)</td>
</tr>
<tr>
<td>40s</td>
<td>38 (3/8)</td>
<td>50 (4/8)</td>
<td>33 (2/6)</td>
</tr>
<tr>
<td>50s</td>
<td>75 (3/4)</td>
<td>100 (4/4)</td>
<td>N/A (-)</td>
</tr>
<tr>
<td>60s-</td>
<td>25 (1/4)</td>
<td>50 (2/4)</td>
<td>33 (1/3)</td>
</tr>
</tbody>
</table>
negative. However, in 2 ‘She settled the matter roundly’, of Japanese origin, 4 ‘he faced the situation squarely’, of English origin and 6 ‘a square meal’, of English origin, native speakers more frequently used the metaphorical expressions of their own language. For 3 ‘I spent the weekend roundly’, which was an innovative metaphorical expression, all the English participants and 91.4 per cent of the Japanese answered in the negative.

To turn now to meanings (and reasons) in the metaphorical expressions, we paid close attention to two points: comparison of the participants’ answers with the original meanings in the CED and the SJD, and the influence of existing metaphorical expressions on new ones. Appendix 12 shows primary meanings (and reasons) for the six metaphorical expressions.

1 ‘He was roundly defeated’: 91 per cent of the English participants gave the meaning ‘He was completely defeated’. The extension from ROUNDNESS to COMPLETENESS here is very strong. Although 14 per cent of the Japanese participants cited this extension, the most frequently cited meaning was ‘He was easily defeated’ (23%). This is probably due to the influence of the use of 2, which is considered next.

2 ‘She settled the matter roundly’: 86 per cent of the Japanese participants gave the meaning ‘She settled the matter peacefully’. They explained the extension from ROUNDNESS to SMOOTHNESS and PEACEFULNESS, emphasising the geometric feature ‘no corners’ for a round shape. In contrast, 42 per cent of the English participants gave ‘She settled the matter completely’, this being clearly influenced by the extension from ROUNDNESS to COMPLETENESS which was observed in 1.

3 ‘I spent the weekend roundly’: Both the English and the Japanese participants gave some meanings of this innovative metaphorical expression. In English, ‘doing a variety of activities’ (15%) and ‘I had a full busy weekend’ (9%) were cited. These meanings seemingly had little to do with the extension from ROUNDNESS to COMPLETENESS, but they indirectly connected to the extension through the iconicity among

---

37 It is likely that for some English participants, ‘his or her square character’ sounds a little strange and that they prefer ‘He or she is a square’. This might be a reason why a small majority of the English participants (57.6%) gave affirmative answers.

38 The English (or Japanese) participants were those who were potentially able to give meanings (and reasons): They were participants who answered ‘Yes’ in question (1), those who answered ‘No’ and were able to imagine meanings and reasons, and those answered ‘I don’t know’ and were able to imagine meanings and reasons.
COMPLETENESS, MANY and FULLNESS. In contrast, 20 per cent of the Japanese participants gave the extension from ROUNDNESS to PEACEFULNESS, and this was the same extension as in 2. Interestingly, the second meaning ‘without any problem’ had the reason ‘Corners indicate problems’. It is likely that the extension from ROUNDNESS to CALMNESS incorporated another sub-extension from NO CORNERS to NO PROBLEMS.

4 ‘He faced the situation squarely’: Seventy-nine per cent of the English participants cited the meaning ‘head-on’, but their reasons were varied (e.g. ‘Square’ implies directness’, ‘A right angle’ means a person having a confrontation without trying to turn away’). The source SQUARENESS and the target DIRECTNESS were here clear. Nevertheless, it did not seem easy for the English participants to give easily expressed extensions. Although 29 per cent of the Japanese participants gave the same meaning as in English (head-on), their reasons were different from English (e.g. ‘Square’ implies straightness’, ‘Squares’ indicate planes facing each other’).

5 ‘his or her square character’: Many English participants (42%) gave the meaning ‘conservative’ and the reason “Square’ is a very even, boring, or uninteresting shape’. Thirty-four per cent of the Japanese participants cited the meaning ‘inflexible’ which was based on the extension from SQUARENESS to RIGIDNESS or EXACTNESS.

6 ‘a square meal’: Eighty-five per cent of the English participants gave the meaning ‘a good full meal’. Various reasons (e.g. ‘Square’ indicates a tray for a single meal’ and ‘The meal fills up your corners’) were observed. Although we can assume the extension from SQUARENESS to FULLNESS, it is not as clear as in 5. In Japanese, most participants (84%) did not cite any meaning. It may have been difficult for them to apply existing metaphorical extensions such as from SQUARENESS to RIGIDNESS in 6 to this expression.

We turn to the scores in the relationship between the expressions and their related basic shapes in question (3). The results are shown in Table 5.15.
<table>
<thead>
<tr>
<th>No</th>
<th>Expression</th>
<th>O</th>
<th>P</th>
<th>Yes</th>
<th>No</th>
<th>DK</th>
<th>WM</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>He was roundly defeated.</td>
<td>E / J</td>
<td>E</td>
<td>1.08</td>
<td>36.4</td>
<td>1.47</td>
<td>60.6</td>
<td>2.00</td>
</tr>
<tr>
<td>2</td>
<td>She settled the matter roundly.</td>
<td>J</td>
<td>E</td>
<td>0.00</td>
<td>3.0</td>
<td>1.42</td>
<td>97.0</td>
<td>1.38</td>
</tr>
<tr>
<td>3</td>
<td>I spent the weekend roundly.</td>
<td>(New)</td>
<td>E</td>
<td>1.00</td>
<td>100.0</td>
<td>1.00</td>
<td>1.39</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>He faced the situation squarely.</td>
<td>E</td>
<td>E</td>
<td>1.57</td>
<td>84.8</td>
<td>1.00</td>
<td>15.2</td>
<td>1.48</td>
</tr>
<tr>
<td>5</td>
<td>his or her square character</td>
<td>E / J</td>
<td>J</td>
<td>2.93</td>
<td>40.0</td>
<td>1.82</td>
<td>54.3</td>
<td>3.50</td>
</tr>
<tr>
<td>6</td>
<td>a square meal</td>
<td>E</td>
<td>E</td>
<td>1.13</td>
<td>90.9</td>
<td>0.00</td>
<td>9.1</td>
<td>1.03</td>
</tr>
</tbody>
</table>

Notes:
1) O: Origin, E: English, J: Japanese
2) P: Participants, E: English, J: Japanese
3) Yes/No/DK: 'Yes', 'No' and 'I don't know' in question (1)
   WM: Weighted means of the scores of 'Yes', 'No' and 'I don't know' in question (1)
   SD: Standard deviation
4) Score: Average scores in five-point evaluation scale (0 (not related at all) to 4 (strongly related))
   %: Percentage of the use of the expression in question (1)

Table 5.15 Average score in the relationship between the metaphorical expression and its related shape

For question (3), participants were asked to mark their responses to “When you hear the expression, does the word related to a particular shape make you think of a particular shape?” on a five-point evaluation scale. Scores 0, 2 and 4 indicated ‘not related at all’, ‘mixed feeling’ and ‘strongly related’ respectively. Table 5.15 shows that most scores are less than 2. The weighted means of the average scores in Table 5.15 indicate that the relationships in English were weak and had a narrow range of score (1.00-1.72), and that the relationships in Japanese have a wide range (0.59-2.59). The differences in the weighted means of the scores between English and Japanese were not significant in 1, 4, 5 and 6 (0.44-0.67), while the difference in 2 (1.21) was significant (t=3.76, p<0.05, two-tailed). In 3, which was the innovative expression, the relationships in both English (1.00) and Japanese (0.97) were weak and little difference between them (0.03) was evident.

The correlation between the use of the metaphorical expressions and the above scores of the relationships is now investigated.
1 ‘He was roundly defeated’ (both English and Japanese origin): In English, the 36.4 per cent of the participants who answered ‘Yes’ to the question of the use of the expression had an average score of 1.08 in the relationship between the metaphorical expression and the round shape. The 60.6 per cent of the participants who answered ‘No’ had an average score of 1.47. In Japanese, most participants (94.3%) answered ‘No’ to the question, and as expected the average score (0.77) in the relationship was very low.

4 ‘He faced the situation squarely’ and 6 ‘a square meal’ (English origin): Most English participants (84.8% in 4 and 90.9% in 6) answered ‘Yes’ to the question about use of the expressions, and the average scores in the relationships between the expressions and the square shape were 1.57 and 1.13 respectively. By contrast, most Japanese (97.1%) answered ‘No’ to the question, and the average scores (0.85 in 4 and 0.57 in 6) were low.

2 ‘She settled the matter roundly’ (Japanese origin): Most Japanese participants (97.1%) answered ‘Yes’ to the question of the expression, and the average score (2.64) in the relationship between the expression and the round shape was high. Most English participants (97.0%), conversely, answered ‘No’ to the question, and the average score in the relationship was 1.42.

5 ‘his or her square character’ (both English and Japanese origin): In Japanese, the percentages of ‘Yes’ and ‘No’ responses to the question of the use of the expression were 40.0 per cent and 54.3 per cent. The average scores in the relationship between the expression and the square shape were 2.93 and 1.82 respectively, and the former was greater than the latter by more than one point. In English, the percentages of ‘Yes’ and ‘No’ responses to the question were 57.6 per cent and 42.4 per cent respectively. The average scores in the relationships were similar and high in English (1.84 and 1.54 respectively).

3 ‘I spent the weekend roundly’ (innovative): All English participants and most Japanese (91.4%) answered ‘No’ to the question about use of the expression. The average scores in the relationship between the expression and the round shape were 1.00 in English and 0.97 in Japanese.

In summary, the English participants did not strongly relate these six metaphorical expressions to shapes (1.00-1.72). When the percentages of ‘Yes’ responses to the question about use were high (84.8% in 4 and 90.9% in 6), the average scores of the
relationships between particular expressions and their related shapes were 1.57 in 4 and 1.13 in 6. When the percentages of ‘No’ responses to the question were high (97.0% in 2 and 100.0% in 3), the average scores of the relationship were 1.42 in 2 and 1.00 in 3. The Japanese participants strongly connected the expressions to their related basic shapes. When the percentage of ‘Yes’ responses to the question was high (97.1% in 2), the average score of the relationship between a particular expressions and its related shape was high (2.64 in 2). When the percentages of ‘No’ responses to the question were high (94.3% in 1, 91.4% in 3, 91.4% in 4 and 97.1% in 6), the average scores of the relationships were low (0.77 in 1, 0.92 in 3, 0.85 in 4 and 0.57 in 6).

