Chapter 2

Review of Related Literature

This chapter reviews the related previous work on the study of frames of reference. It first gives a detailed description of the important terms used in this study, trajector and landmark as well as figure and ground. It then outlines the three frames of reference; intrinsic frame of reference, relative frame of reference, and absolute frame of reference. Finally, it illustrates the studies on spatial frame of reference by Grabowski and Weiss and other researchers.

2.1 Trajector versus Landmark and Figure versus Ground

Trajector and *landmark*, or *figure* and *ground* are four related important terms used in the study of the spatial frames of reference. The understanding of these terms will help the researchers as well as interested people to understand how a certain frame of reference is used. In order to understand the spatial frames of reference discussed in this paper, an understanding of these basic concepts of Cognitive Linguistics is obviously required. This is due to the fact that a frame of reference involves the location of the trajector or the figure in respect to the landmark or the ground. *Trajector* and *landmark*, or *figure* and *ground* are terms used to describe an *asymmetrical relation between entities* according to Talmy (1983) and Langacker (1986) (cited in Svorou, 1994: 9) Talmy used the terms *figure* and *ground* following the various Gestalt Psychologists while Langacker uses the terms *trajector* and *landmark*. Apart from these terms, there are also several other terms used such as *locans* and *locatum*, *relans relatum* (Svorou, 1993: 9),

and *referent* and *reference point* (Levinson, 1996). In this thesis, however, the researcher, will use the term *trajector* (henceforth TR) and *landmark* (henceforth LM) to refer to these two main concepts. Accordingly, TR is used to describe the object we want to locate its place in space, while LM is used to describe the object used as a reference object for us to locate the TR.

Figure refers to the objects or entities with clearer perceptual prominence than *ground.* That is to say, *figure* contains the forms and has shape and is more outstanding than *ground* in terms of locations, colors, closed contours, movements or motion in continued stages along the path of its moving direction. Talmy (1983, cited in Bowerman, 1996: 399) pointed out that where there are two objects speakers usually treat the smaller, more mobile object as the figure or object to be located, and the more stable object as the ground, or referent object. Due to the moving characteristic of the *figure*, it is sometimes called the *TR*, in contrast to the term *LM* or the concept *ground.* When we say *The book is on the table*, we focus our interest on the location of *the book* rather than *the table.* Here *the book* is regarded as the *figure* or *TR* which is more feasibly moved around than *the table* which becomes the *ground* or the *LM.*

Ungerer and Schmid (1996) summarize the notion of figure and ground by referring back to Gestalt psychology and the famous face/vase illusion --- whether two faces might be perceived as more outstanding than a vase or vice versa. When the vase is viewed more prominently, it is seen as a foreground picture or a *figure* and the two faces will automatically be treated as a background image or a *ground.* Similarly if the two faces are more prominently perceived, they become a *figure* and the vase becomes a *ground.* This 'perceptual prominence' can be used to understand the language expressions, especially to explain the locative relations rendered in prepositions by the use of the terms *TR* for *figure* and *LM* for *ground* and a

path through which a TR moves along. These three important elements (figure, ground, and path) will be the components of the central schemas representing cognitive configuration.

Considering the statement showing an apparent sense of motion like *The bird is flying over the mountain*, we know that the bird is the TR that moves along the path of movement and has a location above the LM or the mountain. In Figure 1 ,the thick black circle marked with *TR* represents the TR or the bird which moves in a continued stage (*st1*, *st2*, and *st3* respectively) and the rectangular box marked with *LM* represents the LM or the mountain.

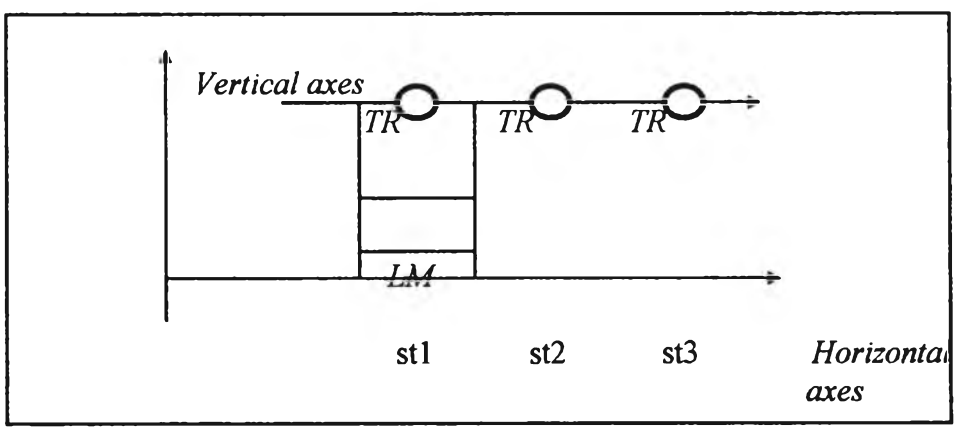


Figure 1 Representation of *TR* and *LM* in sentence *The bird is flying over the mountain* [Adapted from: Unerer and Schmid (1996: 161)]

