

2009

**PREPRINT 373**

TOPOI – *Towards a Historical Epistemology  
of Space*

Martin Thiering

**Linguistic Categorization of Topological  
Spatial Relations**





## TOPOI – TOWARDS A HISTORICAL EPISTEMOLOGY OF SPACE

The TOPOI project cluster of excellence brings together researchers who investigate the formation and transformation of space and knowledge in ancient civilizations and their later developments. The present preprint series presents the work of members and fellows of the research group *Historical Epistemology of Space* which is part of the TOPOI cluster. The group is based on a cooperation between the Humboldt University and the Max Planck Institute for the History of Science in Berlin and commenced work in September 2008.



# LINGUISTIC CATEGORIZATION OF TOPOLOGICAL SPATIAL RELATIONS

Martin Thiering  
Max-Planck-Institute for the History of Science

This paper presents new data on the encoding and linguistic construction of topological spatial relations. The claim is that most of the supposedly topological relations are rather subjective, contextualized and perspectivized. In order to give evidence, this paper surveys the conceptualization of topological spatial relations and the lexicalization and distribution of the various meaning components that go into spatial description. Additionally, this paper looks at the effects of and interaction among language, cognition, and perception in a variety of languages. The languages at focus are Dene *Sų́łíně* (Chipewyan), a polysynthetic Athapaskan language spoken in Cold Lake, Alberta (Canada), an agglutinative language, Upper Necaxa Totonac (Mexico), as well as various Indo-European languages (English, Norwegian, German).

To gain natural language data, this paper draws on two elicitation tools. One was developed at the Max-Planck-Institute in Nijmegen, the *Topological Relation Markers (TRM)*. The *TRM* test consists of 71 simple black-and-white drawings of various objects, e.g., a cup on a table. Participants are asked to react to the prompt “Where is object X?”. Based on the *TRM* test, data from the *Spatial Categorization test (SPACE)* developed by the author will be presented. It is supposed to reveal some more insights into linguistic spatial categorization, and more specifically the categorization of topological spatial relations. Moreover, data will be presented on the lexicalization and distribution of the various meaning components that go into spatial description. The *SPACE* test consists of 95 simple video animations of various objects.

The results of both tests support a distributional and only partially compositional view of spatial semantics. Moreover, the various meaning components that go into the encoding of spatial description in many languages are hard to pinpoint to a single morpheme or word, e.g., an adposition. For speakers of some languages, especially Dene Chipewyan and Totonac, seemingly static and objective scenes require morphosyntactic devices which signal perspective, level of specificity, motion, causation, and other rather ‘non-spatial’ meaning components.

Keywords: Spatial Semantics, Spatial Categorization, Athapaskan Languages, Elicitation Tool

## 0. ABBREVIATIONS

[?]	Unidentifiable morpheme's meaning
ADV	Adverb
AM	Classificatory verb stem: Object being an "amorphous mass with the texture of hay, grain, snow [...]" (Davidson et al. 1963: 34)
ACC	Accusative
AO	Single animate object
APL	Applicative
BP	Body part (used in Totonac to specify a location with the human body as the reference point), e.g., head, arm, mouth etc.
CL	Classifier: determines the intransitivity or transitivity of the classificatory verb stems in Dene
CLV	Classificatory verb system: used in Dene to profile the FIGURE regarding its qualitative features such as size, shape, material, texture, animacy, e.g., round, solid-, stick-like objects etc.
DAT	Dative
DEIC	Deictic
DET	Determiner
DST	Distal
DYN	Dynamic
EXIST	Existential marker, neutral orientation in terms of spatial encoding, e.g., 'to be'
FIG	FIGURE: smaller and movable entity in a construction
FO	Classificatory verb stem: flat or flexible objects exist/lie or are handled, e.g., 'blanket', 'article of clothing', 'a leaf', 'a pillow', 'a dollar bill' (S. Rice 1997: 106).
GEN	Genitive
GND	GROUND: larger and more static entity and anchorage point
GND <sub>1</sub>	GROUND: depending on the (di-, tri-)transitivity, several reference points get
GND <sub>2</sub>	encoded being GND <sub>1</sub> and GND <sub>2</sub> as in 'the boy [FIG] hides from the girl [GND <sub>1</sub> ] behind the chair [GND <sub>2</sub> ]'
IMPF	Imperfective process: temporal process (atelic)
INCH	Inchoative
INCORP	Incorporative
INST	Instrumental
ITER	Iterative
LOC	Locative (post-, pre-, adposition): a spatial marker profiling the general location of the FIGURE and a linking element related to the FIGURE and GROUND
MM	Classificatory verb stem: a mass of mushy matters exists/lies, e.g., 'lard', 'butt or 'honey' (Davidson et al. 1963: 34).
MNR	Manner: FIGURE's qualitative characteristics of its specific orientation in space and/or time as in 'S/he strolls out of the room', the verb 'to stroll' profiles the FIGURE's motion
NM	Nominalizer: Nouns can be formed by intransitive verbs using a suffix expressing either a state or object denoted by the verb; refer to an object, substance, or sensation which is definitive of or typified by that process.
NOM	Nominative
NREL	Non-human relativizer (Totonac only)
OC	Classificatory verb stem: open container exists/lies (+/-liquid)
PERF	Perfective process: temporal process that has come to an end (telic)

PL	Plural
PO	Possessive: ownership of the FIGURE
POST	Posture or neuter verb: object being at rest/exists/lies; implies that these verbs are posture verbs, e.g., 'sit', 'stand', and 'lie' (S. Rice 2002b).
PP	Postposition
PRF	Perfect
PRG	Progressive: temporal and ongoing process (atelic)
PRON	Pronoun
PST	Past participle
REFL	Reflexive
RO	Classificatory verb stem: round or hard/compact objects exist/lie, e.g., 'ball', 'radio', 'coin', 'pen-knife', 'one berry', 'one shoe', 'ring' etc. (Davidson et al. 1963: 34).
S	Subject: syntactic category (in most cases parallel to the FIGURE)
SG	Singular
SO	Classificatory verb stem meaning a single "rigid stick-like object", e.g., 'pen', 'scissor', 'table', 'chair', 'key', 'canoe', 'car' (Davidson et al. 1963: 34)
STAT	Static
VCA	Classificatory verb stem: Verbs that express partially controlled action that is initiated by an agent
VFM	Classificatory verb stem: Verbs referring to free movement not involving an agent (verbs of free movement)
VMC	Classificatory verb stem: Verbs that express handling or manipulation and continuing manual contact



## 1. LANGUAGE AND SPATIAL CATEGORIZATION

This paper is a cognitive semantic account on the linguistic construction of topological spatial relations in a small set of typologically distinct languages.<sup>1</sup> The general goal is to survey how topological spatial relations are “structured in terms of a cognitive organization called *conceptual structure* (CS)” (Jackendoff 2002: 123; see also Levinson 1998).<sup>2</sup> More specifically, it is argued here that topological space is linguistically construed based on language-specific affordances (Bowerman & Choi 2001; Jackendoff 1996; Peterson, Nadel, Bloom & Garrett 1996; Slobin 1996).<sup>3</sup> One of the central questions of this paper is the source of such encoding differences as forced onto the linguistic system by the affordances. This paper presents an empirically-based study of spatial meaning across a small variety of languages.

Topological spatial relations are defined as locational relations between objects specifying spatial concepts in general. In a narrow and more mathematical sense, topological relations are considered impermeable or perspective-neutral locative relations between physical objects.<sup>4</sup> Topological concepts in most European languages and in most other languages are primarily encoded by adpositions (Bennet 1975; Brée & Pratt-Hartmann 2002; Carlson 2000, 2003; Carlson & Logan 2001; Cienki 1989; Crangle & Suppes 1989). For example, to encode horizontal alignment or relationship in the FIGURE-GROUND asymmetry (see below), the prepositions ‘on’ and ‘in’ are ideally used (Hawkins 1986; Herskovits 1985, 1986; Landau & Jackendoff 1993; Svorou 1993). Additionally, there is the interior, e.g., ‘in’,

---

<sup>1</sup> The selection of languages is due only to the availability of speakers.

<sup>2</sup> Jackendoff rightfully points out that conceptual structure is part of thought, hence, it is a cognitive structure (Jackendoff 2002: 123).