In Table 5.15, the standard deviations of the weighted means are generally high. However, the data for average scores in the relationship between a metaphorical expression and its related shape may suggest some important points for the correlation between the percentage of the use of the expressions and the score of the relationship between the expression and its related shape. The following graph demonstrates the correlation more clearly.

In Graph 5.16, the horizontal axis shows the percentage of the use of the expression and
the vertical axis indicates the score of the relationship between the expression and its related shape (0 (not related at all) to 4 (strongly related)). As Graph 5.16 shows, the scores in Japanese were higher than those in English on the whole. In English, a tendency in which more used expressions show lower scores may be observed in the range of high percentages of use (50-100%).

In order to compensate for insufficient data on the percentage of use of the expressions in the above graph, we combined the scores of the relationship (between the expression and its related shape) and the percentage of non-use of the expression, using another graph.

Graph 5.17 shows that the scores are generally low (less than 2.00). Close examination, however, reveals that in the range of high percentages of non-use (50-100%), less used expressions (higher percentages of non-use) gave lower scores. In particular, Japanese showed this tendency.

With such a small number of metaphorical expressions, it is difficult to obtain reliable data on the correlation between the percentage of use of the expressions and the score of the relationship between the expression and its related basic shape. However, if the result from the above cross-linguistic investigation is regarded as a tendency, it gives us a clue to the question of how much native speakers of English and Japanese are aware of underlying
metaphorical extensions in using metaphorical expressions.

When the proportion of participants who recognised a metaphorical expression was around the middle, neither low nor high, the participants who recognised it more strongly asserted the relationship between the expression and its related shape. However, when the proportion of participants who recognised a metaphorical expression was low or high, the participants did not assert such a strong relationship. These phenomena may imply that more common expressions (e.g. 2 in Japanese, 4 and 6 in English) less frequently evoke their related basic shapes in the speaker’s mental space. Both the English and the Japanese participants may have used the common expressions without being aware of their underlying metaphorical extensions.

Returning to the first hypothesis, it can be stated that existing metaphorical extensions in both English and Japanese had a strong influence on the understanding of a new expression based on the round shape. For the square shape, however, no effect could be seen. The second hypothesis about the relationship between metaphorical expressions and their related basic shapes was partly supported.

5.4.2 From linguistic forms to visual pictures

Our investigation of the associations between basic shapes and words in 5.2.1 suggested the existence of mental pictures extended from given shapes (visual pictures). In this section, we examine which basic shapes the participants associated with a particular word and which factors enabled the participants to conjure up the shapes. Here we re-examine the notion of mental pictures. This investigation is the reverse of that described in 5.2.1.

5.4.2.1 Outline

Prior to our investigation we posited the hypothesis that, from a particular word, many and varied basic shapes would be drawn, some of which would be common to English and Japanese because they were based on a limited number of geometric features, whereas others would be specific to each language, because they were based on metaphorical extensions peculiar to one language.

In order to test the above hypothesis, we showed seven words to the participants and
asked them to draw the associated basic shapes. We classified the basic shapes and examined the underlying metaphorical extensions.

5.4.2.2 Method

○ Participants

The participants were the same as in 5.4.1.2.

○ Materials

Question (3) of the same questionnaire as in 5.4.1 was used for this investigation (see Appendix 11). The seven words employed are shown below.

<table>
<thead>
<tr>
<th>No</th>
<th>English</th>
<th>Japanese</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>boring</td>
<td>taikutu na</td>
</tr>
<tr>
<td>2</td>
<td>complete</td>
<td>kansei sita</td>
</tr>
<tr>
<td>3</td>
<td>direct</td>
<td>tyokusetu no</td>
</tr>
<tr>
<td>4</td>
<td>problematic</td>
<td>mondai no aru</td>
</tr>
<tr>
<td>5</td>
<td>relieved</td>
<td>ansin na</td>
</tr>
<tr>
<td>6</td>
<td>tidy</td>
<td>kityoomen na</td>
</tr>
<tr>
<td>7</td>
<td>uneasy</td>
<td>huan na</td>
</tr>
</tbody>
</table>

These are all abstract words, based on the data collected in 4.1, 5.2.1, 5.3.1 and 5.3.2.\(^{39}\)

The following instructions were given to the participants:

---

\(^{39}\) The correspondences between the English and Japanese words are judged by the author as a native speaker of Japanese.
“What shapes do the following words bring to mind? Draw your ideas, providing as many illustrations as possible. You may choose shapes from the shapes in the square at the bottom of the next page, or draw your own ideas.”

The fourteen basic shapes presented to participants are shown below.

(Circle) (Square) (Rectangle) (Rhombus) (equilateral Triangle)

((horizontal) Straight Line) ((vertical) Straight Line) (Hooked Line) (Wavy Line) (Curved Line)

(Right Angle / Corner) (Tick) (X) (Cross)

Note: The words in brackets do not appear on the questionnaire.

Procedure

The questionnaires were kept by participants to fill in over a maximum two-week period. The data collected from the questionnaires were dealt with in the following two ways:

1) The number of times that particular shapes were given as an association for a particular word was counted, and those numbers were used to rank the words in descending order.

2) For each word, the percentage of all shapes chosen was calculated. The shapes were then ranked in descending order.
5.4.2.3 Results

Most of the English and Japanese participants chose shapes from the fourteen shapes presented in the questionnaire. A few participants drew their own ideas (e.g. an arrow for ‘direct’) and some of them partly included one of the fourteen shapes presented (e.g. a continuous hooked line for ‘problematic’).

First, we consider the average number of associated shapes, as shown in Table 5.18.

<table>
<thead>
<tr>
<th>English</th>
<th>AN</th>
<th>Japanese</th>
<th>AN</th>
</tr>
</thead>
<tbody>
<tr>
<td>R</td>
<td>Word</td>
<td></td>
<td>R</td>
</tr>
<tr>
<td>1</td>
<td>Complete</td>
<td>1.5</td>
<td>1</td>
</tr>
<tr>
<td>2</td>
<td>Tidy</td>
<td>1.5</td>
<td>2</td>
</tr>
<tr>
<td>3</td>
<td>Uneasy</td>
<td>1.4</td>
<td>3</td>
</tr>
<tr>
<td>4</td>
<td>Direct</td>
<td>1.2</td>
<td>4</td>
</tr>
<tr>
<td>5</td>
<td>Boring</td>
<td>1.2</td>
<td>5</td>
</tr>
<tr>
<td>6</td>
<td>Problematic</td>
<td>1.1</td>
<td>6</td>
</tr>
<tr>
<td>7</td>
<td>Relieved</td>
<td>1.1</td>
<td>7</td>
</tr>
<tr>
<td>Overall Average</td>
<td>1.3</td>
<td>Overall Average</td>
<td>1.5</td>
</tr>
</tbody>
</table>

Notes:
1) R: Ranking
2) AN: Average number of associated shapes (per person)

Table 5.18 Average number of associated shapes

The numbers of associated shapes in Table 5.18 range from one to two on average, and there are no great differences between the first and the last word in both English and Japanese. The numbers in Japanese are greater than in English, but in all the words, no significant difference between English and Japanese is seen. In 5.2.1, which investigated words associated with particular shapes, we found that the average numbers of associated words in Japanese (5.3) outnumbered English (4.8). We also found great differences in the average number, more than double, between the first and the last shape in both English and Japanese.

We then considered the associated shapes and the percentages of all shapes chosen for each word. In some words, a particular shape predominated in the associated shapes (e.g. 52.1% of the English participants drew Circle for ‘complete’). In others, some shapes, each of which constituted five per cent or less of the total of associated shapes, were in the
majority (e.g. 63.6% of the Japanese participants drew ‘others’ for ‘taikutu na’ (boring)). In some words, the associated shapes in English and Japanese were very similar, while in others, they were specific to each language. The details are shown in Appendix 13.

In the following four words, we see that a particular shape predominated in the associated shapes.

2 ‘complete’: Circle was a very important shape in both English (52.1%) and Japanese (41.4%). In addition, the choice and ranking of the top four shapes (Circle, Square, (equilateral) Triangle, and Rhombus) were identical in English and Japanese, and their percentages were similar to each other. The common geometric features of the four shapes were ‘closed’ and ‘symmetrical’.

3 ‘direct’: (Horizontal) Straight Line was the first associated shape in English (40.0%). In Japanese, only 24.4% of the participants drew horizontal Straight Line for ‘direct’, but the fact that an additional 15.6% gave vertical Straight Line, suggests that Straight Line was significant, but not extremely important.

5 ‘relieved’: The Japanese participants drew Circle (55.3%) as the first associated shape, probably because Circle is the symbol of a correct mark (a tick in English). Likewise, the English participants drew Tick (17.1%), which was the symbol of the correct mark, as the second associated shape, though it did not predominate in the associated shapes.

6 ‘tidy’: Both the English and the Japanese participants drew Square (39.6% in English and 50.9% in Japanese) as the first associated shape. The top four shapes in English (Square, Circle, Rhombus and (equilateral) Triangle) and the top two shapes in Japanese (Square and (equilateral) Triangle) have in common the geometric features ‘closed’ and ‘symmetrical’.

In the remaining three words, there are some points to note.

1 ‘boring’: There are great differences in the associated shapes between English and Japanese. The English participants drew Straight Line (both horizontal and vertical:

---

40 See Appendix 13.
41 In 5.2.1, the English participants gave ‘complete’ (8th place / 3%) from Circle.
42 In 5.2.1, the English participants cited ‘direct’ (12th place / 2%) from (horizontal) Straight Line.
43 In 5.2.1, the English participants gave ‘tidy’ (9th place / 2%) from Square.
41.0%) and Square (23.1%). The Japanese drew Wavy Line (25.0%) and Right Angle/Corner (11.4%).

4 ‘problematic’: The Japanese participants drew X (38.3%) as the first associated shape, (equilateral) Triangle (15.0%) as the second, and Tick (13.3%) as the third. These are all symbols: X (an incorrect mark), (equilateral) Triangle (a neither good nor bad mark) and Tick (an incorrect mark). The English participants drew Hooked Line (24.3%) as the first associated shape and Wavy Line (10.8%) as the third. Both shapes have in common the geometric feature ‘not straight’. X was the second associated shape (18.9%) probably as a symbol of ‘wrong’ or ‘mistake’.