Though the choice of TR and LM is primarily based on size and motion as discussed above (large, immobile objects will be treated as LM), this is not always the case at which TR differs from LM in a spatial arrangement situation. Svorou (1994: 11) notes that there are other factors determining the distinction between TR and LM, namely *cultural significance* and *frequency of encounter*. Small objects are sometimes picked as the LM if they have cultural significance. Take a Seven-Eleven store as an example. This place attracts a lot of customers, which constitute a remarkable LM despite large buildings around it. In the case of frequency of encounter, any

entity, which is encountered frequently or is more salient will become a LM. An environmental space like a coast near a coastal city always serves as a LM even though its size is smaller than the sea or the body of water or the town itself.

Sometimes the concepts of TR and LM are used to describe spatial prepositions. Kreitzer (1997) makes use of the concepts *TR*, *LM*, and *path schema* to draw a schematic representation of the preposition *over* to show that this polysymy can be explained in terms of component level schemata and relational schemata. These schemata are two of the three levels of image-schematic structure or schemata, a central mechanism of conceptualization: the component level, the relational level, and the integrative level. Kreitzer uses the preposition *over* as an example to show component level schemata and relational schemata. Kreitzer argues that image schema transformations occur in component level schema, which become "decomposable" into a *TR* and an *LM*. "If the relation expressed by the preposition is a dynamic one, then the TR component will consist of a path schema, termed a *relational level schema*" (Kreitzer, 1997: 293). *Integrative level schemata* are the complex schemata created by the combination of relational level schemata integrated with other schemata. The application of schemata for the spatial relations is thought to be universally implemented.

As previously mentioned, the understanding of TR and LM will help us clarify the concept of a *spatial frame of reference* which has been used by psychologists in identifying locations of a TR in relation to an LM. There are 3 systems of spatial frame of reference: *intrinsic frame of reference*, *relative frame of reference*, and *absolute frame of reference*. These three frames of reference will be discussed in detail in the following section.

2.2 The Three Frames of Reference

The frames of reference are best defined as the patterns of how the TR or the figure's location is perceived in respect to LM or the ground. The TR or the figure's location might be perceived as related to the LM or the ground's outer shapes, or to the assumption of the speakers using the location of themselves in space, or to a fixed system determined by people of certain cultures. This variation will depend on the shapes of the LM or the ground, which will be discussed one by one below. There are three basic frames of reference.

2.2.1 Intrinsic Frame of Reference

An intrinsic frame of reference is a frame that depends on an LM's intrinsic properties to determine the location of a TR. An LM always has clear orientation because it is always an intrinsically oriented object or an asymmetrical object. In a spatial arrangement situation, the inherent asymmetries of the LM will separate its region into equivalent sub-regions: top or bottom, front or back, left or right. When this kind of LM is used as a reference object to locate any entity in relation to it, these partial spaces or subspaces determine the location of such an entity. For example, a car's front region is assigned to be the part with headlights or the part facing the direction in which the car moves. When human perception of space depends on the object-deictic orientation, it is its intrinsic frame of reference that plays the most important role. This frame of reference is also sometimes known by some other names such as an *object-centered frame of reference* (Bryant, 1997) and an *object-deictic orientation* (Heine, 1997), who notes that the object-deictic orientation will center the attention of the participants on some inanimate item like a car or a chair. This has also been

referred to as an *intrinsic system* or *intrinsic frame of reference.* The statements such as *the cat is in front of the car* and *the face of the television* explicitly signify the use of an intrinsic frame of reference.

2.2.2 Relative Frame of Reference

A relative frame of reference is a frame that depends upon the view of a speaker (or a listener, since human beings use a coordinate system, defined by the three body axes (head/ feet, front / back, left / right) to specify location of the object with respect to a LM that does not have clear orientation or to non-oriented objects. In other words, speakers or listeners assume a particular location and perspective in determining spatial orientation. The statement *the dog is in front of the tree* when the location of the dog is actually at the side of the tree the speaker is facing, and therefore the side that faces away from such a speaker of the tree will be described as the back of the tree. The following cartoon strip is a good example of people always imposing their own face on the face of a non-oriented LM.

Figure 2 Cartoon strip showing the use of Relative Frame of Reference[From Svorou, 1994: 21]

Heine (1997) calls this frame a deictic orientation or a speaker-deictic, that is described with reference to the location and perspective assumed by a speaker or listener who have contrasting deictic coordinates. She also notes that this notion is associated above all with the concepts of "up", "down", "front", "back", "in", "left", and "right." She also remarks that the term *relative system* has been used by other authors. She also notes a

very interesting observation from Hill (1974, 1982, forthcoming in Heine, 1997: 12-13) that there is a distinction between what is called the closed and open systems of orientation when there is a non-oriented LM. There are two models, namely, a *face-to-face model* and a *single-file model.* Figure 3 below, adapted from Heine (1997), helps explain the notions of these two models. The left-hand hill is assumed by the speaker to have a face. So he would say that *the box is in front of the hill.* This is called the face-to-face model. A speaker at the foot of the right-hand hill, however, would say *the box is behind the hill* ,assuming the other side of the mountain is its face, which is turning away from him. This is called a single-file model. These two models tend to be adopted in such a case where a LM (here is the hill) is non-oriented, that is no clear region partitioning its front from its back.