<sup>3</sup> Knowledge of an object embodies knowledge of the object’s spatial dimensions, that is, of the gradable characteristics of its typical, possible or actual, extension in space. Knowledge of space implies the availability of some system of axes which determine the designation of certain dimensions of, and distances between, objects in space. (Lang, Carstensen & Simmons 1991: 7)

<sup>4</sup> Linguistic topology is regarded [...] as the most general science of spatial relations, can be based on the relationship between “part” and “whole” or in other words on the concepts of “being-included-in”. Closely related to these concepts is that of the “surrounding” of a “point”. [...] Topologically there is no difference between a circle, an ellipse, a regular or irregular polygon with any number of sides. [...] [L]ikewise, there is no difference between a sphere, a cube, cylinder, and a cone. Differences in size are also disregarded in topology. (Lewin 1936: 87-88)

‘inside’ versus the outer space, e.g., ‘at’. These relations are often considered to be universally relevant to linguistic descriptions cross-linguistically and to be neutral regarding scale and orientation (Langacker 1987).

The aim of the paper is to survey speaker-independent, if not perceptually based features in the encoding of spatial categorization. The use of such features is assumed by most lexical semanticists who study spatial terms (Lehrer 1990; Nuyts & Pederson 1998; Rosch & Lloyd 1978; Taylor 1989; 1990). In this paper, data from two elicitation tools will be presented shedding light on the linguistic construction process and the various components involved in encoding spatial topological concepts it. Hence, this survey is about the construction and the conceptual structure of what has been called topological spatial relations (Johnson-Laird 1996).

If one only looked at a handful of European languages, it might seem that universal perceptual mechanisms are at work and, cross-linguistically, speakers encode spatial relations in a scene on relatively similar and objective grounds (Bryan, Tversky & Lanca 2000; Dirven, 1982a, b, 1993). When presented with black-and-white line drawings depicting the spatial relationships between two prominent objects, speakers’ answers to the question “Where is object X?”<sup>5</sup> were as follows in example (1) next page.

---

<sup>5</sup> Note that whenever possible the respective native language has been used to prompt the speaker. Also, the most neutral way of asking the question has been preferred to avoid a priming effect, i.e., “where is object X”.

*Figure 1: CUP ON TABLE*<sup>6</sup>  
 Prompt: *Where is the cup?*

- (1) a.      FIG      EXIST/POST              LOC      GND<sup>7</sup>              German  
           *Die Tasse ist/steht auf dem Tisch.*  
           The cup    3sg.S.IMPF.be/stand on the table  
           ‘The cup is/stands on the table.’
- b.      FIG      EXIST              LOC GND              Norwegian  
           *Kopp-en er på bord-et.*  
           cup-the    3sg.S.IMPF.be on table-the  
           ‘The cup is on the table.’
- c.              FIG      EXIST              LOC      GND              French  
           *La tasse est sur la table.*  
           The cup    3sg.S.IMPF.be on the table  
           ‘The cup is on the table.’
- d.              FIG      EXIST              LOC      GND              Spanish  
           *La tassa está en la mesa.*  
           The cup    3sg.S.IMPF.be on the table  
           ‘The cup is on the table.’

The examples in (1) encode the cup (in all cases the FIGURE<sup>8</sup> or TRAJECTOR) as being located on the table (the GROUND or LANDMARK).<sup>9</sup> In addition, all these languages use a positional or existential verb that marks the location of the cup and places it in a static ‘on’-relation with respect to the horizontal GROUND, i.e., the table. The verb does not specify any further information about the object to be located explicitly, that is, no additional semantic information in terms of the material or shape of the object is given.<sup>10</sup> In short, speakers of these languages generally encode the picture in Figure 1 as a static spatial relation between the cup and the table and express it by means of a copular or posture verb along with a preposition.

<sup>6</sup> See Appendix A for the *TRM* stimuli pictures.

<sup>7</sup> The FIGURE is the smaller entity with respect to the larger background (GND) related either by an existential (EXIST) or a posture verb (POST) in addition to a locative marker (LOC) (Talmy 1978; 1983).

<sup>8</sup> All technical terms are highlighted by capitals.

<sup>9</sup> Language construes different concepts in invoking a reference point and a referent. Two main cognitive operations based on physiological properties can be established: the FIGURE as the variable element or positive space and the GROUND as the reference element or negative space (Hofstadter 1980; Talmy 1978, 1983, 2000a-d). For Langacker (1987), these are called TRAJECTOR and LANDMARK, respectively.

<sup>10</sup> Posture verbs imply certain orientations such as *steht* ‘stand’ in (1a), i.e., only long objects with full contact to the ground can ‘lie’, while objects with some vertical extension can ‘stand’.

As stated above, topological spatial relations are generally assumed to be universal and are described as being encoded by locative markers or adpositions.<sup>11</sup> In general, it is assumed in the literature of standard spatial semantics that the physical world can be described as well-delineated and unambiguously conceptualizable. For example, in truth-conditional semantics, there is a case scenario of the world that is mirrored by well-formed language. According to such approaches going back to logic developed by Carnap, Frege or Russell, the physical world is made up of objects that are well-defined in shape and position in space (cf. Johnson 1987 for an extensive critique of this objectivist view). The logical approach to language describes it as functioning primarily to denote concepts that are speaker-neutral and dependent on the inherent features of the object (Armstrong, Gleitman & Gleitman 1983; Flores d'Arcais 1986; Heller 1990; Herrmann, Grabowski, Schweizer & Graf 1992; Herrmann & Schweizer 1998). According to this view, what people talk about are discrete objects and their relations to the world, and the spatial domain is situated in a multidimensional coordinate system as proposed by most geometric Euclidean approaches (Brugmann 1988; Hawkins 1986; Herskovits 1986; Lakoff 1987; Ruhl 1989; Svorou 1993; Tyler & Evans 2001, 2003). In linguistics in particular, it has been assumed that the meaning of locational topological expressions can be specified as a proposition construed out of a simple geometric relation applying to the objects.

In line with Johnson-Laird this paper argues that “the relation [of lexical semantics; M.Th.] to the world depends on human cognitive capacity” (Johnson-Laird 1983: 204).<sup>12</sup> The focus is then on what will be called *subjectivized spatial marking* in language, an idea

---

<sup>11</sup> Existing approaches to the semantic analysis of locative particles (e.g. English spatial prepositions) presuppose a local semantics for these lexemes (Herskovits 1985, 1986; Landau & Jackendoff 1993). That is, it is assumed that the semantic content which they bear is distributed paradigmatically over the single form-class. To put it more simply, it is assumed that spatial relational meaning [...] is carried by the locative particle, and only by the locative particle. This is, by definition, the basic assumption of all kinds of contrastive analysis [...]. (Sinha & Kuteva 1995: 167)

<sup>12</sup> Hence, this research is in line with Levinson's claim that “[...] there are very substantial differences between languages in the semantic parameters utilized in spatial description, and that makes it natural to ask how these parameters correlate with non-linguistic cognition.” (Levinson 2003: xviii; see also Gumperz & Levinson 1996; Levinson & Wilkins 2006)

according to the general principle in cognitive linguistics that the speaker shapes linguistic meaning via language use. This may seem odd at first since it is generally assumed that spatial relations between physical objects only need to be detected by our senses and then verbalized. In opposition to this view, perception is individually marked and determined by the language user and her/his linguistic knowledge (Gosztonyi 1976: 825; see also Miller & Johnson-Laird 1976).

### 1.1. Linguistic Encoding of Spatial Relations

In example (1e), in a response from an Upper Necaxa Totonac speaker to describe Figure 1 in Section 1.1 above, the FIGURE is profiled in a more specific and less generic way as opposed to the responses in (1a-d).<sup>13</sup>

(1) e.	LOC <sub>1</sub> +LOC <sub>2</sub> :BP	GND	POST	FIG	Totonac
	<i>naixa'kpú:n</i>	<i>mésa</i>	<i>wi:lh</i>	<i>ta:sá</i>	
	<i>nak=ix-a'kpú:-n</i>	<i>mésa</i>	<i>wi:lh</i>	<i>ta:sá</i>	
	LOC=3PO-crown-NM	table	sit	cup	
	'The cup is on top of the table'				

In addition to the usage of an all-purpose oblique locative marker *nak*, the FIGURE is located with respect to a metaphorical body part construction profiling the 'up'-part of the FIGURE by means of the use of *a'k pú:n*—the 'crown' of the human head. The posture verb encodes the FIGURE-specific quality that enables it to 'sit on top of the table', hence, three semantic components profile the specific spatial location taking the human body as the perceptual reference point.

For speakers of Dene, no physical object (or FIGURE) can be specified without reference to its shape or configuration, i.e., the fact that it is round, stick-like, flexible, or animated has a function constituency (Davidson, Elford & Hoijer 1963; Li 1946; S. Rice

---

<sup>13</sup> Upper Necaxa Totonac belongs to the Totonac (Papantla, North-Central, South-Central, and Misantla Totonac) and Tepehua (Tlachichilco, Huehuetla Tepehua, Pisa Flores Tepehua) family of languages, an isolate linguistic group in the Northern Puebla State, Mexico, and adjacent areas of Veracruz and Hidalgo. It is spoken by around 3,000 people in four communities, Patla and Chicontla, in the Necaxa River Valley in Northeastern Puebla, and Cacahutl'an, San Pedro (Beck 2004).