7 ‘uneasy’: Both the English and the Japanese participants drew Wavy Line (25.5% in English and 17.5% in Japanese) as the first associated shape. Wavy Line and Curved Line which was drawn as the third (9.5%) in Japanese, share the geometric feature ‘not straight’. Hooked Line (2nd shape in English (19.1%) and 4th in Japanese (7.9%)) and Tick (4th in English (6.4%)) have in common the geometric feature ‘straight but bent’. Tick in English would probably not represent a correct mark here but Tick (2nd shape (11.1%)) in Japanese looks more like the symbol for an incorrect mark.

As has been shown, different words stimulated different shapes from the participants. Some basic shapes were shared between English and Japanese, while others were particular to each language. The hypothesis is supported. For shapes associated with words based on geometric relationships, English and Japanese are similar (e.g. for ‘complete’, ‘direct’, ‘tidy’ and ‘uneasy’). For those associations based on symbolic relationships, only X for ‘problematic’ was shared by the two groups of participants. Other symbols (e.g. Circle in Japanese for both ‘complete’ and ‘relieved’, (equilateral) Triangle and Tick in Japanese for ‘problematic’, and Tick in English and Circle in Japanese for ‘relieved’) were specific to

---

44 In 5.2.1, the English participants cited ‘boring’ from (horizontal) Straight Line (6th place / 4%) and Square (9th place / 2%). In addition, in large dictionaries such as the OED, the entry ‘straight’ has the sense ‘conventional’, and ‘square’ has ‘conventional, old-fashioned’.

45 In 5.2.1, both the English and the Japanese participants cited various negative words (e.g. ‘wrong’ and ‘mistake’) from X. The Japanese gave ‘not so good’ and ‘not good enough’ (6th place / 4%) from (equilateral) Triangle.

46 Hooked Line and Wavy Line were also given as the first and second associated shapes in 7 ‘uneasy’.

47 As in ‘uneasy’, Wavy Line was given in ‘problematic’, which had negative connotations, as the third associated shape. Interestingly, however, English participants gave Wavy Line as the first in ‘relieved’ which had positive connotations.
each language.

5.5 Discussion points

This chapter describes three surveys of metaphorical extensions, examining participants’ use and understanding of linguistic forms and their related basic shapes. Although some findings seem to be independent of one another, in practice, they are closely related and will be combined in discussion. We here posit three points to consider regarding concept formation through iconic metaphorical extensions, arising from the results of the three surveys.

1) Connections between a particular linguistic form and a mental picture are dynamic, not static. The investigations 5.2.1 (Associations between particular basic shapes and words), 5.3.1 (TOL in the relationships between basic shapes and words) and 5.4.2 (Associations between particular words and basic shapes) suggest that the relationship between a linguistic form and a mental picture is dynamic (e.g. the relationship between a linguistic form ‘complete’ for Circle and multiple mental pictures [never ending], [no breaks] and [encompassing] in 5.3.1).

2) A new concept is formed through metaphorical extensions among existing concepts. A concept is the process of forming paths which have direction and distance, among mental pictures. The investigations 5.3.1 (TOL in the relationships between basic shapes and words) and 5.3.2 (Relationship between two words related to basic shapes) show some of the processes used to form paths among mental pictures. Some differences in path formation between English and Japanese are seen in 5.3.2 (Different number of participants offering a given word and different distances between the word indicating a particular basic shape and the other words in metaphorical extensions) and 5.4.1 (Influence of existing metaphorical extensions on new metaphorical extensions).

3) As an extended discussion point, it is suggested that the preceding two points rely heavily on the speaker’s repeated involvement with the environment. Repetition of similar involvement at different times and places stabilises and modifies concepts.
Combining these three points with several theoretical perspectives discussed in earlier chapters, we consider dynamic models of concept formation through iconic metaphorical extensions in the following chapter.
6 Dynamic models of concept formation

In this chapter, I discuss dynamic models of concept formation through iconic metaphorical extensions, drawing together the theoretical frameworks in Chapters 2 and 3, with the results of the investigations in Chapters 4 and 5.

Concepts, apparently stored in the mental space, are freshly activated every time they are evoked. It seems reasonable to consider that the cognitive processes forming a concept are dynamic, not static. Above all, concept formation through iconic metaphorical extensions must be dynamic because it is based on “extensions” of existing concepts.

I propose dynamic models of concept formation which should apply in any language. I extend the idea of path formation through metaphorical extensions, which was discussed in Chapter 3, to explain how a speaker controls iconic metaphorical extensions by changing the direction and distance of the paths. This extension to the path model accommodates the ideas that metaphorical extensions shift in the mental space and that the source overlaps the target, neither of which were treated in the first presentation of the model in Chapter 3.

As an important part of the extended path model, I propose a “switching system” in which a speaker forms a labelled concept switching his or her attention and/or consciousness between a linguistic form and a mental picture.¹ This switching system allows me to consider the idea of overlapping of two domains in polysemy, and this idea extends to the idea that the source overlaps the target in the path model.

In this section, I focus on two topics first: the switching system between linguistic forms and mental pictures, and its roles in iconic metaphorical extensions. I then discuss concept formation through iconic metaphorical extensions using the path model. Finally, I consider the idea that concepts are re-formed through repetition of iconic metaphorical extensions.

¹ In Chapter 3, a linguistic form indicates a mental picture and the relationship between them is unidirectional. In the switching system, the relationship is bidirectional: a linguistic form indicates a mental picture and a mental picture conjures a linguistic form (see 6.1.3).
6.1 Connecting linguistic forms and mental pictures

Associations between linguistic forms and visual pictures (basic shapes) were investigated in 5.2.1 and 5.4.2. It was suggested that mental pictures, which reflect particular visual pictures, and their related linguistic forms appear alternately in particular labelled concepts. We suggest that the speaker’s attention and/or consciousness fluctuates between them rapidly.

In this section, we discuss the proposal that the alternate appearance of linguistic forms and mental pictures is caused by a “switching system” in the mental space. The switching system is based on dynamic reciprocal changes in the speaker’s attention and/or consciousness between linguistic forms and mental pictures. The switching system connects a linguistic form and a mental picture, and builds up a labelled concept discussed in Chapter 3.

We first review the labelled concept in order to consider what a “switching system” is. Next, we throw light on the structure of the switching system.

6.1.1 Review of the idea of a labelled concept

A particular linguistic form might provoke similar mental pictures even in speakers of different languages, if it has an appropriate translation. However, speakers probably do not share identical mental pictures, even if they speak the same language. How are linguistic forms and mental pictures connected to each other? We suggest that speakers connect a linguistic form and a mental picture switching them in the mental space.

The investigations into the associations between linguistic forms and visual pictures which we described in Chapter 5 throw some light onto the connections between linguistic forms and mental pictures. The task of associating words with particular basic shapes (5.2.1) revealed that the participants could come up with many associated words (4.8 in English and 5.3 in Japanese), while the task of associating basic shapes with particular words (5.4.2) showed few associated shapes (1.3 in English and 1.5 in Japanese). We

---

2 These were average numbers in eight basic shapes (see 5.2.1.3).
3 These were average numbers in seven words (see 5.4.2.3).
suggest that, in 5.2.1, the participants extend a particular basic shape (e.g. Circle) to various mental pictures (e.g. [moon], [sun] and [encompassing something]) before putting their responses into words. Some of these (e.g. [moon] and [sun]) may be closely connected, and others (e.g. [moon] and [encompassing something]) may be separated from each other yet still exist within a single group of mental pictures related to the basic shape. The participants connect the mental pictures and particular linguistic forms.

In 5.4.2, conversely, the participants associate basic shapes (e.g. Circle, Square, (equilateral) Triangle) with a particular word (e.g. ‘complete’). The participants drew a few basic shapes because, in 5.4.2, what they associated with the word was restricted to basic shapes alone. In general, however, any linguistic form may indicate various mental pictures.

As discussed in 3.1.3, a single linguistic form is connected to a single mental picture at any particular time and/or place. In order to deal with this most important aspect of a labelled concept, we use the notion of a “switch” changing from a linguistic form to a mental picture and vice versa. The switch is the change of the speaker’s attention and/or consciousness between a linguistic form and a mental picture. A switching system constitutes a labelled concept in the mental space. In the switching system, a particular linguistic form is connected to a particular mental picture at any particular time and/or place. This notion is depicted in Figure 6.1.
In Figure 6.1, one linguistic form ‘a’ is connected to one mental picture [a-2]. This connection produces a labelled concept.

6.1.2 Connection between a linguistic form and a mental picture

In a labelled concept, the relationship between a linguistic form and a mental picture is arbitrary, and there are many and varied arbitrary combinations. Some are shared by many speakers, and others are specific to particular speakers. Section 5.2.1 showed that the participants produced both identical and different associated words when they were shown basic shapes. We proposed that the production of these associated words resulted from freely changing and extending mental pictures from a particular basic shape. Some relationships between linguistic forms and mental pictures were shared by many participants, while others were specific to individuals. The results of the questionnaires (5.4.2) showed that the participants produced both identical and different shapes when presented with particular words. We proposed that the production of shapes directly reflected mental pictures which were associated with particular words. Again, some relationships between linguistic forms and mental pictures were common to many
participants, and others were peculiar to individuals.

In switching between a linguistic form and mental pictures, the relationships between the linguistic form and the mental pictures are arbitrary. However, the relationships among the mental pictures are very often motivated, rather than arbitrary. In 5.4.2, for example, the participants associated some basic shapes (e.g. Circle, Square and (equilateral) Triangle) with a particular word (e.g. ‘complete’). We found common geometric features (e.g. “closure” and “symmetry”) in these shapes. We proposed that the relationships among the basic shapes were often motivated by given geometric features.

6.1.3 Direction and distance in the connection

It is obvious that there are two directions of switching between a linguistic form and a mental picture, i.e. from a linguistic form to a mental picture and from a mental picture to a linguistic form. Does the switching start from the linguistic form or the mental picture? It starts from both the linguistic form and the mental picture. We observed clear evidence for this claim in 5.2.1 and 5.4.2. In 5.2.1, the participants conjured up various words from a particular basic shape demonstrating a switching direction from mental picture to linguistic form. In 5.4.2, the participants associated basic shapes with a particular word demonstrating a switching direction from linguistic form to mental picture. This reciprocal switching has two directions. One is the indication of a particular mental picture by a linguistic form (‘complete’ leads to [circle]), and the other is the conjuring of a particular linguistic form by a mental picture. ([circle] leads to ‘complete’). These two directions are shown in Figure 6.2.