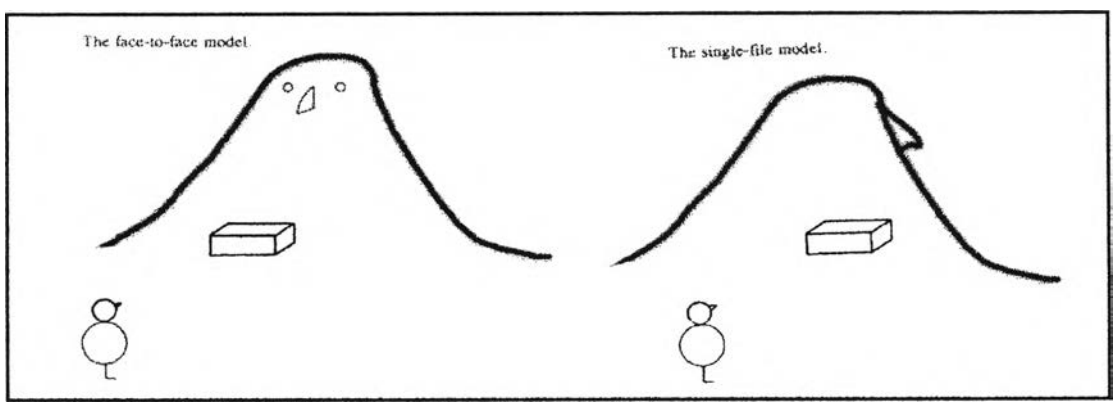


Figure 3 The schematic representation of the face-to-face model and the single-file model

Heine (1997: 12) notes that "Trees, mountains, and stones normally lack an intrinsic reference frame in Western societies: Where their fronts and backs are located is determined situationally by the relative location of the speaker and/or the listener, rather than by the inherent properties of the items concerned." This is not always the case, however. In some cultures trees and mountains do have inherent properties. The Chamus of Kenya, for instance, conceptualize the part of the tree where its trunk is

inclined or where the biggest or largest numbers of branches are found as the front, while the Kikuyu and other Bantu-speaking peoples living in and around the Kenyan Rift Valley conceptualize the steeper side of a mountain as its back. (Heine, 1997: 13).

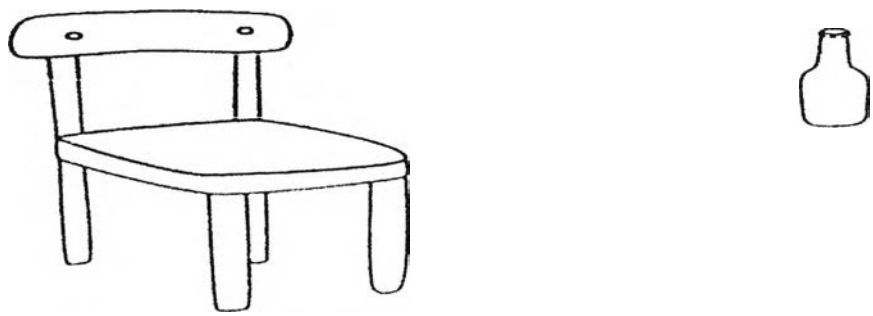
Heine also remarks that object-deictic orientation can exhibit interesting cross-cultural variation for objects such as trees and mountains. Their backs and fronts are only normally "determined situationally by the relative location of the speaker and/or the listener, rather than by the inherent properties of the items concerned" in western cultures. They are, however, known to have inherent fronts and backs in the cultures such as the Chamus of Kenya, the Kikuya and other Bantu-speaking peoples living and around the Kenyan Rift Valley.

The relative frame is found to be used by speakers in most languages because it imposes only bodily coordinates to identify the location of objects in space. This frame might be called by other names by other writers such as a *speaker or viewer-centered frame of reference*, an *egocentric frame of reference*, a *deictic or* a *deixis* (Svorou, 1996; Levinson, 1996; Regier, 1996a; Bickel, 1997). The point where the speaker/hearer stands can be called *deitic center* (Regier, 1996b: 171).

2.2.3 Absolute Frame of Reference

This last frame of reference is rarely found in the world's languages but has received a certain amount of interest among anthropologists as well as among cognitive linguists. People speaking languages using absolute frame of reference do not tend to use either of the two previously mentioned frames. In such languages, spatial descriptions are obvious fixed bearings which are similar to our cardinal directions, north, south, east, and

west but are not necessarily assigned to the same direction. For example, Speakers of Tzeltal, a Mayan language spoken in Chiapas, Mexico, always describe objects in space in strict contiguity as shown in the figure 4 from Levinson (1996).