1997).<sup>14</sup> Hence, in Dene semantic information about the FIGURE is often conflated into the verb stem. This is in contrast to the generic encoding the FIGURE receives in the European languages given in the examples above. Example (1f) presents a typical elicited description of the scene in Figure 1 in Section 1.1 by Dene speakers.<sup>15</sup>

(1) f. GND	LOC	FIG	DEIC+CLV=STAT[FIG]	Dene
<i>bek'eshich 'lyi</i>	<i>k'e</i>	<i>tsobilti</i>	<i>datheta</i>	
table	on	cup	up-IMPF.3sg.S-SO.be situated	
'The cup is (located) up (there) on the table.' <sup>16</sup>				

The example in (1f) indicates that the scene is indeed encoded as a static 'on'-relation between the FIGURE—'the cup'—and the GROUND—'the table'. However, (1f) also indicates that the verb stem *-ta* in itself expresses more than the static location of an entity, i.e., functional information of the involved object is encoded as well. Hence, it also specifies that the FIGURE is a compact round object. Moreover, this object is conceptualized in a deictic and, hence, pragmatic frame.<sup>17</sup> This is due to the inclusion of the verb prefix *da-* 'up' that here conveys the fact that, from the vantage point of the speaker, the placement of the cup is above a waist-level midline (S. Rice 2002). Hence, the relation of the FIGURE to the GROUND is not neutral in terms of perspective as opposed to the more neutral 'on' perspective in all the examples in (1a-d). One might want to argue that there is an increase of semantic load in the encoding of degree of specificity and perspective used by speakers of the various languages from very general—the European examples—and non-specific to very specific encodings—Totonac and Dene.

<sup>14</sup> Speakers do not abstract away metric properties of shape, size, angle, and distance (see Tversky & Lee 1998: 164).

<sup>15</sup> Standard orthographies for the European languages and for Dene and Totonac will be used.

<sup>16</sup> In its neuter and momentaneous forms, the stem verb encodes also 'to handle a long stick-like object'. Note also that the aspectual prefixes (*-the-* in the present example) are placed immediately before the pronominal subjects (Li 1946: 412).

<sup>17</sup> The idea of deixis is crucial in this paper. It is agreed here with Levinson (2003) that deixis is not necessarily spatial. "Deixis concerns the relativization of reference to properties of the speech event. Many aspects [...] have nothing to do with spatial conception. But deixis is involved in the interpretation of spatial expressions in many different ways. [...] [M]any statements of location and motion make overt reference to deictic parameters, as in *It's over there* or *He's coming here*. [...] [D]eixis is simply a means of providing a rather special ground or reference point, namely the location of the speech participants." (Levinson 2003: 70; see also Bühler 1934). The term deixis is used here as an element that has no stable referent but receives its semantic content from the situation or context of an utterance (Bal 1996: 72).

The phenomenon to be explored here is known as the *degree of specificity* of the FIGURE's location with respect to the GROUND (Svorou 1993). This degree of specificity is related to the amount of detailed expressive content with which spatial relations are described in various languages. Svorou claims that the English prepositional phrase 'on the door' has a lower degree of specificity compared to 'on the left side of the door' (Svorou 1993: 6-8). The latter specification encodes further partitions of the door into smaller regions. Dene and Totonac speakers are required through their language—or *language affordances*<sup>18</sup> to depict a scene in a highly specified and often highly contextualized way that often includes deictic information. In short, there is no neutral or absolute construal, but either a construal that mentions or one that does not mention the vantage point of the speaker; hence, the speaker's perspective is expressed in some languages, and not in others (Piaget & Inhelder 1956).

Another example gives an idea of the different ways construing spatial relations in Dene. Again, a supposedly simple stimulus picture from the Topological Relations Markers series (an elicitation tool containing 71 simple black and white drawings of various FIGURE/GROUND relationships) is used, one that is anything but simple for a Dene speaker. The picture in Figure 2 below illustrates the difference between contextualized or perspectivized and non-contextualized situation in the encoding of space in the different languages elicited in this paper. It shows a scene that at first seems to be topological and, hence, static. However, whereas speakers of Germanic and Romance languages tend to describe the scene illustrated in Figure 2 as static, Dene speakers (especially the strongest ones<sup>19</sup>) tend to describe the scene as dynamic and perspectivized.

---

<sup>18</sup> That is the semantic content hard-wired into specific morphosyntactic devices depending on the correlation between the environment and the functional characteristics of objects and the human being.

<sup>19</sup> See Thiering (2009) on language attrition in Dene in the encoding of spatial relations and the differences between younger and elder (or stronger) speakers.



never simply ‘over’ the mountain, but that it moves as well. In Dene, the scene is encoded as a dynamic motion event that necessitates a physical description of the FIGURE through the selection of a particular classificatory verb stem and not as a static spatial relation between the generic objects only. Hence, the Dene language user contextualizes the scene as opposed to European speakers. In this example there is no use of a purely topological and static ‘over’ or ‘above’ relation referring only to an objective and geometric coordinate system. In Dene, even such supposedly simple scenes require additional semantic information in their description of a spatial scene.

As a preliminary hypothesis it can be stated here that for a speaker of Dene, topological spatial relations are not necessarily the most salient aspects of a given scene, even if speakers are explicitly asked to comment on the specific locative relations therein. Moreover, dynamic and deictic elements are included that are neither spatial nor absolute (Crawford, Regier & Huttenlocher 2000; Regier 1996; Regier & Carlson 2002; Thiering 2006; see also Malotki’s insightful book on spatial concepts in Hopi (1979)).

### *1.2. Imaging Features*

Languages differ in terms of the actual lexical components that instantiate FIGURE/GROUND asymmetries. In other words, language-specific affordances profile the asymmetry between the FIGURE and the GROUND and determine the reference or viewing frame of the conceptualizer of a scene. The elements of a spatial relation are variably mapped onto the morphosyntax of different languages (Cuyckens 1994; 1997; Cuyckens & Radden 2002). They are not simply atomic spatial components; rather, they occur together with other elements to form a spatial construction or, to introduce the term of (*spatial*) *cohort systems* here (see below). Rarely does all spatial meaning reside in a single locative element such as a preposition (Clark 1968; Cresswell 1978; Dirven 1982, 1993; Goldberg 1995).

The fine granularity in Dene and Totonac, i.e., the degree of specificity in the description of spatial scenes, indicates the language-specificity of the encoding processes and the spatial orientation of the speakers. The level of specificity at which they are mentioned, the type of verb used, the presence or absence of an overt locative marker, additional perspectivizing or background information conveyed by the speaker and so on. This range of morphosyntactic and lexical devices in the encoding process is profiled by the various *cohort systems*. A cohort systems is meant to activate other semantic networks in the actual discourse. These systems entail various participants including verb stems and a number of prefixes that are aligned to the verbs, but also to the FIGURE and GROUND and other imaging features. The cohort systems also include imaging features speakers profile in the instantiation of a spatial scene. The features given in Table 1 are used throughout the present study to label the relevant elements in an expression that has been elicited from speakers of different languages when asked to describe displayed objects in a spatial scene.

*Table 1: Conceptual Imaging Features Potentially used in Spatial Constructions*

1.	FIGURE: Depends on Various Shape, Size, Material Construction
2.	FIGURE/GROUND Alignment
3.	FIGURE + GROUND <sub>1</sub> + GROUND <sub>2</sub> Alignment
4.	Perspective + CONCEPTUALIZER
5.	a. +/- SCOPE; b. +/- SCALE; c. +/- PROXIMITY
6.	Functionality <sup>21</sup>
7.	Deictic Spatial, and Frames of Reference Information

(based on Langacker 1987, 2000; Talmy 2000b, c)

The major components that are used in addition to the FIGURE/GROUND alignment are:

1. Various verb systems such as existence, posture, dynamic, static and classificatory verbs
2. Various locatives profiling the degree of specificity of the FIGURE/GROUND asymmetry, LOC<sub>1</sub> + LOC<sub>2</sub>, and body parts
3. Various FIGURES and GROUNDS profiling the scope of the scene and determining the involved participants.<sup>22</sup>

<sup>21</sup> This parameter refers to Vandeloise's functional concepts (Vandeloise 1984, 1991). It is used here to motivate dynamic versus static situations.

<sup>22</sup> Langacker distinguishes five general parameters as cognitive abilities: specificity, background, perspective, scope, and prominence (Langacker 2000: 5).