4 “Direction” between a linguistic form and a mental picture is different from “direction” between mental pictures and between groups of related mental pictures which we discussed in 3.2. We shall consider the latter “direction” later in 6.3.
We now consider distance between a linguistic form and a mental picture.\(^5\) The arbitrariness of the relationship between a linguistic form and a mental picture makes it appear that there is no distance between them, and certainly no stable distance. However, we propose that the notion of distance is useful in representing the degree of connectedness of linguistic forms and mental pictures. Mental pictures evoked by the same linguistic form may differ in their distances from that linguistic form, because the mental pictures take different positions in a given group of mental pictures related to the linguistic form. This construct is shown in Figure 6.3.

---

\(^5\)“Distance” between a linguistic form and a mental picture is different from “distance” between mental pictures and between groups of related mental pictures which we discussed in 3.2. We shall consider the latter “distance” later in 6.3.
In Figure 6.3, the distance between the linguistic form ‘a’ and the mental picture [a-1] is short, while that between ‘a’ and [a-3] is long. What do these different distances represent in the switching system? A short distance indicates that a linguistic form and a mental picture are strongly connected, while a long distance indicates that they are not. In other words, a connection with a short distance requires less cognitive effort to create a labelled concept, and that with a long distance needs greater cognitive effort. In 5.4.2, for instance, the participants associated basic shapes with a particular word (‘complete’). Most participants drew Circle first, and then Square and (equilateral) Triangle. We suggest that when the participants saw the word they first conjured up Circle in the mental space, before drawing it. We thus propose that the distance between the word ‘complete’ and the first drawn shape Circle in the mental space is short and that the shape is more easily associated. The distance between the word and the second or third drawn shape is longer, and the shape is less easily associated. It seems reasonable to think that the distance between a linguistic form and its core mental picture is shorter than that between the linguistic form and the peripheral mental pictures.

6.1.4 Shifting mental pictures
For a particular linguistic form, there may be related mental pictures which form a certain group in the mental space. We assume that these mental pictures cannot exist at the same time. One mental picture appears and then disappears in the mental space. Another appears and disappears. Mental pictures are shifting, and at a particular time a single mental picture is connected to a linguistic form, producing a labelled concept. Similar labelled concepts can be produced but the same labelled concept is not produced repeatedly. The connection between a mental picture and a linguistic form takes place for an instant. A mental picture which is connected to a particular linguistic form at a particular moment, differs from another mental picture which is connected to the same linguistic form at the next moment.

We observed shifting mental pictures indirectly in the study. In 5.4.2, the participants associated a series of basic shapes (e.g. Circle, Square, and (equilateral) Triangle) with a particular word (e.g. ‘complete’). We assume that when the participants recognised the word they visualised mental pictures (e.g. [a round shape], [a square shape], or [a triangular shape]) related to the basic shapes.

In Figure 6.3, imagine that mental pictures shift from [a-1] to [a-3]. The connection between the linguistic form ‘a’ and the mental picture [a-1] changes to that between ‘a’ and [a-2], and then to that between ‘a’ and [a-3], constituting three labelled concepts. It is worth noting here that the distance between ‘a’ and [a-3] is greater than that between ‘a’ and [a-1] (or [a-2]). As discussed in the preceding section, the first mental picture associated is strongly connected to a linguistic form, later mental pictures are less strongly connected.

In 5.3.1, for example, the participants explained underlying metaphorical extensions between a particular shape and its associated word. One Japanese participant provided connecting links between the basic shape Square and the word ‘taikutu na’ (boring) by referring to a series of words (‘square’, ‘angular’, ‘rough or careless’, ‘taciturn’, ‘boring’). We propose that such chains of association reflect shifting mental pictures. The mental picture [something angular] which involves a geometric property of Square shifts to [something rough or careless] which is not a geometric property. Then it shifts to

---

6 Related mental pictures which are indicated by the use of a linguistic form at different times and places form a group (see 3.1.3.1).
[someone taciturn] which attributes a property to a person’s character. Thus, the shifts of mental pictures are represented by the increased distance between the linguistic form ‘taikutu na’ (boring) and related mental pictures.

Shifting mental pictures help us explain the connection between a linguistic form and its related mental pictures, creating related yet different labelled concepts. The question here arises as to whether different labelled concepts are established whenever mental pictures shift. In Figure 6.3, three connections between one linguistic form and three mental pictures are seen. The speaker may of course make connections to more mental pictures. We suggest that mental pictures are modified, from one to another, until an appropriate mental picture is connected to a particular linguistic form at a particular time and in a particular place.

6.2 Role of the connections between linguistic forms and mental pictures

The previous section dealt with the switching system between a linguistic form and a mental picture. It was argued that a single connection between a linguistic form and a mental picture existed for one instant, establishing a labelled concept. However, there seems to be a field in which multiple connections may exist simultaneously. That is polysemy, in which two groups of mental pictures overlap. The switching system and the idea of overlapping allow us to form a new model of iconic metaphorical extensions, wherein a linguistic form of the source plays an important role.

6.2.1 Connections between a linguistic form and its meanings

A polysemous word consists of a linguistic form connected to more than one meaning. In such cases, given that meanings are mental pictures or that meanings have their own mental pictures, multiple mental pictures are connected to a linguistic form, building up multiple labelled concepts. The presence of mental pictures is important in considering the structure of polysemy.

In 4.2, when I suggested polysemous networks for six basic shapes using dictionaries, I first thought of one (or more) mental picture from each sense under a given entry. Then I compared some mental pictures, and finally considered whether any connections existed
among them. The mental pictures played crucial roles in connecting senses which had linguistic forms. These connections are shown in Figure 6.4.

In Figure 6.4, the linguistic form (the entry) ‘a’ is connected to three mental pictures [a-1], [a-2] and [a-3], forming three labelled concepts. The three mental pictures are linked to the three linguistic forms ‘a-1’, ‘a-2’ and ‘a-3’ respectively. For example, the linguistic form (the entry) ‘straight’ is connected to three mental pictures (e.g. [something continuing in the same direction and without bending], [someone’s hair having no curls or waves] and [someone’s answer being honest and frank]), and these connections build up three labelled concepts. The three mental pictures are also linked to three periphrastic linguistic forms (e.g. ‘continuing in the same direction with no bending’, ‘having no curls or waves’ and ‘honest and frank’), constituting another three labelled concepts.

In Figure 6.4, the three connections between a linguistic form (an entry) ‘a’ and three mental pictures ‘a’- [a-1], ‘a’- [a-2] and ‘a’- [a-3] coexist. Actually, however, the speaker connects one linguistic form and one mental picture. We claim that it is impossible to have
two or more labelled concepts simultaneously in the mental space. Dictionaries make it seem as though multiple connections constitute multiple labelled concepts at the same time, but this is only an artifact of dictionary structure.

As discussed in 6.1.3, the distances between a particular linguistic form and its related mental pictures are not identical. The distances are different because the related mental pictures take different positions in a given group of mental pictures related to the linguistic form. The relationship between a linguistic form and a mental picture is arbitrary, but the relationships among mental pictures are often iconic. The iconic relationships give the mental pictures particular positions in a given group.

In Figure 6.4, the distances between the linguistic form ‘a’ and the mental pictures [a-1], [a-2] and [a-3] are different, and those between ‘a’ and the linguistic forms (corresponding to the mental pictures) ‘a-1’, ‘a-2’ and ‘a-3’ are also different. Consider the example which we have just discussed of the three labelled concepts associated with the linguistic form ‘straight’. We suggest that the distances between ‘straight’ and the three mental pictures of those labelled concepts differ. The distance between ‘straight’ and [something continuing in the same direction and without bending] is short, and they are strongly connected. The distance between ‘straight’ and [someone’s hair having no curls or waves] is longer than the first one. The distance between ‘straight’ and [someone’s answer being honest and frank] is much longer than the first or the second one, and they are connected less strongly.

6.2.2 Overlap of two groups of related mental pictures

As the preceding discussion suggests, two mental pictures (e.g. [something continuing in the same direction and without bending] and [someone’s answer being honest and frank]) which are connected to a particular linguistic form (e.g. ‘straight’) can appear to lack obvious connections, which is represented as increased distance in a given group of related mental pictures. Why do at least seemingly unrelated mental pictures exist in a single group? Did they come from different groups? To address these questions, we posit the hypothesis that two groups of related mental pictures overlap through two mental pictures which are connected to each other by a particular metaphorical (or metonymical) extension. Figure 6.5 shows the overlap of two groups of related mental pictures.
Concept A

Concept B

At the top of Figure 6.5, the two labelled concepts A and B are completely separate, and the mental pictures [a-1] and [b-1] belong to different groups of related mental pictures. In each labelled concept, the distance between the linguistic form ‘a’ or ‘b’ and the mental pictures [a-1] or [b-1] is short. At the bottom of the figure, the overlap of the groups of A
and B is almost complete. The mental picture [b-1] is connected to both ‘a’ and ‘b’. The distance between [a-1] and ‘a’ is shorter than that between [b-1] and ‘a’.

With this idea, we explain the differences in distance between the linguistic form ‘straight’ and the mental pictures [something continuing in the same direction and without bending] and [someone’s answer being honest and frank]. Initially, before the concept stabilises, the two mental pictures belong to different groups of related mental pictures. The distances both between ‘straight’ and [something continuing in the same direction and without bending] and between ‘honest’ and [someone’s answer being honest and frank] are short. The iconic relationship between the two mental pictures, which is based on a metaphorical extension from STRAIGHTNESS to DIRECTNESS (or FAITHFULNESS), brings the two groups close to each other. When the two groups overlap, ‘straight’ is connected to both [something continuing in the same direction and without bending] and [someone’s answer being honest and frank]. The distance between ‘straight’ and [something continuing in the same direction and without bending] is shorter than that between ‘straight’ and [someone’s answer being honest and frank].

The hypothesis that two groups overlap through two mental pictures which are connected to each other by a particular metaphorical (or metonymical) extension, is a useful idea for understanding what occurs in polysemy.

6.2.3 Creation of a new labelled concept

In 3.1.3.3, the idea was presented that the structure of a metaphorical extension consisted of extensions between mental pictures and between groups of related mental pictures. The model displayed in Figure 3.3 was based on this idea, and, at that stage, succeeded in accounting for concept formation through iconic metaphorical extensions. Now, in order to improve the explanation, we need to modify the model using the switching system between a linguistic form and a mental picture and the idea of overlapping of two groups of related mental pictures.