"The bottle is uphill of the chair."

waxal ta y-ajk'ol xila te limite
standing at its-uphill chair the bottle

Figure 4 The schematic representation of absolute frame of reference [from Levinson (1996)]

The sentence *waxal ta y-ajk'ol xila te limite* is literally translated as *the bottle is uphill of the chair. Uphill* for Tzeltal speakers designates *south* notion in plain English. It can be seen from this figure from Levinson that speakers who employ this frame do not define the concept of *south* the same way we do. This frame does not depend on a coordinate system, as in the case of a relative frame, but on some axes set outside the observers or speakers in question. This frame of reference is also used by speakers of Guugu Yimithirr (Regier, 1996a). The other names for this frame are a *fixed-bearing system*, an *environmental centered spatial frame of reference*, an *allocentric frame of reference.* or even an *absolute coordinates* (Regier, 1996a, Levinson, 1997) meaning a system that never changes. Bickel (1997) also calls this frame of reference an *extrinsic frame of reference* as opposed to an *intrinsic* frame of reference. Heine (1997) calls this system a *cardinal orientation*, when she only notes that this system is defined in terms of absolute or fixed reference

points that are independent of the position assumed by the speaker, the hearer, or any particular object.

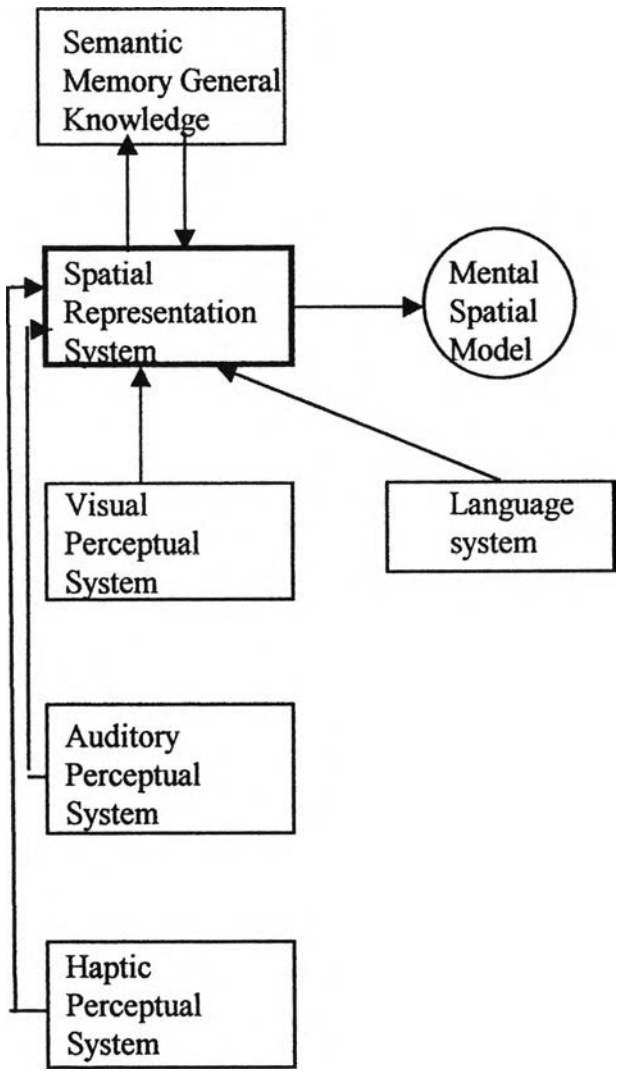


Figure 5 Diagram of the interactions of the spatial representation system with other cognitive systems. (Bryant, 1997)

Heine (1997) also proposes another system of spatial orientation: a *Landmark orientation.* Landmark orientation has reference points and structures rooted in the particular physical environment of the people using them. These points are used to describe locations with reference to environmental LM such as rivers, mountains, and the sea as seen in some

common expressions "away from the river" and "facing the mountain." (Heine, 1997: 13).

Bryant (1997) discusses the Spatial Representation System (SRS) which is possessed by humans and is linked to both perceptual and linguistic systems. Though humans rely heavily on vision for spatial information we also acquire it through auditory and haptic perception as well. Language systems are used to interpret the spatial code mapped onto the SPS by each perceptual system. There is an interaction between the SRS and semantic memory general knowledge. The SRS uses three frames of reference which "establish a correspondence between the mental representation of a pace and aphysical or perceived space. These reference frames are coordinate systems in which locations can be specified along three dimensions" (Bryant, 1997: 247). These thee frames of reference are *egocentric* or *viewer-centred* frames of reference, *allocentric* or *environmental* frame of reference and *object-centred* frame of reference. An egocentric is the frame that is defined by the three body axes (head / feet , front / back , left / right) or sometimes in a head-centric coordinate system. An allocentric frame of reference is defined by orthogonal axes set outside the observer. This frame is typically oriented with response to the gravitational axis of the world or to the two horizontal directions along the plane of the local terrain.