The foremost spatial information is given by the FIGURE/GROUND distinction (Talmy 1978, 1983, 2000). In addition to the FIGURE/GROUND asymmetry, speakers may encode information about perspective and even temporal dimension such as GOAL, PATH, SOURCE or THEME (Fillmore 1968; Jackendoff 1983).

From a spatial linguistics point of view, all those features and the different encoding systems such as posture and classificatory verbs depend on the general idea that a spatial scene is based on the viewer and her/his perspective. This is analogous to the idea of a stage (Langacker's stage model) where the different participants are aligned by the viewer via her/his perspective (Langacker 1987).<sup>23</sup> It is important to carefully single out these imaging features since they provide information about how spatial language is used and what is actually expressed in an utterance (Hayward & Tarr 1995; Munnich, Landau & Doshier 2001; Regier & Carlson 2002; van der Zee & Slack 2003). This implies also the kind of features that are profiled by different languages in different situations. These features determine whether the profiling is optional or obligatory in the particular language. These additional features help to instantiate the actual reference coordinate system that itself is subject to continual changes.

A further important claim is that spatial information is also distributed across the proposition in lightly inflecting and relatively isolating languages such as English. The scattered distribution of relevant meaning components includes items ranging from adpositions and verbs to different kinds of lexical and tense/aspect markers. The different kinds of verbs range from existence predicates to posture verbs and specifically classificatory verbs (Li 1946; Senft 1997).

---

<sup>23</sup> The perspective depends on various features. For example, the scope of the scene is of important information. Langacker describes the scope of an expression as "the array of conceptual content it invokes [...]. It thus comprises a set of cognitive domains [...]" (Langacker 2000: 5). By logical extension, proximity depends on the scope of the construction. The FIGURE can be in a moving or in a static relation to the GROUND.

## 2. LANGUAGE TYPOLOGY

This section presents a typological overview of the various languages under survey. The reader is advised to consult the standard literature and grammars on European languages under survey, i.e., the endless number of reference grammars of German (Eisenberg 1999; Helbig 1999) and English, and the only comprehensive one for Norwegian (Faarlund, Lie & Vannebo 1999).

In the following, a brief sketch of the less familiar Upper Necaxa Totonac language—spoken in East Central Mexico by about 3,000 speakers—will be presented. An insightful—and only—grammar of Upper Necaxa Totonac (Patla-Chicontla Totonac) has been published in 2004 (Beck 2004; see also Levy 1992 and Upper Necaxa Totonaco project at <http://www.arts.ualberta.ca/~totonaco/index.html>). Like Dene (see the next section), though not polysynthetic (depending on the linguists' definition; cf. Sapir 1915), Upper Necaxa Totonac is a morphologically complex agglutinative language that features particularly rich inflectional marking of the verb. Verb stems are inflected for subject and object agreement. There are four aspects (imperfective, perfective, perfect, and progressive), and three tenses: present (not marked), past (prefix *i*[-]) and future (marked by the prefix *na*-). Verbs in Upper Necaxa Totonac are divided into two major aspectual inflection classes, active and stative verbs. Stative verbs have only imperfective and inchoative forms, whereas active verbs inflect four aspectual categories: imperfective, perfective, perfect, and progressive.

Totonac also has a wide range of valency-altering affixes that includes two causatives and four applicatives. In addition, the language is notable for its lack of prepositions and its extensive use of body part prefixes on verbs to form locative expressions and to localize the

affected parts of event-participants, in many cases increasing the basic valency of the stem. Body parts are of special interest since they encode spatial relations in addition to posture verbs and adpositions. The prefixation of body parts resembles noun incorporation, but only special prefixing combining forms of body part roots may be incorporated. When these roots are incorporated, they serve to delimit the verb's locus of affect, that is, they indicate which part of the subject or object is affected by the action.

The next section provides a more detailed description of the Dene verb structure. As will be shown, this language shows morphosyntactic structures that differ from the other languages in this survey. These differences give rise to the assumption made above that different languages have different affordances which need to appear in an expression for it to be grammatical. More precisely, it seems that Dene needs to be more precise morphosyntactically than, English German, or even Totonac. This seems especially prevalent in the encoding of spatial topological relations, relations that are supposedly very basic in the area of space.

### *2.1. Dene Verb Structure*

The general encoding pattern in Dene indicates that the language features a predominant and consistent classificatory verb system including directional prefixes as well as a postpositional inventory creating a relational predication cohort (Cook 2004; Kari 1979; Li 1946; McDonough 2000; K. Rice 1989; S. Rice 2002 on the general structure of the Athapaskan verb stem system).<sup>24</sup> Such verbs have different morphological forms depending on the object to be encoded. Hence, their stems change depending on shape, animacy, and/or physical features of the object being located or handled (S. Rice 2002: 69).

---

<sup>24</sup> Cook argues that Dene has about 36 postpositions that morphologically behave like nouns. They inflect with pronominal prefixes (Cook 2004: 92). Cook also highlights the fact that the determination of a postposition's meaning is as notoriously difficult as in English or any other language, hence, it is often impossible to determine the precise meaning out of context. However, these postpositional prefixes are widely acknowledged as modifying the meaning of the verb stem (S. Rice & Wood 1996).

The choice of a particular verb stem from the appropriate set of verb stems has the effect of assigning to the noun of the sentence certain qualities of number, shape, texture, or purpose. If these qualities are semantically inappropriate to the noun, another verb stem must be used (Carter 1976: 24).

All the Athapaskan languages exhibit an alternation of verb themes that is traditionally called classificatory. The classificatory themes describe the nature of an object handled with respect to parameters such as extension and dimension. The verb theme indicates the nature of the object handled while the type of activity involved is expressed in the prefixes. (Rice 1989: 779)

Hence, classificatory verbs or themes profile existential situations or actions of certain categories of objects (Davidson et al. 1963). Table 2 summarizes the four classificatory verb types.

*Table 2: The Different Classificatory Verb Types*

1. Posture or locative verbs	no movement involved: e.g., ‘sit’, ‘stand’, ‘lie’, ‘be in position/location’
2. Verbs of handling, manipulation, continuing manual contact	e.g., ‘give’, ‘hand’, ‘take’, ‘put’, ‘handle’, ‘bring’, ‘carry’
3. Verbs of partially controlled action (+ agent)	e.g., ‘toss’, ‘throw’, ‘hang up’, ‘set down’, ‘drop’, ‘lose’, ‘push over’
4. Verbs of free movement, independent of agent	e.g., ‘fall/tip over’

(S. Rice 1997: 103; see also Cook 2004; Davidson et al. 1963; Li 1946; K. Rice 1989; S. Rice 2002)

The Dene verb shows polysynthetic and fusional characteristics in its morphology and has a rich prefix system (cf. Boas 1997; Buschmann 1855; Morice 1890). Subject and object prefixes are fused within the verb (Cook 2004; S. Rice 2002: 66ff.). According to traditional accounts, the Dene verb consists of a verb theme (the basic lexical entry made up of a stem and one or more thematic prefixes) and additional prefixes (Li 1946; K. Rice 1989). To show the verb stem changes according to the FIGURE to be encoded, an example of stem variation is given in TABLE 3 below (see next page). It will become evident how different objects to be handed over effect the verb stem.

TABLE 3: Variations on the Theme ‘I transferred X to him/her’

<i>beghaniḥti</i>	‘I gave <u>ANIMATE BEING</u> to him/her’
<i>beghaniʔa</i>	‘I gave <u>ROUND/HARD OBJECT</u> to him/her’
<i>beghaniṭa</i>	‘I gave <u>STICKLIKE OBJECT</u> to him/her’
<i>beghaniḥchúdh</i>	‘I gave <u>FLAT OBJECT</u> to him/her’
<i>beghaniḥla</i>	‘I gave <u>PLURAL OBJECTS</u> to him/her’
<i>beghaniḥka</i>	‘I gave <u>OPEN CONTAINER</u> to him/her’
<i>beghaniḥchu</i>	‘I gave <u>UNSPECIFIED OBJECT</u> to him/her’

Obviously, the Dene verb stem changes according the quality of the FIGURE, i.e., different shape, size, animacy of the objects to be encoded determine the choice of verbs stem. Moreover, the Dene verb is polysynthetic and bears fusional characteristics in its morphology. It has also a rich prefix system. Subject and object prefixes are fused within the verb (Cook 2004; S. Rice 2002: 66ff.). According to traditional accounts, the Dene verb consists of a verb theme (the basic lexical entry made up of a stem and one or more thematic prefixes) and additional prefixes (Li 1946; K. Rice 1989). A general schema of the Dene verb plus stem pattern is given in Table 4.