In the source, a linguistic form is connected to a mental picture, building up a labelled concept. When the mental picture is extended to another mental picture in the target, the linguistic form in the source is connected to the mental picture in the target, creating
another labelled concept. In Japanese, for example, an extension from a mental picture of the source (e.g. [a round shape] or [something without corners]) to another mental picture of the target (e.g. [a situation without problem] or [a peaceful situation]) underlies the metaphorical expression ‘kanozyo wa sono ken o maruku osameta’ (She settled the situation roundly (She settled the matter peacefully)). In the source, the linguistic form ‘maruku’ (roundly) is connected to the mental picture, and they build up a labelled concept. The extension from the mental picture of the source to the mental picture of the target shifts the connection between the linguistic form ‘maruku’ (roundly) and the mental picture of the source to the connection between ‘maruku’ (roundly) and the mental picture of the target. The connection of the linguistic form of the source and the mental picture of the target forms a new labelled concept. This action is displayed in Figure 6.6.
In Figure 6.6, the connection between the linguistic form ‘a’ and the mental picture [a-1] builds up a labelled concept. The mental picture [a-1] in the source extends to another mental picture [b-1] in the target, and at the same time, the group (of related mental pictures) to which [a-1] belongs extends to the group to which [b-1] belongs. These two extensions shift the connection between ‘a’ and [a-1] to that between ‘a’ and [b-1]. The connection of ‘a’ and [b-1] creates a new labelled concept.

In the above example, the concept PEACEFULNESS is seen in the metaphorical expression ‘kanozyo wa sono ken o maruku osameta’ (She settled the matter roundly (She
settled the matter peacefully). The concept PEACEFULNESS can be expressed in a neutral way, by using an expression such as ‘kanozoyo wa sono ken o odayaka ni osameta’ (She settled the matter peacefully). Or it can be expressed in a marked way, by using an expression such as ‘kanozoyo wa sono ken o maruku osameta’ (She settled the matter roundly). We suggest that the latter concept is a new labelled concept which is based on the connection between the linguistic form ‘maruku’ (roundly) in the source and a particular mental picture in the target (e.g. [a situation without problem]). This connection, which creates the marked concept PEACEFULNESS, is brought about by extending particular mental pictures between the source and the target (e.g. from [a round shape] to [a situation without problem]).

Finally, as discussed in 6.1.3, there are differences in distance between a linguistic form and a mental picture. When a linguistic form is connected to two (or more) mental pictures, closeness or remoteness of connection with a mental picture may be presented as near or far distance. In Figure 6.6, the distance between the linguistic form ‘a’ (e.g. ‘maruku’ (roundly)) and the mental picture [a-1] (e.g. [a round shape]) is shorter than that between ‘a’ and [b-1] (e.g. [a situation without problem]). Since the latter is created by the extension from [a-1] to [b-1], it is presented as further away from the linguistic form than the former.

6.2.4 Role of linguistic forms

As discussed above, a particular linguistic form of the source indicates mental pictures in both the source and the target. For example, the metaphorical expression ‘He gave a straight answer’ has an underlying metaphorical extension from a mental picture of the source (e.g. [something continuing in the same direction and without bending]) to another mental picture of the target (e.g. [He speaks honestly and frankly]). The mental picture in the target exists without any indication of a particular linguistic form (e.g. ‘honest’ or ‘frank’). By contrast, the linguistic form in the source ‘straight’ is essential. ‘Straight’ indicates the mental pictures in both the source and the target.

A given mental picture in the target can exist without any indication of a linguistic form, because the mental picture is the goal to be metaphorically understood. The mental picture
exists from the beginning of a particular metaphorical extension. On the other hand, the linguistic form of the source is a tool for the speaker to metaphorically understand a particular mental picture in the target. The linguistic form indicates both a mental picture in the source and another mental picture in the target. In Figure 6.6, the linguistic form of the target ‘b’ is represented as not being always necessary. The connection between ‘b’ and the mental picture [b-1] is also depicted as not always necessary.

The way of extending a particular mental picture in the source to another particular mental picture in the target is a “habit of concept formation” in a given speaker. A particular linguistic form in a certain language represents the habit of concept formation by indicating mental pictures in the source and the target. When the speaker hears and uses a particular metaphorical expression, its underlying metaphorical extension not only provides its metaphorical meaning but also helps build up a habit of concept formation in the speaker’s mental space.

6.3 Dynamic path model

In the preceding sections, two issues were considered, the switching system in which a linguistic form and a mental picture connect to each other, and the creation of a new labelled concept by iconic metaphorical extensions. Using these ideas, a dynamic model can be built of concept formation through iconic metaphorical extensions, extending the idea of path formation in metaphorical extensions discussed in Chapter 3. In this section, we discuss the structure and use of the path model.

6.3.1 Structure of the path model

As discussed in 3.2, paths in the mental space have direction and distance. Direction is a unidirectional extension from the source to the target, and distance is the degree of iconicity between the source and the target. Several investigations in Chapter 5 directly and indirectly showed the presence of direction and distance in metaphorical extensions. Furthermore, some of the investigations revealed that direction and distance can change

\footnote{We shall discuss habits of concept formation later in 6.4.2.3.}
rapidly according to the participants’ intentions. In this section, we attempt to form a dynamic model to explicate the structure of concept formation through iconic metaphorical extensions.

6.3.1.1 Presence of direction and distance

Extensions from the source to the target create paths. Two extensions between mental pictures and between groups of related mental pictures constitute one path. A path is supported by the notions “direction” and “distance” between the source and the target. In 5.3.2, for example, based on the results of the task in which the participants arranged cards, on which words associated with Circle, Square or Straight Line were written, it was argued that direction and distance were useful notions to represent the positioning of the words, and that some directions and distances supported particular metaphorical extensions underlying the participants’ arrangement of the cards.

In 4.2, I suggested polysemous networks in which, in relation to six basic shapes, some senses under particular dictionary entries were connected by lines. Although these lines were hypothesised, they were based on metaphorical (or metonymical) extensions between mental pictures which the senses provoked. The lines had distance and the relationship between senses was often directional.

We have observed phenomena in which metaphorical extensions are seemingly bidirectional. Do these phenomena show that paths in metaphorical extensions are bidirectional? It is suggested that, even if a one-way path from the target to the source seems to exist, this path is one which traces back a path from the source to the target. In 5.2.1 and 5.4.2, for instance, some seemingly bidirectional extensions were evident in associations between basic shapes and words. Some English participants associated the word ‘boring’ with the basic shape Square, and, conversely, associated Square with ‘boring’ - these two associations are based on one extension from SQUARENESS to BOREDOM, not on two extensions from SQUARENESS to BOREDOM and from

---
8 In Figure 6.6 in 6.2.3, an iconic metaphorical extension, which consists of two kinds of arrows, represents one path.
9 I used the CED (Collins COBUILD English Dictionary) and the SJD (SHIN-JIRIN (Dictionary)), and I used solid lines for strong relationships between the senses, broken lines for weak relationships, and no lines for indeterminate relationships.
BOREDOM to SQUARENESS. The association of Square with ‘boring’ is based on the extension from the basic shape Square to the concept BOREDOM.

6.3.1.2 Rapid changes of direction and distance

Simplifying paths allows the speaker to form concepts more effortlessly and more effectively. In 3.2, we discussed the idea that the repeated use of a particular metaphorical extension makes the direction simpler and the distance shorter.\(^\text{10}\) This simplification usually takes place over time. However, in fact, direction and distance may quickly change following the speaker’s intentions.

We have observed phenomena in which the direction of a path becomes simpler or more complex, and the direction becomes shorter or longer in a very short time. In 5.3.1, for example, we addressed the question of how participants deal with associations between basic shapes and their associated words by using Thinking Out Loud (TOL). We collected data on the participants’ on-going treatment of metaphorical extensions. Their rapid production of associated words and phrases in TOL implies that they quickly changed directions and distances in particular metaphorical extensions as illustrated below:

1) Some participants produced a list of partially synonymous words and phrases (e.g. ‘a relaxing feeling’, ‘peace’, ‘completeness’ and ‘calmness’ in Circle/HAPPY in English, ‘warm’, ‘a soft feeling’ and ‘not bitter’ in Circle/SIAWASE (HAPPY) in Japanese).

2) Some participants used words and phrases to develop an argument (e.g. ‘not sharp edged, not pointy’, ‘smooth’ and ‘comfortable looking’ in Circle/HAPPY in English, ‘angular’, ‘rough, careless’ and ‘taciturn’ in Square/TAIKUTU NA (BORING) in Japanese).

3) Some participants produced a set of words and phrases in which geometric factors, non-geometric factors, and the mixed factors mingled (e.g. ‘no intersection’, ‘no stress’, ‘inclusive’ and ‘working together in a circle’ in Circle/HARMONY in English, ‘no corners’, ‘happy’, ‘encompassed’ and ‘peaceful’ in Circle/TYOOWA (HARMONY) in Japanese).

\(^\text{10}\) We shall consider concept formation through repetition later in 6.4.
We assume that, if the above words and phrases (e.g. ‘a relaxing feeling’) had connecting mental pictures (e.g. [Someone feels relaxed]), the directions between the mental pictures and the mental pictures of particular basic shapes (e.g. [circle]) changed quickly, and the distances between them changed quickly.

In 5.3.2, the task used was to ask the participants to arrange, on a sheet of paper, cards on which words associated with a particular shape were written. We observed that different participants had different ways of placing the cards. Importantly, many participants arranged the cards through the process of changing and replacing them again and again. We assume that the participants rapidly changed the directions between the mental picture of a particular basic shape and the mental pictures associated with the words, and the distances between them.

In building up polysemous networks in 4.2, I first considered my mental pictures for each sense under a given lexical entry, then compared these mental pictures, and finally considered whether or not any connections might exist between them and how the mental pictures might be far from each other. Remembering these processes, I quickly changed the directions between the mental pictures and the distances between them.

These phenomena show that the speaker can quickly change the direction and distance between mental pictures. This on-going mental activity in metaphorical extensions makes the path model dynamic. The dynamic path model explains that the speaker has a good command on metaphorical extensions in a very short time. We discuss the changes of direction and distance more in the use of the path model in the following section.