2.3 Studies on Spatial Frames of Reference

2.3.1 Grabowski and Weiss

Grabowski and Weiss (1996) study two frames of reference: intrinsic and relative as used by the speakers of Dutch, German, French, Italian, and English. Absolute frame of reference does not exist in these languages. Grabowski and Weiss aim at finding the factors or determinants that cause

these speakers to use intrinsic frame and/or relative of reference instead. Both have observed that these two frames of reference cause ambiguity because the intrinsic frame of reference as well as the relative frame of reference can occur with intrinsically oriented objects.

They explain this ambiguity using the figure 6 below. We can locate the point where both cats are seen with either statement -- *the cat is in front of the convertible* and *the cat is on the left of the convertible.* Though most people tend to use the first statement for the cat standing near the position of the headlight and the second one for the cat near the convertible door, these two statements can be used with either cat depending on the frame of reference employed by the speakers.

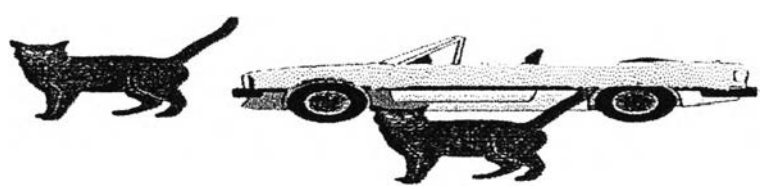


Figure 6 The ambiguous use of the notions of FRONT and BACK (from Grabowski and Weiss, 1996)

This case is not as ambiguous as when the reference object(the car in Figure 6) is replaced by a non-oriented object. Miller and Johnson-Laird (1976) states in *Language and Perception* that the intrinsic frame of reference is always preferred to the relative frame of reference when the subregion of referent object has clear outer appearance. However, diversity across cultures arises as regards to the choice between these two frames of reference. Grabowski and Weiss began by designing an experiment to test German speakers' perception of FRONT and BACK notions and later on adapted similar procedures for the other four languages.

Their experimental tools included a yellow Volkswagen beetle, representing an intrinsically oriented object, and a toy tree, representing a

non-oriented object. The setting was created with an approximately 60 x 40 cm size road with 2 parking areas, called Subspace 1 and Subspace 3 respectively, beside it (see Figure 7). Between the parking lots stands a space for either the Volkswagen beetle or the tree. Experimentation was conducted with one participant at one time. The participants or subjects did not know they were being tested on spatial expressions. Subjects were asked to move or to imagine they were driving a toy car and instructed as follows: "Imagine you are giving a friend a lift home. But you don't know exactly where he lives. He says:

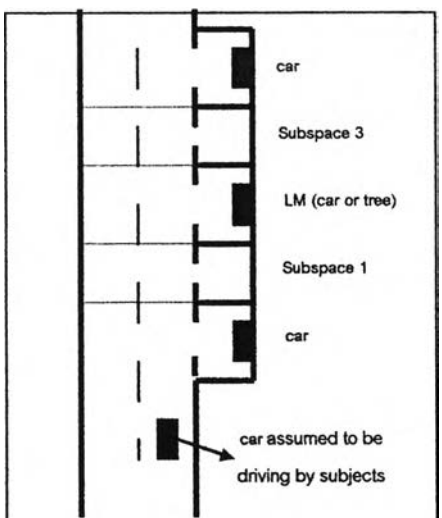


Figure 7 The setting of Grabowski and Weiss (1996)

Could you please drop me off in front of (vor) / behind (hinter) the yellow beetle / the tree? Where would you stop the car?" The listeners or participants would then choose to park the car in one of the two spaces provided, Subspace 1 or Subspace 3. Both researchers expected that, for the case of a non-oriented LM (tree), the relative frame would be chosen, and in the case of oriented LM (yellow beetle), that the intrinsic frame would be chosen. When the frequency of choices for both subspaces were counted, Grabowski and Weiss reported the conclusion in the Table 1 below. The result confirmed what was expected by them in case of the non-oriented reference object — that the relative system was predominant. The results were, however, at variance with their expectation in the case of the oriented reference object. Grawboski and Weiss claim that there was an ambiguity arising from the use of the two frames of reference when the oriented reference object was used. It was assumed that subjects would choose to park the car at Subspace 1 for *vor* [in front of] and Subspace 3

for *hinder* [behind]. The reverse was true for the intrinsic frame of reference.