Table 4: Template Rendering of the Dene Verb Prefixes + Stem

PP	ADV	ITER	INCRP	PRON 3S	OBJECT	MODE	ASPECT	1 <sup>ST</sup> /2 <sup>ND</sup> S	CLASS	STEM
1	2	3	4	5	6	7	8	9	10	11
(McDonough 2000) <sup>25</sup>										

McDonough divides the verbal complex into a bipartite structure: Positions 1-4 are the satellites, and positions 5-10 are defined as the pre-stem position (McDonough 2000). The positions (1-4) (= disjunctive prefixes) and (5-6) (= pronominal subjects/objects) are part of the disjunct or lexical zone and largely have a derivational function, positions (7-10) are

<sup>25</sup> In the Athapaskan literature it is common to use such templates. The number of prefixes vary significantly, e.g., Athna has 23 prefix positions (Kari 1979), Slave 14 (K.Rice 1989), and Navajo 10 (Young & Morgan 1987).

called conjunct or grammatical zone and include obligatory inflectional categories such as tense, aspect, modality, subject agreement, or valency (Li 1946: 409). Valency classifiers in position 10 indicate the transitivity and voice of the verb, i.e., whether the subject takes a direct object or not. These classifiers mark the valency of the verb. With regard to the following description, the stem plus the positions 8-10 as well as slot 1 are of primary interest. Hence, the general focus here is on the motivation of certain semantic construction types and the encoding of the FIGURE/GROUND asymmetry as modified by the cohort.

The next section presents some selected data sets elicited from the *TRM* study.

### 3. THE TOPOLOGICAL RELATION MARKER SERIES (TRM)

As stated earlier, topological relations are regarded as being objective, externally given, and therefore neutral to the speaker or any culturally-specific context. The speaker's vantage point or perspective supposedly does not matter in the encoding of topological relations. Moreover, the objects to be related are generally considered to bear inherent qualities not ascribed by the speaker. By contrast, it is argued here that speaker perspective and the specific instantiation of an object by the speaker and her/his cultural and cognitive background play a crucial role in the encoding process.

Parallel to the decoding of spatial topological relations the instantiation of actual frames of reference and the vast battery of inferred extra-linguistic information that is imposed on various scenes is at focus in the following data presentation (Carlson-Radvansky & Irwin 1993, Carlson-Radvansky Carlson-Radvansky 1996) Jackendoff argues that conceptual structure is "the locus for the understanding of linguistic utterances in context, incorporating pragmatic considerations and "world knowledge" (Jackendoff 2002: 123). This reference system of contextual information provides details about the scene according to the speech-act participants, as well as their particular spatial orientation to the observed scene.

### 3.1. Method

#### 3.1.1. Participants

A total of 14 speakers of Dene were interviewed, 11 female and 3 male, solicited primarily from the Cold Lake First Nation Reserve in east-central Alberta, Canada. They were paid for their participation as language consultants. Both native and near-native speakers of this language were interviewed at their convenience either in Edmonton, Alberta, or in Cold Lake, Alberta.<sup>26</sup> All of them were bilingual, speaking English as well as Dene in their daily lives; only one of the speakers is affiliated with academia. Their ages ranged from 35 and 85 years.<sup>27</sup>

For comparative purposes, 10 speakers of standard German (age between 30 and 61 years, all having an academic education), 10 speakers of Canadian English (age between 24 and 45, including 5 undergraduate students of linguistics at the University of Alberta and 5 speakers not affiliated with linguistics or academia), and 6 speakers of standard Norwegian (Bokmål) (age between 22 and 65; including 3 undergraduate students and 3 speakers not affiliated with linguistics or academia) were asked.<sup>28</sup>

---

<sup>26</sup> It should be noted that Dene is a highly endangered language. The younger speakers' generation at Cold Lake rarely uses Dene on a daily basis. For this survey, only reliable data from 9 of the 14 speakers have been used, that is, only the elderly speakers (between the of age 65 and 85). Only this age group is still comfortable in the language conversationally. These speakers are still able to tell stories in Dene, and most importantly, they are still able to produce the full range of relevant spatial encoding patterns. The influence of language attrition and the influence of English becomes apparent in comparing the younger speakers to the elders (Thiering 2009). The younger speakers are between 35 and 55 of age. They tended to use more sentences in which a postposition rather than a classificatory verb of full proposition bears most of the relevant information. Hence, some of the answers by younger speakers were ungrammatical, e.g., the wrong verb stem or paradigm and/or only the most simple tense/aspect inflections were used. Additionally, only a handful of default postpositions were repeated in each answer. This fact is important to note not only because of the process of language attrition, but also because of the data used. The author decided to use only the utterances from the 9 elder speakers.

<sup>27</sup> Moreover, for the *TRM* task responses from 4 Totonac speakers collected by David Beck and Ryan Klint from the University of Alberta have been used. All were bilingual Spanish-Totonac speakers (Totonac being the L1) and ranged in age from 44 to 67 years old. None of them were affiliated with linguistics or academia.

<sup>28</sup> Pederson et al. (1998) suggest that for any initial description of a particular language's topological system, 3 speakers are sufficient, but for more reliable data for comparative purposes, a minimum of ten speakers are needed.

### *3.1.2. Materials, Design, and Procedure*

Pederson et al. (1998) highlight that the researcher is supposed to prompt the language consultant in the following way: “I am interested in how to speak in your language about where one thing is in relation to another.” The participant is told that s/he will see some pictures and is then asked to respond to the prompt “Where is object X?”, e.g., ‘Where is the cup?’, ‘Where is the boy?’ or ‘Where is the boat?’.

The *TRM* test is designed as an offline task. It involves 71 simple black-and-white line drawings presented to a speaker one at a time. In addition to the print version, I prepared a Power Point presentation of the series of pictures to be presented to speakers on a laptop computer. The results of these field sessions were transcribed by me and a speaker assistant (Valerie Wood, bilingual Dene linguist from the Cold Lake community) and entered into a score sheet. In addition to making pencil and paper notes, the sessions were digitally recorded via a portable mini-disc player or through the built-in microphone of a Power Book G4 laptop computer. For the purpose of summary and overview, the speaker data from each of the languages were transferred from the score sheets to an electronic database to provide a more permanent and more easily comparable data file.

### *3.2. Results and Discussion: Overview*

In this section, some comparative results are presented that shed light on the nature and frequency of the various morphosyntactic cohorts contributing to spatial marking in the languages under survey. Moreover, it will be discussed what the major features used in instantiating various FIGURE/GROUND relations are.

In the following, various selected occurrences of the Dene, German, Norwegian, English, and Totonac results are summarized. Data will be presented by language for the various morphosyntactic cohort devices used by speakers in the interpretation and encoding of the *TRM* pictures. The specific interest is in the usage of static verb systems, i.e.,

existential, locative, or posture verbs, versus more dynamic verb systems, i.e., motion verbs and the various usages of locative markers or other locative particles (Coventry & Garrod 2004).

The most striking result is that spatial topological relations are expressed by a semantically richer cohort system in Dene than in the European languages. The German results show a consistent use of posture verbs whereas English (and Norwegian) primarily use an existence marker in addition to adpositions—‘be at’, ‘be in’, ‘be on’—and so forth.

In Dene, this system includes additional prefixes aligned with classificatory verbs expressing perspectivized and more dynamic information. These prefixes encode extensive information about the nature or configuration of the FIGURE, the directionality of the path it takes in entering into a relation with the GROUND, but also tense and aspect of the entire profiled situation. In the results from Totonac, the cohort consists of a robust body part system specifying the immediate point of contact or relation that the FIGURE bears to the GROUND. Totonac also uses a 4-way posture verb inventory that suggests shape (Peterson 1994) and alignment information about the FIGURE. With respect to degree of specificity, Dene and Totonac speakers tend to mark the FIGURE/GROUND asymmetry on a different degree of specificity as opposed to the European speakers. Dene Chipewyan and Totonac are more specific in their encoding patterns than European languages. Moreover, space is not the only coordinate system in the encoding of presumable topological relations. Most of the utterances in Dene and Totonac are profiled via cohorts that bear both spatial and temporal information. This entrenchment is profiled according to the language-specific affordances. For example, it should be expected to find the semantic burden of conveying spatial information relegated largely to adpositions, but as the Dene data nicely show, it is important to consider the morphosyntactic cohorts that interact with the adpositions to describe a scene in a spatially and temporally whole manner. The Totonac data also show a stable cohort of

metaphorical body part extensions and show a high degree of specificity.<sup>29</sup> Hence, functional information such as size, shape, distance etc. of the objects is involved

One of the most striking findings is that descriptions of the relations between static FIGURES and GROUNDS in Dene are not coded by a simple postposition. Spatial topological encoding typically involves a more dynamic and contextualized (perspectivized)—speaker-deictic—construal, as opposed to a rather static, non-contextualized and objectivized one (Taylor & MacLaury 1995).