6.3.2 Use of the path model

The preceding sections showed how the dynamic model employing paths can be used to describe direction and distance in metaphorical extensions in the survey. We here consider how the speaker uses the dynamic path model. It is suggested that, in the speaker’s mental space, metaphorical extensions shift in order to form a concept according to the speaker’s context, or that, when a metaphorical extension shifts in certain contexts, this shift results in the formation of a new concept.
6.3.2.1 Definition of shifting metaphorical extensions

A metaphorical extension in concept formation is a process, not a product, in the mental space. As discussed in 6.1.4, mental pictures are shifting in a given group of related mental pictures. One mental picture appears and then disappears. Another appears and disappears. As mental pictures shift, metaphorical extensions, which connect two mental pictures, change. For example, in the concept A LOVE TRIANGLE, there is a metaphorical extension from a particular mental picture in the source (e.g. [an isosceles triangle]) to another mental picture in the target (e.g. [She is in love with two men and cannot decide which one to choose]). These mental pictures might shift according to the speaker’s context (e.g. from [an isosceles triangle] to [an equilateral triangle] in the source, from [She is in love with two men and cannot decide which one to choose] to [She is married but is also having a love affair] in the target). In metaphorical extensions, shifting mental pictures can provide many and varied connections of mental pictures between the source and the target.

Remember that a path has direction and distance. The LOVE TRIANGLE example is supported by a simple and short path between the source and the target. Even though the mental pictures in the source and/or the target shift within the extension from TRIANGULARITY to THE POSITIONS OF THREE PEOPLE IN LOVE, the direction between them does not change at all and the distance does not change greatly.

Shifting metaphorical extensions change paths (e.g. from a simple and short path to a complex and long path, or vice versa). When speakers use a metaphorical expression normally, they do not seem to separate the source from the target. When speakers examine a metaphorical expression consciously, they can separate the source from the target, sometimes placing a mediating concept in between.

In order to examine these shifting metaphorical extensions more closely, we now consider the main patterns of shifting metaphorical extensions, the overlap of the source and the target, and iconicity and cognitive effort in the following three sections.

6.3.2.2 Main patterns of shifting metaphorical extensions
In 3.2, combinations of direction and distance in metaphorical extensions were discussed: simple, complex and indeterminate paths, having short, long and indeterminate distances. We have three types of paths, simple and short, complex and long, and indeterminate, and now consider shifting metaphorical extensions in each type. First, in a simple and short path, direction does not change but distance does change. The distance between the source and the target is originally short and it becomes shorter through repetition of a particular metaphorical extension, so that finally the source and the target overlap. For instance, when a speaker encounters the metaphorical expression ‘a love triangle’ for the first time, he or she separates the source TRIANGULARITY from the target THE POSITIONS OF THREE PEOPLE IN LOVE in order to consider the extension from the source to the target consciously. But the distance between the source and the target gradually becomes shorter as the speaker repeats the metaphorical expression. The speaker might has various mental pictures in both the target and the source (e.g. [She is in love with two men and cannot decide which one to choose] and [He is married but is also having a love affair] in the target, [an isosceles triangle] and [an equilateral triangle] in the source). These various mental pictures allow the speaker to shorten the distance, providing steps towards the overlap of the source and the target. Importantly, the speaker can lengthen this shortened distance between the source and the target whenever he or she consciously examines the metaphorical expression, separating the source from the target.

Second, in a complex and long path, direction is complex and distance is long because of a mediating concept. When the mediating concept is omitted through familiarity of a particular metaphorical extension, direction becomes simpler and distance becomes shorter. Here, the complex and long path is regarded as a dyad of two simple and short paths from the source to a given mediating concept and from the mediating concept to the target. The simple and short paths are the same paths we discussed above. That is, they may become much shorter, so that finally the source and the target overlap. In the metaphorical expression ‘a very straight woman’, for instance, the mediating concept NO DEVIATION is assumed between the source STRAIGHTNESS and the target CONVENTIONALITY. When a speaker first hears or uses the metaphorical expression consciously, he or she may

---

11 We shall discuss repetition of metaphorical extensions later in 6.4.
use the mediating concept to bridge the gap between the source and the target. The speaker has many mental pictures in both the target and the source (e.g. [She is normal in her opinions] and [She is conservative in the way she lives] in the target, [something continuing in the same direction and without bending] and [something extending uniformly] in the source). These mental pictures enable the direction and the distance to become simpler and shorter by creating steps towards the overlap of the source and the target. When the speaker examines the metaphorical expression, he or she can separate the source from the target, and further have a mediating concept such as NO DEVIATION. The direction then becomes complex and the distance becomes long.

Finally, in indeterminate paths, both direction and distance between the source and the target are indeterminate. It is not clear-cut whether a metaphorical extension shifts or not. Probably, however, a metaphorical extension does not shift as the above two metaphorical extensions do. Take the metaphorical expression ‘They have faced the situation squarely’ as an example. When a speaker first hears and uses the expression, he or she separates the source SQUARENESS from the target DIRECTNESS, and may even use a mediating concept such as RIGHT-ANGLEDNESS. We suggest that metaphorical extensions with indeterminate paths rely on extensions between groups of related mental pictures alone ([SQUARENESS] of the source and [DIRECTNESS] of the target), and it is difficult to connect a particular mental picture in the source and a plausible mental picture in the target such as [they faced the situation head-on]. It is thus unlikely that the speaker separates the source and the target whenever he or she repeats the metaphorical expression. We assume that the direction and the distance between the source and the target become simpler and shorter very quickly towards the overlap of them, while the speaker repeats the metaphorical expression. It seems to be very difficult to make the direction simpler and the distance shorter gradually without metaphorical extensions between particular mental pictures. When the speaker examines the metaphorical expression, he or she can separate the source from the target, and furthermore, can give a mediating concept.

The above three patterns are shown in Figure 6.7.

---

12 The speaker can also have mental pictures in the mediating concept (e.g. [something without change or difference] and [something monotonous] in NO DEVIATION).
Figure 6.7 Main hypothesised patterns of shifting metaphorical extensions

In Figure 6.7, metaphorical extensions with simple and short paths (1) and those with complex and long paths (2) shift within three stages (I, II and III). Metaphorical extensions with indeterminate paths shift between stage I and stage III. In stage I, the paths are the most complex and/or the longest, and in stage III, the source and the target overlap. Stage II shows the intermediate stage.

6.3.2.3 Overlap of the source and the target

An overlap of the source and target is displayed in stage III in Figure 6.7. Significantly, the overlap of the source and target is the normal situation under which speakers use most metaphorical expressions. It is highly probable that, when speakers use the metaphorical expressions ‘a love triangle’, ‘a very straight woman’ and ‘They have faced the situation squarely’, they do not separate the sources TRIANGULARITY, STRAIGHTNESS and SQUARENESS from the targets THE POSITION OF THREE PEOPLE IN LOVE, CONVENTIONALITY and DIRECTNESS.

Thus in the normal use of metaphorical expressions, the source overlaps the target. A metaphorical extension is based on seeing the source as the target. This overlap makes it easy for the speaker to see the source as the target. This concept is basic yet important,
and is displayed in Figure 6.8.

Figure 6.8 shows the situation in which the source overlaps the target. The mental picture of the target [b-1] is in the group of related mental pictures to which the mental picture of the source [a-1] belongs. In general, when people can see an object which is behind another object, the object in front must be transparent. Does this hold true in mental pictures? We suggest that the situation in which the source overlaps the target shows that a particular
mental picture of the target can be recognised through a group of related mental pictures in the source. We regard this group in the source as a “mental frame.” A mental frame has the basic attributes of the source and characterises each metaphorical extension. For example, in the metaphorical expression ‘a very straight woman’, [STRAIGHTNESS], which is the group of related mental pictures in the source, is a mental frame. This mental frame has basic attributes of the source (e.g. “continuing in the same direction” or “no bending”). Through the mental frame, the speaker recognises a particular mental picture of the target (e.g. [She is normal in her opinions]) and connects the linguistic form ‘straight’ to the mental picture, forming the marked concept CONVENTIONALITY of the metaphorical expression ‘a very straight woman’. In the metaphorical expression ‘They have faced the situation squarely’, the group of related mental pictures in the source [SQUARENESS] is a mental frame. This mental frame has basic attributes (e.g. “corner”, “right-angle” and “a joint of two sides”). The speaker sees a particular mental picture of the target (e.g. [They have faced the situation head-on]) through that mental frame, and links the linguistic form ‘squarely’ to the mental picture, creating the marked concept DIRECTNESS of the metaphorical expression ‘They have faced the situation squarely’.

6.3.2.4 Cognitive effort in shifting metaphorical extensions

As mentioned in 3.2.2.2 and 6.3.2.2, three kinds of path represent the difference in iconicity between the source and the target. Simple and short paths (e.g. in ‘a love triangle’) show high iconicity between the source (e.g. TRIANGULARITY) and the target (e.g. THE POSITIONS OF THREE PEOPLE IN LOVE), and the cognitive effort to connect them is low. Complex and long paths (e.g. in ‘a very straight woman’) show low iconicity between the source (e.g. STRAIGHTNESS) and the target (e.g. CONVENTIONALITY), and the cognitive effort to connect them is high. Finally, in indeterminate paths (e.g. in ‘They have faced the situation squarely’), we cannot determinate whether iconicity between the source (e.g. SQUARENESS) and the target (e.g. DIRECTNESS) is high or low. The iconicity is indeterminate, and cognitive effort to connect them is also indeterminate. In the discussion of the preceding section, overlap of source and target is the normal situation in which speakers use most metaphorical extensions. In the overlap, is iconicity between the source and the target high or low? The
answer is that iconicity is very high, and cognitive effort is very low. This relationship is depicted in Figure 6.9.

![Diagram](image)

**Figure 6.9 Relationship between iconicity and cognitive effort in shifting metaphorical extensions**

In Figure 6.9, a metaphorical extension with complex, long paths is at the upper left. Iconicity between the source and the target is low and cognitive effort to connect them is high. An overlap of the source and the target is seen at the lower right, in which iconicity is high and cognitive effort is low.

As discussed above, most metaphorical expressions are used by speakers without consciously separating the source from the target. That is, speakers use metaphorical expressions in the overlap of the source and the target, and cognitive effort to connect them is very low. If metaphorical expressions required speakers to make greater effort than non-metaphorical expressions, their underlying metaphorical extensions would not be practical as tools of concept formation. The manner in which concept formation is achieved in speakers’ everyday lives is expected to be economical. Speakers can and do separate source from target and even give mediating concepts, with some cognitive effort, when they need to consciously examine a particular metaphorical expression. When speakers quickly change the directions and distances of paths, cognitive effort also quickly fluctuates.
6.4 Concept formation through repetition

We have seen how two dynamic models of “switching” and “paths” are able to explain concept formation through iconic metaphorical extensions. The models basically dealt with the single formation of a new concept. In practice, however, most concepts are formed through their repeated use. In considering concept formation, we need to review the two dynamic models from the standpoint of repetition in the mental space. In this section, we discuss the structure of repetition and concept re-formation and repetition of iconic metaphorical extensions.