It was expected, before the experiment, that subjects would choose the relative frame of reference in the case of the tree and the intrinsic frame of reference in the case of the beetle. The choice of the relative frame responded to the choice of Subspace 1 for *vor* and to Subspace 3 for *hinter*, and vice versa for the choice of the intrinsic frame. As shown in the table, however, the subjects can differentiate between the alternative subspaces

tree	Subspace		yellow beetle	Subspace	
	1	*3*		*1*	*3*
"vor"	20	0	"vor"	24	15
"hinter"	3	17	"hinter"	23	17
total	23	17	total	47	32

Table 1 Frequency of choices of frames of reference by German speakers of "vor" and "hinter" in take-a-ride-home situations

when the referent object was a non-oriented object (tree) regardless of only three people parking the car in Subspace 1 when *hinter* was instructed. Ambiguity arose in the case of the LM as seen in the fact that more than half the number of subjects choosing Subspace 1 for *vor* did the opposite. This finding was reinforced by the fact that 17 people chose Subspace 3 in contrast to 23 people choosing Subspace 1 for *hinter*. This showed that the orientedness of the LM (car) played a major role in the interpretation.

Amazed by the result, Grabowski and Weiss changed the situation from an informal situation (giving a friend a ride home) to a more formal and institutionalized one: this time the participants were asked to imagine that they were taking their driving test, in which they were receiving instructions from the examiner to park either in front of or behind the oriented or non-oriented LM. The results are shown in Table 2. In this experiment, the results were the opposite from the results in the previous

experiment in that ambiguity took place in the case of the LM being a tree or non-oriented LM, specifically 8 and 7 people chose Subspace 1, and 2 and 3 people chose Subspace 3, for *vor* and *hinter* respectively.

tree	subspace	
	1	*3*
"vor"	8	2
"hinter"	7	3
total	15	5

yellow beetle	Subspace	
	1	*3*
"vor"	3	17
"hinter"	17	3
total	20	20

Table 2 Frequency of choices of frames of reference by German speaker of "vor" and "hinter" in driving-test situations

As can be seen from the numbers in Table 2, in the case of an oriented LM, most people (17) choose Subspace 3 for *vor* and Subspace 1 for *hinter*, which signifies the use of an intrinsic frame of reference. Here, Grabowski and Weiss conclude that two factors, the formal/ informal characteristic of the social situation and the existence of inherent properties pertaining to the LM, determine the interpretation of these two spatial terms. In conclusion, we can say that intrinsic and relative frames of reference are used interchangeably if the LM is intrinsically oriented in the ride-home situation. In a formal situation, however, the relative frame of reference is dominant in the case where the LM is non-oriented. Ambiguity, thus, arises in both of these two situations.

To prove that ambiguity does not necessarily depend on the situations, Grabowski and Weiss adjusted the alignment of the intrinsically oriented LM, the beetle car, in relation to the direction of the road by moving and the alignment of the car in relation to the road 30 °. The result after this modification showed that all 10 and 9 subjects chose to park the car in Subspace 1 for *vor* and Subspace 3 for *hinter* respectively, this removing the ambiguity in the first experiment. This result occurred because the participants no longer depend on the orientedness of the car. Similarly, when the LM car was put in the opposite direction, all 8 and 10

subjects respectively chose to park the car in Subspace 1 for *vor* and Subspace 3 for *hinter*, which implies adoption of the relative frame of reference.

The result of this experiment, however, leads to the question whether the relationship between spatial and temporal terms is responsible for the ambiguity found in earlier experiments. To test this hypothesis, they begin to do similar experiments with four more languages: French, English, Italian and Dutch. This time instructions were given in the native languages of the languages being examined. The use of spatial prepositions in these languages are different from German. German and Dutch are languages which have three prepositions since both languages share spatial and temporal prepositions equivalent to *in front of* in English.. Table 3 below summarizes the spatial and temporal markers in 5 languages. Spatial prepositions are shown in the first column and temporal prepositions are shown in the second column.

German		Dutch		French		Italian		English	
vor	vor	voor	voor	Devant	avant	davanti	prima	in front of	before
Hinder	nach	achter	na	Derriesre	nach	dietro	dopo	Behind	after

Table 3 Spatial and temporal locatives of 5 languages investigated by Grabowski and Weiss (1996)

Grabowski and Weiss summarized the results of their investigation only in respect to the conditions in which the interpretations of the prepositional expressions were ambiguous. With German and Dutch, which are languages which have three prepositions, it appears that there is an interaction between both factors: the social situation and the orientedness of the LM in the ride-home oriented LM. In four-preposition languages like Italian, French, and English, on the other hand, the

orientation of LM is the only significant factor because ambiguity occurs whenever a non-oriented LM is used. Participants of these languages use only intrinsic frame of reference when an LM like a car shows clear orientation.