### *3.3. Topological Spatial Relations: Empirical Samples and their Interpretation*

This section presents a selection of descriptions for principally topological spatial relations across the target languages. The role of any non-spatial influence on spatial cognition (perceptual and kinesthetic domains) or, to be more precise, spatial constructions is at issue here. In particular, the interest is in determining some of the construal mechanisms that are involved across these languages in the predication of a variety of FIGURES located in relation to different reference objects. The data presentation is ordered from the most canonically topological relations to less topological ones cross-linguistically.

The language examples are structured as follows. The top line, Line 1, shows abbreviations for the various imaging parameters that are tracked in this paper across each speaker's response to each item. These parameters include construction types such as the FIGURE (FIG), GROUND (GND), LOCATIVE (LOC), POSTURE VERB (POST), CLASSIFICATORY VERB (CLV), DEGREE OF SPECIFICITY (DOS) etc (“+” means the conflation of two or more concepts). Line 2 gives the elicited language example in the standard orthography. Line 3 represents an interlinear gloss, while Line 4 gives an approximately equivalent grammatical description in

---

<sup>29</sup> Thanks to Ryan Klint for the following frequency count on Totonac body parts. Speaker 1 used 18% nominal and 57 % prefix body part construction (25% no body part construction), Speaker 2 used 56% nominal and 38% body part prefixes (6% no body part construction), Speaker 3 used 19% nominal and 70% prefixes (12% without), and finally Speaker 4 (different dialect) used 28 nominal and 61% prefix body part constructions (11% without).

English including tense, aspect and modus markers. The semantic distinction of the classificatory stems in particular follows the taxonomy as proposed by Davidson, Elford & Hoijer (1963: 31ff.; see also Li 1946). The results from German, Norwegian, English, and Totonac speakers are given for comparative purposes.<sup>30</sup> The direct comparison allows me to point out similarities and differences among the languages. This section is further subdivided into several functional and topological notions and relations from the most neutral relations to the most non-neutral relations in Dene.

An important note about the representation of the data, and the Dene data in particular: If speakers have given more than one description for a scene, the different descriptions are given as well (independent whether the majority of speakers used the specific structure). The same procedure is given for the other languages, only that the responses differed with respect to the choice of verb.

### 3.3.1. *Inanimate FIGURE Supported by Horizontal GROUND*

The data in this section and the following present the encoding of spatial topological relations like containment, contiguity, support, occlusion, proximity, and projection. The focus is primarily on the general location of the FIGURE as encoded by the postposition in addition to the verb system. We will see in this section that Dene shows predominant encoding processes of the spatial relation by the postposition *k'e*—‘on’—plus a locative—posture—verb including a directional and/or spatial prefix. German, Norwegian, and English almost exclusively show existence verb usages and locative markers equivalent to English ‘on’. In Totonac evidently the usage of body part constructions is evident profiling the relationship between FIGURE and GROUND with reference to the human body as the point of reference.

---

<sup>30</sup> Note that similar encoding patterns to the Norwegian data points can be found in Swedish and Danish. Speakers of Swedish and Danish were asked to confirm the general relationships between the FIGURE/GROUND asymmetries and all of the descriptions were similar to Norwegian. Additionally, 2 speakers of French and 3 speakers of Spanish (2 Mexican-, 1 Argentinian) were asked for comparative purposes.

The responses in the example in (3) present a typical relation of contiguity and support in which the static GROUND supports the FIGURE from below. The results are coherent throughout the various Dene speakers (even the younger ones), hence, they represent the dominant response pattern. The classificatory verb with the *-the-* imperfective prefix expresses the fact that the FIGURE is not in motion, but at rest (Davidson et al. 1963: 31; S. Rice 1997: 103).

*Figure 3: PENCIL ON DESK*  
 Prompt: *Where is the pencil?*

(3) a.	FIG	GND	LOC	DEIC+POST=STAT[FIG]	Dene (100%)
	<i>erihŋ'isčené</i>	<i>həlzuzi</i>	<i>k'e</i>	<i>da-the-tə</i>	
	pencil	office.desk	on	up-IMPF.3sg.S-SO.exist	
	'The pen is (up) on the desk.'				
b.	FIG	POST/EXIST	LOC	GND	German (100%)
	<i>der Stift</i>	<i>liegt/ist</i>	<i>auf</i>	<i>dem Tisch.</i>	
	the pen	3sg.S.IMPF.lie/be	on	the table	
	'The pen lies on the table.'				
c.	FIG	POST/EXIST	LOC	GND	Norwegian (100%)
	<i>penn-en</i>	<i>ligger/er</i>	<i>på</i>	<i>bord-et</i> <sup>31</sup> .	
	penn-the	3sg.S.IMPF.lie/be	on	table-the	
	'The pen lies/is on the table.'				
d.	FIG	EXIST	LOC	GND	English (100%)
	<i>the pencil</i>	<i>is</i>	<i>on</i>	<i>the desk.</i>	
	the pen	3sg.S.IMPF.be	on	the desk	
	'The pen is on the desk.'				
e.	FIG	LOC <sub>1</sub> [BP]+EXIST+LOC <sub>2</sub> =DOS	GND		Totonac (100%)
	<i>lápís</i>	<i>a'kpu:waká'lh</i>	<i>mésa</i>		
	<i>lápís</i>	<i>a'kpu:-waká'lh</i>	<i>mésa</i>		
	pen	crown-be.high	table		
	'The pen is on the table.'				

In (3a) the classification verb stem in the imperfective profiles the static position of a stick-like FIGURE. An interesting aspect in terms of the speaker's perspective is the use of the prefix *da-* which adds a degree of specificity since it is a deictic marker. It adds information about the speaker's vantage point and places the pencil in a certain elevated position relative to the speaker's vertical midline. Hence, the FIGURE is not only positioned on a horizontal surface by virtue of the *k'e* 'on' position, but the prefix *da-* also profiles a vector field. This field

<sup>31</sup> The determiner in Norwegian is affixed to the noun as opposed to German and English where the determiner is positioned as a separate morpheme preceding the noun.

instantiates the speaker's perspective depending on the vantage point. The salient reference point is the same larger landmark as the one typically expressed in English—'the table'. The moveable objects are consistent with English 'the pencil' respectively.

In (3b-d), the FIGURE is also generally located in a static 'on'-relation to the GROUND. In the English example, the FIGURE is in a static location as encoded via the existential locative cohort 'X be on Y'. The German and Norwegian examples are more specific in that all speakers chose to encode the FIGURE via a posture verb that indicates a certain orientation of the FIGURE. Posture verbs in these languages relate the FIGURE to the GROUND depending on its shape and orientation being fully attached to a horizontal GROUND—e.g., 'the pencil lies on the table'—but not depending on animacy of material constituency as in Dene.<sup>32</sup>

The pencil or the cup examples (as introduced in Section 1) present static relationships between the FIGURE and the GROUND. The GROUND is a horizontal and static surface and all FIGURES are non-animate objects. Speakers of Dene encode the FIGURES depending on their shape or texture. Again, the postposition serves only as the general locational marker for the FIGURE in relation to the GROUND. One might argue that the FIGURE is aligned in a static topological relation to the horizontal GROUND, the perceiver is not mentioned or implied. Hence, the asymmetry is rather neutral in terms of perspective. The deictic marker *da-* in Dene already implies a perceiver and hence perspective (cf. Malotki 1979 on Hopi deictic markers).

In the examples (5a+e) that the speakers instantiate additional information to the general FIGURE/GROUND asymmetry. The additional information regards the speaker's vantage point in which s/he profiles the FIGURE's location. The FIGURE being 'up' or 'on top of' implies a certain orientation of the viewer and hence encodes her/his perspective. By that, the language (and the situational setting) forces the speaker to encode this presumably topological relation in a slightly more detailed way than the European speakers do. The situation is not

---

<sup>32</sup> For example, in German, a cup usually does not 'lie' on a table, unless someone pulls it over and it rolls on its side. It does not 'sit' either, but 'stands'.

neutral to the speaker, as we would expect in a topological relation. It is rather a contextualized situation specifying the FIGURE with respect to the viewer or construer on a certain elevated level. Hence, the prominence of the encoding pattern is the FIGURE's relation to (a) the GROUND, and (b) the construer.

So far, quite canonical encoding patterns have been presented in which static objects are related to static reference points. The next set presents encodings of FIGURE/GROUND-relations that differ slightly from this.