6.4.1 Structure of repetition in concept formation

As discussed in 3.1.4, repetition of the connection of a linguistic form and a mental picture forms a labelled concept, and repetition of the extension of mental pictures from the source to the target gives rise to a metaphorical extension. In this section, we reconsider these ideas and discuss the structure of each mental activity.

6.4.1.1 Repetition of connections between a linguistic form and mental pictures

The structure of the connection between a linguistic form and a mental picture was considered in 6.1. A switching system connects the linguistic form and shifting mental pictures, and forms a labelled concept. In considering the structure of repetition of connections of a linguistic form and a mental picture, we need to focus again on the relationship between a linguistic form and a mental picture.

In considering repetition of connections between a linguistic form and mental pictures, we must be aware of the following points:

1) The linguistic form is stable.
2) Mental pictures shift over time with or without connection to a linguistic form.

Based on these points, the structure of repetition of connections between a linguistic form and shifting mental pictures is shown below.
In Figure 6.10, the three ‘a’s in the top row indicate three utterances of the linguistic form ‘a’ at different times. The mental pictures shift from [a-1] to [a-3] over time, with or without connection to the linguistic form ‘a’. That is, the “and/or” in the figure means that the mental picture [a-1] can be connected to the linguistic form ‘a’, or shift to another mental picture [a-2], or shift to another mental picture [a-2] and be connected to the linguistic form ‘a’ simultaneously. For example, the mental picture [a flat shape with three straight sides and three angles] is connected to the linguistic form ‘triangle’, and ‘triangle’ is connected to the mental picture [a group of three people who are all connected with each other in a particular situation, but often have different interests]. Importantly, the first mental picture can also change to the second one without any connection with the linguistic form. In repetition of connections between a linguistic form and shifting mental pictures, mental pictures are modified gradually in the course of the establishment of a particular labelled concept.

6.4.1.2 Repetition of iconic metaphorical extensions

An iconic metaphorical extension consists of two kinds of extension, i.e. an extension between mental pictures and an extension between groups of related mental pictures. In concept formation through iconic metaphorical extensions, as discussed in 6.3.2, these two
extensions shift a connection between a particular linguistic form and a mental picture of the source to another connection between the linguistic form and another mental picture of the target. Repetition of iconic metaphorical extensions means that those two extensions recur, shifting the connections in the mental space.

In the survey, some responses which illustrate this repetition of metaphorical extensions were observed. In 5.3.1, one English participant explained the underlying metaphorical extensions between the basic shape Circle and the word ‘harmony’, referring to words and phrases as shown:


These data represent cognitive processes in associating HARMONY with ROUNDNESS. The words and phrases, which are all linguistic forms, are connected to particular mental pictures. We can assume several extensions from the source ROUNDNESS to the target HARMONY, as indicated in Figure 6.11

![Figure 6.11 Hypothesised metaphorical extensions from ROUNDNESS to HARMONY](image)

It is difficult to determine exactly which mental picture of the source extends to a mental
picture of the target from the order of the participant’s utterances alone. Moreover, some mental pictures may be mediating pictures between ROUNDNESS and HARMONY (e.g. [something inclusive] and [someone working together in a circle]). However, repetition of extensions from ROUNDNESS to HARMONY can be seen. The connections between the linguistic form ‘circle’ (or ‘round’) and some mental pictures in the source (e.g. [no crossing point] and [not cutting something else]) shift to the connections between ‘circle’ (or ‘round’) and some mental pictures (e.g. [a situation or a scene without stress] and [a situation or scene without idea of blocking]).

These connections are displayed in Figure 6.12.
Figure 6.12 shows that, in the source, the three ‘a’s in the left row indicate three utterances of the linguistic form ‘a’ at different times.\textsuperscript{13} The mental pictures shift from [a-1] to [a-3].

\textsuperscript{13} In the target, the three (‘b’)s in the right row indicate three utterances of the linguistic form ‘b’ at different times, but they are not always necessary (see 6.2.4).
over time, with or without connection to the linguistic form ‘a’. The “and/or” in the figure means that the mental picture [a-1] can be connected to the linguistic form ‘a’, or shift to another mental picture [a-2], or shift to another mental picture [a-2] and be connected to the linguistic form ‘a’ simultaneously.

Figure 6.12 represents the threefold repetition of a metaphorical extension, using a linguistic form ‘a’ (e.g. ‘circle’) and mental pictures [a-1], [a-2] and [a-3] in the source (e.g. [no crossing point], [no intersections] and [no cutting something else]), and mental pictures [b-1], [b-2] and [b-3] in the target (e.g. [a situation or a scene without stress], [a situation or a scene without idea of blocking] and [a situation or a scene with a friendly atmosphere]). In the course of repetition of the metaphorical extension, the connection between the linguistic form ‘a’ and the mental pictures [a-1], [a-2] or [a-3] consecutively shifts to the connection between ‘a’ and [b-1], [b-2] or [b-3]. Metaphorical extensions between shifting mental pictures in both the source ([a-1] to [a-3]) and the target ([b-1] to [b-3]) modify the connections between a linguistic form of the source and mental pictures of the target (‘a’ - [b-1] to ‘a’ - [b-3]).

6.4.2 Concept formation and repetition of iconic metaphorical extensions

As discussed above, a metaphorical extension is formed and re-formed through its repetition. The speaker learns his or her own ways to form and re-form a concept through repetition of iconic metaphorical extensions. Some ways are common to many languages, while others are peculiar to one. In this section, we discuss concept formation through repetition of iconic metaphorical extensions, and its influence on habits of concept formation in a particular language.

6.4.2.1 Repetition of concept formation

In the survey, some investigations constituted a kind of test of concept formation for the participants, and others required them to engage in concept re-formation. When the participants associated words with particular basic shapes in 5.2.1, this was concept re-

---

14 In the target, mental pictures shift from [b-1] to [b-3] over time, and they are not always connected to the linguistic form ‘b’ (see 6.2.4).
formation in which they used their existing knowledge of metaphorical (or metonymical) extensions. In 5.4.1, the participants attempted to understand new metaphorical expressions (e.g. ‘I spent the weekend roundly’). This was the formation of a new concept, although they used their existing knowledge of metaphorical extensions in forming it. In polysemous network formation in 4.2, in which I suggested many polysemous networks, the process of making most networks in Japanese was by concept re-formation, while the process of making some networks in English was by concept formation.

The phenomena in these investigations have been discussed through the dynamic model of paths. The model illustrates both concept formation and concept re-formation through repetition of metaphorical extensions, because both concept formation and concept re-formation are based on one basic model of extending the source to the target in the mental space. It is difficult to distinguish concept formation from concept re-formation exactly, and we do not attempt any further discussion.

An important point to note here is that a concept is not automatically formed or re-formed in the speaker’s mental space. The speaker is an actor who repeats a particular metaphorical extension in forming or re-forming a concept. A particular context surrounding the speaker enables him or her to repeat the extension. The speaker’s context plays a crucial role in forming or re-forming the concept and that context changes over time. In 5.2.1, for instance, the words which the participants associated with particular basic shapes indicated that the contexts of the participants differed widely. These participants had contexts which provoked mental pictures which led to many words.

6.4.2.2 Concept formation through repetition of iconic metaphorical extensions

Repetition of iconic metaphorical extensions was discussed in 6.4.1. It was suggested that this involved the recurrence of the same kind of path. We now suggest the repetition of iconic metaphorical extensions makes the path simpler and shorter over time. This is similar to path formation in a forest. It takes a long time and considerable effort to make a path from one point to another in the forest for the first time. The path may be long and full of twists and turns. As people follow the same path many times, it becomes clearer and wider. There may be a reduction in the time and effort required to traverse it and
eventually it may become a short cut. Path formation, whether in the forest or in the mental space, is a process which becomes simpler and shorter through repetition.

When Japanese speakers hear or use the metaphorical expression ‘kanozyo wa sono ken o maruku osameta’ (She settled the matter roundly (She settled the matter peacefully)) for the first time, for example, the distance between the source ROUNDNESS and the target PEACEFULNESS is long. The speakers separate the source from the target. What is more, the direction may be complex, because speakers may produce mediating concepts such as NO CORNERS and NO PROBLEMS for bridging the gap between ROUNDNESS and PEACEFULNESS. They consciously connect a particular mental picture of the source (e.g. [a round shape]) and another particular mental picture of the target (e.g. [She settled the situation peacefully]). This connection needs some time and some cognitive effort to establish. In the repetition of the expression, mental pictures in the target change according to the speakers’ contexts (e.g. [She peacefully settled the trouble in the family] and [She successfully mediated in a dispute between two sides]). Mental pictures in the source gradually change from the concrete (e.g. [a round shape]) to the abstract (e.g. [something without breaks] and [something without serious disorder]). Concrete mental pictures in the source are no longer as important for the speakers as those in the target in connecting the linguistic form of the source ‘maruku’ (roundly) and a particular mental picture of the target. The distance between the source and the target becomes shorter and the direction becomes simpler by the omission of mediating concepts. Finally, concrete mental pictures in the source become a mental frame. Through this mental frame [ROUNDNESS], the linguistic form of the source ‘maruku’ (roundly) is linked to a particular mental picture in the target. This situation indicates overlap of the source and the target, and the distance between them is the shortest and the direction is the simplest. Processing time and cognitive effort to connect the source and the target are minimised. Speakers can then repeat the metaphorical expression using the mental frame without being aware of a particular mental picture in the source.

Our dynamic model of concept formation and re-formation through iconic metaphorical extensions is shown in Figure 6.13.
Figure 6.13 Concept formation through repetition of iconic metaphorical extensions
In Figure 6.13, the distance between the source and the target becomes shorter over time. At a certain point in the repetition of metaphorical extensions, the source overlaps the target, and then the distance no longer changes. We now summarise the process of concept re-formation through iconic metaphorical extensions.

1) Repetition of iconic metaphorical extensions makes a path simpler and shorter. An iconic metaphorical extension consists of a path between mental pictures and a path between groups of their related mental pictures.

2) At a certain point in the course of repetition, the source overlaps the target.

3) A group of related mental pictures of the source becomes a mental frame. This mental frame ([ ] in Figure 6.13) no longer reflects a particular mental picture of the source, but has basic attributes of the source.