2.3.2 Other Researchers

Svorou (1994) outlines the conceptual framework upon which spatial information is based. She reviews many related issues such as how physical world interacts with our cultural knowledge is responsible for the way we view and talk about all aspects of the world through language and discusses the so-called "spatial grams," which are the linguistic expressions expressing primarily spatial relations. summary of Svorou, people's locating objects in space with respect to other objects within the same region are determined on a psycho-physiogical level and described on a linguistic level. Svorou also remarks that there are a number of ways in which a spatial arrangement of two entities may be described linguistically. She observes that there exists some characteristic of certain entities that make it more probable that they will be treated a as TR or an LM than others, within specific contexts. The LM can be treated as "targets, goals or final destinations, as sources and starting points, implying actual and virtual motion, or, finally, as static entities" (Svorou, 1994: 11). There are certain ways for an LM to be determined. First, the choice of an LM in stead of as a TR might be an object which is *large,* and *immobile* (Talmy, 1983 in Svorou, 1994: 11). In a situation where there are such objects, we can predict that a speaker will tend to locate a relatively smaller and/or mobile/moving object in relation to the bigger objects. Second, size does not matter in the case of objects with *cultural significance.* A small building like a grocery might

be chosen as an LM simply because it attracts much attention even when houses in the neighborhood are much larger. Third, *frequency of encounter* can be a factor for determining the selection of an object as an LM. An environmental entity frequently visited can be treated as an LM because it is more salient and easily accessible than other objects near it.

Svorou also provides a detailed conceptual framework concerning region, and the distance between the referent and the reference object that makes specific spatial description valid. "Regions are a conceptual structure which are determined by our knowledge about physical, perceptual, interactional, and functional attributes of entities" (Svorou: 1994: 15). This produces three basic kinds of entities: 1) entities typically conceived of as having an *interior region* such as cans, cups, baskets, etc. 2) entities typically perceived as having an *exterior region* such as trees, tabletops, mountains, etc. 3) entities typically treated as not having regions such as countries, continents, and fields. 4) entities having several regions due to their physical and functional characteristics such as lakes, buildings, caves, phone boxes, etc.

Svorou focuses on the exterior region of an object as an LM. There are three parameters that determine the relation of a TR or a referent and the external region of the LM; namely, distance, external contours, and the inherent properties of the LM. In a spatial situation, distance separates a TR from the LM, so, with respect to distance, the general region of the LM can be divided into a NEAR-REGION and a FAR-REGION. The shape of the LM object is responsible for its external contours, which will be partitioned into AROUND-REGION, ALONG-REGION, THROUGH-REGION, AND ACROSS-REGION. The inherent configuration of the LM is the last factor that determines the relation between the LM and TR in a spatial situation. The inherent properties of an object will determine whether it is a *symmetrical* or an *asymmetrical* object The difference between

these two sub-groups of objects is that the first does not have any differentiated parts on their exterior while the latter do. Trees, for example, are entities with only one asymmetrical axis, top-bottom, but spatial description of an object in relation to the tree is usually based on the horizontal axis rather than on a vertical one, thus being normally treated as symmetrical objects. Trees, however, are treated as asymmetrical objects having different facets in some cultures in Eastern Africa. "Asymmetrical entities contribute to locating other entities with greater precision with respect to them." (Svorou, 1994: 20) The inherent properties of the LM create clear sub-regions: TOP-REGION, BOTTOM-REGION, FRONT-REGION, BACK-REGION, LEFT-REGION, and RIGHT-REGION, which will in turn determine the location of the TR.

Svorou (1994) also discusses the frames of reference or "the notions which integrate observed behavior with respect to region assignment" (Svorou, 1994: 21).

> Most theories distinguish two types of RFs (reference frame), what I call an *inherent RF* and a *deictic RF*, following Tanz (1980). An inherent RF is constructed with reference to the inherent/default values of the sub-regions of the Landmark. We can find the front and the back of a typewriter irrespective of the situational setting. A deictic RF is constructed by ignoring any existing default sub-region values of the Landmark and seeking values in the environment. These values are situationally (deictically) determined, rather than being inherent to the entity.

Apart from the two frames of reference. Svorou proposes that there is a *movement RF* or frame of reference, which is established by the direction of movement of a LM. This results in the assignment of FRONT or BACK or LEFT or RIGHT to sub-regions irrespective of the inherent properties of the LM. Thus, a person running to stop his car running backward down the hill might be described as *running behind* the car even if he is at the part inherently perceived as the front of the car. As this thesis deals with these

FRONT and BACK notions of spatial information, it will be very useful to summarize Svorou's ideas on Front-Back Axis. According to Svorou, the FRONT-REGION can be understood by any of the following definitions.

1. ANTERIOR spatial relation is a relation between a TR and an LM which includes (a) the LM being treated as an asymmetrical object with a FRONT-REGION and a BACK-REGION, (b) an inherent, deictic or movement reference frame assigning values to the regions of the LM, and (3) the TR being located in the FRONT-REGION of the LM.

2. OPPOSITE spatial relation between a TR and an LM, which includes (a) the LM being treated as a partitioned or an unpartitioned entity depending on whether it has an inherent FRONT-REGION and BACK-REGION or not, respectively, (b) the TR being treated as an asymmetrical entity with an inherent FRONT-REGION and an inherent BACK-REGION, which is profiled, and (3) the FRONT-REGION of the TR being located with respect to the LM either in its FRONT-REGION or in its general REGION.