### 3.3.2. FIGURES Coincident and Attached with GROUND

The following set (4) indicates a general orientation and an extended vertical, i.e., 'upright' location of the FIGURE in relation to the GROUND.

*Figure 4: TREE ON TOP OF MOUNTAIN*

Prompt: *Where is the tree?*

- |        |  |                     |  |                  |                |
|--------|--|---------------------|--|------------------|----------------|
| (4) a. | GND+LOC[=DOS]  | FIG                 | [?]POST=STAT[FIG]                          | Dene (100%)      |                |
|        | <i>shéthlaé</i>  | <i>el</i>           | <i>na-ghj-ʔa</i>                           |                  |                |
|        | hill.on.top.of   | spruce.tree         | in.place.of[?]-IMPF.3sg.S-SO.stand.upright |                  |                |
|        | 'The tree stands on top of the mountain (standing upright).' <sup>33</sup> |                     |  |                  |                |
| b.     | FIG  | POST                | LOC GND                                    | German (100%)    |                |
|        | <i>Der Baum</i>  | <i>steht</i>        | <i>auf dem Berg.</i>                       |                  |                |
|        | the tree   | 3sg.S.IMPF.stand    | on the mountain                            |                  |                |
|        | 'The tree stands on the mountain.'   |                     |  |                  |                |
| c.     | FIG  | EXIST/POST          | LOC GND                                    | Norwegian (100%) |                |
|        | <i>Tre-et</i>  | <i>er/står</i>      | <i>på fjell-et</i>                         |                  |                |
|        | tree-the   | 3sg.S.IMPF.be/stand | on mountain-the                            |                  |                |
|        | 'The tree is/stands on the mountain.'                                      |                     |  |                  |                |
| d.     | FIG  | EXIST               | LOC=[DOC] GND                              | English (100%)   |                |
|        | <i>The tree</i>  | <i>is</i>           | <i>on top of the hill.</i>                 |                  |                |
|        | the tree   | 3sg.S.IMPF.be       | on top of the hill                         |                  |                |
|        | 'The tree is on top of the hill.'  |                     |  |                  |                |
| e.     | LOC+BP   | GND                 | POST                                       | FIG              | Totonac (100%) |
|        | <i>naxa'kpú:n</i>  | <i>sipéj</i>        | <i>ya:lh</i>                               | <i>pu:laktín</i> | <i>ki'wi'</i>  |
|        | nak=ix.a'kpú:-n  | sipéj               | ya:lh                                      | pu:lak-tín       | ki'wi'         |
|        | LOC=3PO-crown+nk   | hill                | stand                                      | CLS-one          | tree           |
|        | 'The tree stands on top of (= crown) the hill.'                            |                     |  |                  |                |

<sup>33</sup> The prefix *na-* has a number of different meanings. These are difficult to determine, which is why no transcription of this prefix is given here. Instead, the following symbol [?] is used to indicate and provide possible meanings. Related meanings are 'in place of', 'in return for', 'in front of', 'to live', 'to move', 'to work', 'anticipating or expecting'. Depending on the actual verb stem, this meaning of this prefix changes. However, in this example, it may be an adverbial prefix, a continuative (iterative) form as in 'in place of'.

In this example, a physical contact between FIGURE and GROUND is expressed via the cohort system in Dene. The relation is profiled by a locative static posture verb encoding the FIGURE's general relation to the GROUND as being attached to it in an upright position. In addition, the FIGURE is encoded as being in a specific location on the GROUND and supported by it—'on top of' it. This degree of specificity encodes the FIGURE's exact alignment with respect to the GROUND.

In (4b-c), the FIGURE's location is also profiled as being in an 'on' and 'attached' relation to the GROUND, i.e., the mountain. The use of a posture verb in German and in some cases in Norwegian as well specifies the vertical dimension. This does not only indicate a topological relation, but also the specific quality of the FIGURE in its elongated extension. The English example in (4d) is somewhat different in that speakers tended to use the more specific 'on top of' orientation (which might be colloquial, but nevertheless implies the specific form of the GROUND not being flat), while the general encoding in English is profiled via an existence marker. The Totonac set in (4e) includes a body part metaphorical extension. Here, the top of the mountain is similar to the crown on top of a human head. The encoding process in Totonac specifies two different spatial alignments. One is the general implicature of the posture verb 'to stand', the other is the additional locative marker 'on top of' which gives the precise orientation of the FIGURE/GROUND asymmetry.

To sum up, all examples except the English one encode the FIGURE being in an upright position, while all examples except the German and Norwegian ones specify the exact location of the FIGURE on the GROUND. The Dene speakers instantiate a certain vantage point to align the FIGURE/GROUND asymmetry with respect to a relative frame of reference. In other words, the speaker encodes the orientation of the FIGURE in relation to the construer's position. Hence, the vantage point is a grounding feature that specifies the visual scene and not the geometrical coordinate system alone.

Languages differ in the encoding and carving up of spatial relations, i.e., there seem to be language-specific parameters or affordances—mandatory morphosyntactic qualities of the particular languages—that play a part in expressing the relation between FIGURE and GROUND. It is believed here that the subtle semantic differences in Dene are primarily due to these language-specific affordances, rather than cognitive necessities.

The next section provides some examples in which the FIGURE is in an interior relation to the GROUND.

### 3.3.3. Complete Containment

The following examples present several construction types of spatial relations indicating the FIGURE as located in or contained by the GROUND. Example (5) is a situation type of full inclusion of the FIGURE in the GROUND.

*Figure 5: APPLE IN BOWL*  
 Prompt: *Where is the apple?*

- |     |    |  |                   |                 |               |                          |                         |  |                  |
|-----|----|--|-------------------|-----------------|---------------|--------------------------|-------------------------|--|------------------|
| (5) | a. | FIG  | GND               | GND             | GND           | LOC                      | POST=STAT[FIG]          |  | Dene (100%)      |
|     |    | <i>jiéchok</i>                             | <i>ts'a</i>       | <i>tthai</i>    | <i>tsoghe</i> | <i>ye</i>                | <i>the-ʔa</i>           |  |                  |
|     |    | fruit.big                                  | metal             | dish            | bowl          | in                       | IMPF.3sg.S-RO.exist/lie |  |                  |
|     |    | ‘The big fruit is/lies in the metal bowl.’ |                   |                 |               |                          |                         |  |                  |
|     | b. | FIG  | POST/EXIST        |                 | LOC           | GND                      |                         |  | German (100%)    |
|     |    | <i>Der Apfel</i>                           | <i>liegt/ist</i>  |                 | <i>in</i>     | <i>der (Obst)Schale.</i> |                         |  |                  |
|     |    | the apple                                  | 3sg.S.IMPF.lie/be |                 | in            | the (fruit)bowl          |                         |  |                  |
|     |    | ‘The apple lies/is in the (fruit)bowl.’    |                   |                 |               |                          |                         |  |                  |
|     | c. | FIG  | POST/EXIST        |                 | LOC           | GND                      |                         |  | Norwegian (100%) |
|     |    | <i>Epl-et</i>                              | <i>ligger/er</i>  |                 | <i>i</i>      | <i>skål-en.</i>          |                         |  |                  |
|     |    | apple-the                                  | 3sg.S.IMPF.lie/be |                 | in            | bowl-the                 |                         |  |                  |
|     |    | ‘The apple lies/is in the bowl.’           |                   |                 |               |                          |                         |  |                  |
|     | d. | FIG  | EXIST             |                 | LOC           | GND                      |                         |  | English (100%)   |
|     |    | <i>The apple</i>                           | <i>is</i>         |                 | <i>in</i>     | <i>the bowl.</i>         |                         |  |                  |
|     |    | the apple                                  | 3sg.S.IMPF.be     |                 | in            | the bowl                 |                         |  |                  |
|     |    | ‘The apple is in the bowl.’                |                   |                 |               |                          |                         |  |                  |
|     | e. | FIG  | POST              |                 | LOC+GND       |                          |                         |  | Totonac (100%)   |
|     |    | <i>a'htín</i>                              | <i>mansa:nás</i>  | <i>pu:wi:lh</i> | <i>a'htín</i> | <i>nakpu:cha'há:n</i>    |                         |  |                  |
|     |    | a'htín                                     | mansa:nás         | pu:-wí:lh       | a'htín        | nak=pu:cha'há:n          |                         |  |                  |
|     |    | CLS-one                                    | apple             | CTD-sit/exist   | CLS-one       | LOC=interior             |                         |  |                  |
|     |    | ‘An apple sits/is inside (a container).’   |                   |                 |               |                          |                         |  |                  |

The FIGURE in the Dene example in (5a) is located inside the GROUND—an open container—in a complete containment relation. The postposition is a locative marker and hence we see a

static topological relation between the FIGURE and the GROUND. The FIGURE's general location is also encoded via the classificatory verb stem expressing a round object 'lies' in a concave container with a horizontal center. In all the examples, the FIGURE is related to the GROUND in an interior orientation. This indicates the FIGURE being surrounded by the GROUND in this particular situation.