4) Through the mental frame, the linguistic form of the source ‘a’ is closely connected to a particular mental picture [b-x] or [b-y] of the target.

5) Mental pictures of the target ([b-x] and [b-y]) shift according to the speaker’s contexts, but, in the source, the same mental frame appears in every repetition. The mental frame does not shift.

6) Time and cognitive effort required to connect the source and the target are minimised and become fixed.

A mental frame, which has the basic attributes of the source, is one of the most important factors in keeping the relationship between the source and the target metaphorical in the speaker’s everyday use of metaphorical expressions. As discussed in 6.2.3, an iconic metaphorical extension shifts the connection between a linguistic form of the source (e.g. ‘maruku’ (roundly)) and a particular mental picture of the source (e.g. [a round shape]) to the connection between the linguistic form and another particular mental picture of the target (e.g. [She settled the situation peacefully]). Repetition of the iconic metaphorical extension makes the path from the source to the target simpler and shorter. In the overlap of the source and the target, a linguistic form of the source (e.g. ‘maruku’ (roundly)) is closely linked to a particular mental picture of the target (e.g. [She settled the situation peacefully]) through a mental frame of the source (e.g. [ROUNDNESS]). The
overlap allows the speaker to use most metaphorical expressions with minimum cognitive effort. Importantly, the speaker is not aware of this link because the direct connection between the linguistic form of the source (e.g. ‘maruku’ (roundly)) and a particular mental picture of the target (e.g. [She settled the situation peacefully]) is established in the speaker’s mental space. However, the relationship between the linguistic form of the source and a particular mental picture of the target, which is arbitrary, is still strongly supported by a mental frame of the source (e.g. [ROUNDNESS]). The mental frame of the source is a key to the retention of the metaphorical relationship between the source and the target when the speaker uses most metaphorical expressions unconsciously and automatically. This unconscious and automatic use of metaphorical expressions by using the mental frame helps constitute specific ways of concept formation, and we discuss these specific ways in the following section.

6.4.2.3 Habits of concept formation

Habits are brought about through repetition. Repetition of a particular metaphorical extension establishes a “habit of concept formation” through the speaker’s involvement with the environment. The repetition of a particular metaphorical expression is not accidental but necessary. The speaker learns both the expression and the backgrounds which support it through repetition of the expression (Quinn 1991). The backgrounds include the way the speaker uses the expression in the environment with which he or she is involved.

Through repetition of iconic metaphorical extensions, a speaker re-forms concepts, and, at the same time, learns the way in which he or she re-forms them. His or her own way is a habit of concept re-formation. In order to discuss the habit of concept re-formation, we consider a physical habit. A physical habit starts with its cause, and is repeated in a particular environment. It is often very difficult to find the original cause for provoking the physical habit. On the other hand, we may find the reason for a particular habit of a speaker within the environment in which he or she has repeated the habit. The original cause may have been accidental, but the environment which allowed the speaker to repeat the habits is necessary.
As well as a physical habit, there is a habit of concept formation. The survey provided evidence that suggests that habits exist in concept formation. Some of these were common to English and Japanese, while others were peculiar to each language. In 5.2.1, for example, the participants associated words with particular basic shapes. The proportions of shared and specific associations in both English and Japanese were almost half-and-half. In 5.3.2, we investigated direction and distance in metaphorical (or metonymical) extensions using words which indicated particular basic shapes and words which are associated with them. In both English and Japanese, we found a negative correlation between direction and distance, in which the associated words which the participants chose more frequently (e.g. ‘moon’, ‘sun’ and ‘ball’) were placed near the words indicating the shapes (e.g. ‘circle’). At the same time, between English and Japanese, there were great differences in direction and distance in particular words indicating abstract notions (e.g. ‘complete’ in English and ‘correct’ in Japanese). In 5.4.1, which was a cross-linguistic investigation of existing and new metaphorical expressions, both the English and Japanese participants utilised existing metaphorical extensions for understanding some metaphorical expressions. For understanding other expressions, however, they did not use existing extensions.

So far, we have sought to explicate some of the cognitive processes which underlie common and specific phenomena in English and Japanese using the dynamic model of metaphorical extensions. We propose that all speakers make use of the dynamic model. Speakers form and modify concepts through repetition of iconic metaphorical extensions in different environments. By doing this, they set up habits of concept formation, and the habits of concept formation common to a set of speakers constitute the habits of concept formation in their language or culture.
7 Concluding remarks

In this study I have discussed a number of important ways in which iconic metaphorical extensions can contribute to concept formation. Concept formation through iconic metaphorical extensions is among the most basic and the most important cognitive abilities.

In conclusion, I have proposed that concept formation through iconicity can be explained by a dynamic model which should apply in any language, and that, in this model, the connection between a particular linguistic form of the source and a mental picture of the source shifts to the connection between the linguistic form and another mental picture of the target by an iconic metaphorical extension. This shift enables the speaker to create a new labelled concept.

A linguistic form and a mental picture together constitute a labelled concept in which the speaker’s attention and/or consciousness switches between the two. A particular linguistic form indicates a mental picture which can change freely within a group of related mental pictures.

An iconic metaphorical extension consists of two kinds of extension: one is that between mental pictures in the source and the target, and the other is that between groups of related mental pictures. These two extensions support a dynamic and universal model of iconic metaphorical extensions for concept formation. In this model, there are three main relationships between the source and the target which are represented by three kinds of path, i.e. simple and short paths, complex and long paths, and indeterminate paths. Although the speaker can change these relationships by shifting metaphorical extensions, he or she most often does not focus on the metaphorical extension involved, but rather thinks of the source and the target as overlapping. In the overlap, a group of related mental pictures in the source becomes a mental frame through which a particular linguistic form of the source is linked to a mental picture of the target, and cognitive effort to connect the source and the target is low.

Speakers repeat particular metaphorical extensions in the environment to which they belong, and learn the way to use them. Through repetition, different metaphorical
extensions in different speakers or languages constitute their habits of concept formation.

I turn to answer the question which provoked this study. The question was why I, a native speaker of Japanese, interpreted the English metaphorical expression ‘He was roundly defeated’ as ‘He was defeated without frustration or strife’. When I learnt the meaning ‘He was completely defeated’, I realised that it was likely that some languages employ this meaning in relation to Circle. In fact, in Japanese ‘maru’ (circle) has the meanings ‘a whole’ as a noun and ‘full’ and ‘whole’ as prefixes. The connection between Circle and COMPLETENESS is so strong that it would probably be observed in many languages. Here the context in which ‘roundly’ is used should be noted. In English, ‘roundly’ is used in the context of someone being defeated completely.\footnote{In English, there is a tendency for ‘roundly’ (completely) to be used in negative contexts (e.g. ‘They have roundly condemned the shooting’). This will be an interesting topic for further studies to investigate the relationship between metaphorical extensions and their related negative contexts.} In Japanese, ‘maruku’ (roundly), which is the adverbial form of ‘marui’ (adj, round), is used in the context of someone settling a matter or a dispute peacefully or amicably. I applied this metaphorical use of ‘maruku’ (roundly) to the English expression ‘He was roundly defeated’.

The basic shapes which the English word ‘circle’ and the Japanese word ‘maru’ represent are very similar. Their geometrical definitions, ‘a shape consisting of a curved line completely surrounding an area: Every part of the line is the same distance from the centre of the area’ are identical. However, their metaphorically extended meanings are sometimes different. The difference in metaphorically extended meanings between ‘He was roundly defeated’ and ‘Kanoozyo wa sono ken o maruku osameta’ (She settled the matter roundly (She settled the matter peacefully)) is explained as different uses of the dynamic model of iconic metaphorical extensions. In the English expression, the whole shape of Circle is important, and the extension from the source ROUNDNESS to the target COMPLETENESS is simple and short. In the Japanese expression, the curved line of a Circle is predominant, and the extension from ROUNDNESS to PEACEFULNESS, which may be supported by mediating concepts such as NO CORNERS and NO PROBLEMS, is complex and long.

This study has attempted to reinterpret the weak version of the Sapir-Whorf hypothesis by using a comparative study of cognitive processes between English and
Japanese. After analysis of several descriptive and experimental investigations, I suggest that the way a speaker views the real world is partly determined by the structure of the speaker’s native language. I think of the relationship between the speaker’s thought and the structure of his or her native language as being a matter of options which a speaker has in using linguistic forms in order to make sense of an object or event in the real world. In other words, among all the objects or events which languages can represent, some of these are used in individual languages to represent other objects or events. Thus Japanese uses the basic shape Circle to represent PEACEFULNESS in the expression ‘Kanozyo wa sono ken o maruku osameta’ (She settled the matter roundly (She settled the matter peacefully)), while English uses the same shape to represent COMPLETENESS in the expression ‘He was roundly defeated’. These expressions are repeated by native speakers of Japanese and English, and the repetition stabilises their underlying metaphorical extensions, producing habits of concept formation in each language. In the sense that the uses of metaphorical expressions which are linked to particular linguistic forms have an influence on the production of habits of concept formation through iconic metaphorical extensions in a particular language, I give support to linguistic relativity.

Finally, there are two future directions in which this study could be extended: one concerns the relationships between the four senses other than the visual sense and their related metaphorical extensions, and the other concerns the relationship between iconic metaphorical extensions and their parallel processing in the mental space. First, in this study, by using basic shapes and their related metaphorical extensions, I focused on sight. There is, in addition, a variety of metaphorical expressions based on the senses - hearing, smell, taste and touch (e.g. ‘to ring the changes’, ‘His story is fishy’, ‘her honeyed words’ and ‘a prickly issue’). A particular linguistic form is connected to a mental sound, a mental smell, a mental taste or a mental touch. I suggest that this mental representation extends to another mental representation, and that the extension forms a new concept. Exploring the universality and relativity of metaphorical extensions based on the other senses will undoubtedly yield interesting results. Second, the dynamic model of iconic metaphorical extensions is based on a serial processing system in which one concept extends to another in the mental space. How are metaphorical extensions dealt with in the human brain? Neural networks can explain extensions from the source to the target by utilising a parallel
processing system of information.\textsuperscript{2} I suggest that a particular mental picture and a group of its related mental pictures in the source extend to another mental picture and another group of its related mental pictures in the target in parallel. Moreover, attributes of a particular mental picture (e.g. size, colour, structure) extend from the source to the target in parallel. It will be helpful to use the idea of parallel processing in the cognitive study of concept formation through iconic metaphorical extensions.

\footnote{\textsuperscript{2} Thomas and Mareschal (2001) explain metaphorical understanding through categorisation using connectionism.}