3. DIRECTION TOWARDS involving the typical direction of movement of the TR (towards the LM) in which the region facing the direction of movement is the front and the opposite is the back.

4. ULTERIOR relation in which the LM is treated as a 1-D entity; and TR is located in the region which extends away from that point and away from an observer.

As for the BACK-REGION, there are a number of meaning components as follows:

1. POSTERIOR spatial relation is assumed to hold the following meanings: (a) a LM being treated as an asymmetrical object with a FRONT-REGION and a BACK-REGION, (b) an inherent or a deictic reference frame which assigns values to the regions of the LM, and (c) a TR being located in the BACK-REGION of the LM.

2. UNDER spatial relation is assumed to hold the followings meanings: (a) an LM being treated as an asymmetrical entity with a TOP-REGION and a BOTTOM-REGION.

3. BASE spatial relation involving the LM as an asymmetrical object with TOP-REGION and BOTTOM-REGION regions. An inherent or a deictic reference frame assigns values to the regions of the LM. The TR is located in the BOTTOM-REGION of the LM so that it is contiguous with it.

4. CIRCUMFERENTIAL spatial relation treats the LM as a spherical object, either due to its circular shape or of the circular path a moving entity (TR) follows around the boundaries of the LM.

5. THROUGH spatial relation is a situation in which the LM is treated as a penetratable entity with the TR following a path that penetrates the LM.

6. BACK-TO spatial relation is a situation in which the TR is treated as moving in relation to the LM. It is implied that the LM has been the point of an earlier departure of the TR, and that the TR is not returning to the LM.

7. LATERAL/LOS-PROXIMAL spatial relation is a situation involving the following three conditions: (a) the LM is treated as an asymmetrical entity with a TOP-REGION, BOTTOM-REGION, FRONT-REGION, BACK-REGION, and an undifferentiated SIDE-REGION, (b) an inherent or a deictic frame of reference values assigned to the regions, and (c) the TR is located in one of the SIDE-REGIONs of the LM.

Apart from giving a detailed sketch of the FRONT-BACK spatial grams, Svorou also created a semantic map of subdomain for spatial grams, the morphology of the FRONT-REGION and the BACK-REGION. The "spatial uses of such grams are seen as implications arising from our

experience with FRONT-REGION and BACK-REGION spatial relations. Our experience with motion, the consequence of the configuration of entities in our perception of motion, as well as our perception of directionality ,are associated with our experience of FRONT-REGION and BACK-REGION spatial relations, so that some motion situations may be considered as implications of such spatial arrangements" (p. 208).

Neumann and Widlok (1996) conduct a piece of cross-cultural research to investigate spatial language and non-verbal thinking involving spatial arrangements using non-linguistic experiments, in which Hai||om and Kgalagadi speakers are used. The language elicitation task they used in their experiment was called the "Men and Tree Photo-Photo Matching Game" using a toy man and a toy tree. This game was played by two people sitting side by side in which the vision of both was blocked by a screen preventing them from seeing the photos of the other and communicating through gestures. They have the same set of pictures. One of them, the Director, chose the pictures one by one to describe to the other player, the Matcher who would try to select from his or her photos the picture described by the Director. They were allowed to talk back and forth as much as they want. Neumann and Widlok recorded the use of phrases containing spatial information and grouped them into *relative system*, *absolute system*, and *intrinsic system*. They found that the speakers of Hai||om used the absolute and the intrinsic systems more than the relative system while the Kgalagadi speakers preferred the relative system as in the summary in the following table.

Systems / Languages	Hai||om	Kgalagadi
Absolute	(22) 47.8%	(15) 23.8 %
Relative	(5) 10.9 %	(27) 42.9 %
Intrinsic	(19) 41.3 %	(21) 33.3 %

Table 4 Summary on preference of systems of spatial information in Hai || om and Kgalagadi langauges [from Neumann and Widlok (1996: 354)]

Pederson et. al. (1998) proposed that there was a systematic variation across languages in terms of spatial frames of reference and tried to determine the relationship between language and cognition through a cross-linguistic and cross-cultural study of spatial reference. They focused on two frames of reference: an absolute frame of reference and a relative frame of reference. The technique used to collect data was a called director/matcher games, using non-Indo-European languages as the population of their study. "The findings from these experiments clearly demonstrate that a community's use of linguistic coding reliably correlates with the way the individual conceptualizes and memorizes spatial distinctions for nonlinguistic purposes." (Pederson et al, 1998: 557)

The studies of the spatial frames of reference as presented here are major work done by some researchers. There are many others, who studied the frames of reference indirectly, focussing on spatial prepositions. The works by the researchers illustrated in this chapter are enough to conclude that spatial frames of reference are widely studied.