The European languages encode the FIGURE being in a static location by means of a locative marker, i.e., a pre- or a postposition. The posture verbs in (5b and c) express the general orientation of the FIGURE and again imply a horizontal GROUND. In (5e) the FIGURE is in a complete containment relation, i.e., 'inside the container'.

A more interesting example of an 'in'-relation of the FIGURE to the GROUND is presented in (6). Here the GROUND is partly left out, i.e., an intransitive verb implies the relation. The speakers encode consistently that the material of the FIGURE is responsible for the causation of the broken cup.

*Figure 6: CRACK IN CUP*  
 Prompt: *Where is the crack?*

- |                   |   |                      |       |     |     |                   |            |                      |  |           |               |            |  |                  |
|-------------------|---|----------------------|-------|-----|-----|-------------------|------------|----------------------|--|-----------|---------------|------------|--|------------------|
| (6) a.            | FIG            VMC=DYN[FIG]<br><i>tt'hai</i> <i>ná-ghe-té</i><br>cup            [?]-PERF.3sg.S-SO.break (to.pieces)<br>'The cup is broken (to pieces).'   | Dene (70%)           |       |     |     |                   |            |                      |  |           |               |            |  |                  |
| b.                | FIG            VCA=DYN[FIG]<br><i>liditt'h'ai</i> <i>hú-ǰ-táǰ</i><br>tea.cup        PERF.3sg.S-CL-SO.break (because.of.tension, depends on the material)<br>'The teacup is broken (because of tension).'  | Dene (30%)           |       |     |     |                   |            |                      |  |           |               |            |  |                  |
| c.                | <table border="0" style="width: 100%;"> <tr> <td style="width: 25%;">FIG</td> <td style="width: 25%;">EXIST</td> <td style="width: 25%;">LOC</td> <td style="width: 25%;">GND</td> </tr> <tr> <td><i>Der Sprung</i></td> <td><i>ist</i></td> <td><i>in der Tasse.</i></td> <td></td> </tr> <tr> <td>the crack</td> <td>3sg.S.IMPf.be</td> <td>in the cup</td> <td></td> </tr> </table> 'The crack is in the cup.' | FIG                  | EXIST | LOC | GND | <i>Der Sprung</i> | <i>ist</i> | <i>in der Tasse.</i> |  | the crack | 3sg.S.IMPf.be | in the cup |  | German (100%)    |
| FIG               | EXIST   | LOC                  | GND   |     |     |                   |            |                      |  |           |               |            |  |                  |
| <i>Der Sprung</i> | <i>ist</i>  | <i>in der Tasse.</i> |       |     |     |                   |            |                      |  |           |               |            |  |                  |
| the crack         | 3sg.S.IMPf.be   | in the cup           |       |     |     |                   |            |                      |  |           |               |            |  |                  |
| d.                | <table border="0" style="width: 100%;"> <tr> <td style="width: 25%;">FIG</td> <td style="width: 25%;">EXIST</td> <td style="width: 25%;">LOC</td> <td style="width: 25%;">GND</td> </tr> <tr> <td><i>En revne</i></td> <td><i>er</i></td> <td><i>i kopp-en.</i></td> <td></td> </tr> <tr> <td>a crack</td> <td>3sg.S.IMPf.be</td> <td>in cup-the</td> <td></td> </tr> </table> 'A crack is in the cup.'           | FIG                  | EXIST | LOC | GND | <i>En revne</i>   | <i>er</i>  | <i>i kopp-en.</i>    |  | a crack   | 3sg.S.IMPf.be | in cup-the |  | Norwegian (100%) |
| FIG               | EXIST   | LOC                  | GND   |     |     |                   |            |                      |  |           |               |            |  |                  |
| <i>En revne</i>   | <i>er</i>   | <i>i kopp-en.</i>    |       |     |     |                   |            |                      |  |           |               |            |  |                  |
| a crack           | 3sg.S.IMPf.be   | in cup-the           |       |     |     |                   |            |                      |  |           |               |            |  |                  |



Figure 7: ARROW IN/THROUGH APPLE

Prompt: *Where is the arrow?*

- (7) a. FIG GND VCA=DYN[FIG+LOC=MOTION] Dene (80%)  
*k'á jie ghq-nj-gé*  
 arrow fruit PERF.3sg.S-[?]-SO.poke/spear.through  
 'The arrow is poked through the fruit.'
- b. FIG GND VCA=DYN[FIG+LOC=MOTION/PATH] Dene (20%)  
*k'a jiechok ghq-hε-l-tás*  
 arrow fruit.big PERF.3sg.S-[?]-CLSO.shoot (horizontal.motion)<sup>35</sup>  
 'The arrow is shot through the big fruit (horizontally).'
- c. FIG EXIST LOC GND German (100%)  
*Der Pfeil ist im Apfel.*  
 the arrow 3sg.S.IMPF.be in.the apple  
 'The arrow is in the apple.'
- d. FIG EXIST LOC GND Norwegian (100%)  
*pil-en er i epl-et*  
 arrow-the 3sg.S.IMPF.be inside apple-the  
 'The arrow is inside the apple.'
- e. FIG EXIST LOC GND English (100%)  
*The arrow is in the apple.*  
 the arrow 3sg.S.IMPF.be on the apple  
 'The arrow is in the apple.'
- f. CLS POST+FIG GND<sub>1</sub> GND<sub>2</sub> Totonac (100%)  
*a'htin ya:nilh a'htin flecha pu:ti'pni'*  
 a'h-tin ya:-ní-lh a'h-tin flecha pu:ti'pni'  
 CLS-one stand-APL-stand CLS-one arrow point  
 'An arrow stands/sticks in the round one.'

In (7a,b,f) the general orientation is only inferred by the motion verbs. These verbs implicitly encode the FIGURE'S 'in(terior to) the GROUND'-relation. A specific manipulation of the GROUND by a verb of handling is expressed. The specific use of this verb in the perfective in (7a,b) encodes the result of a movement of the FIGURE and the direction of this movement in relation to the GROUND. (7b) gives more specific information about the direction ('horizontal'). Hence, it is not so much the topological relation that is important for the construer, but the dynamic event of the arrow. In (7c-e), the general orientation is encoded by means of an existential verb in combination with a locative expressing the 'in' or 'inside' relation of the FIGURE to the GROUND. No motion event is encoded here.

<sup>35</sup> The cohort *húnestás* means 'I shoot (an arrow at it)'. A related stem is *-tságh* meaning 'drive' or 'nail a stick-like object through'.

The section summarized a variety of inanimate FIGURES being entrenched in a spatial setting being in a containment relation. Furthermore, atelic or telic events have been profiled in addition to the temporal process alone. The next set also presents inanimate FIGURES, but here they are in a superior relation to the instantiated GROUND.

### 3.3.4. FIGURE Superior to GROUND

In the following section, inanimate FIGURE/GROUND relations and their spatial locations as indicated in English by the locative ‘over’ or ‘above’ are presented. Generally, the spatial relation expressed by the preposition ‘over’ encodes the location of the FIGURE as being ‘in the sphere of’ the reference object (Talmy 1983: 248).

*Figure 8: LAMP OVER TABLE*

Prompt: *Where is the lamp?*

- (8) a. FIG                      GND                      LOC                      DEIC+POST=STAT[FIG]                      Dene (70%)  
*bek'eshich'elyi bek'ák'áni yaghe da-the-tq*  
 table                      lamp                      under                      up-IMPF.3sg.S-SO.exist/lie  
 ‘The table is/lies under the lamp.’
- b. GND                      LOC                      FIG                      [?]POST=STAT[FIG]                      Dene (30%)  
*bek'eshich'elj daghe bek'ák'áni ná-ghe-beł*  
 table                      above/over                      lamp                      down.from.up[?]-IMPF.3sg.S-RO.hang.down<sup>36</sup>  
 ‘The lamp hangs down from up above the table.’<sup>37</sup>
- c.                      FIG                      EXIST/VFM                      LOC                      GND                      German (100%)  
*Die Lampe ist/hängt über dem Tisch.*  
 the lamp                      3sg.S.IMPF.be/hang                      above the table  
 ‘The lamp is/hangs above the table.’
- d. FIG                      VFM                      LOC                      GND                      Norwegian (100%)  
*Lamp-en henger over bord-et.*  
 lamp-the                      3sg.S.IMPF.hang                      above table-the  
 ‘The lamp hangs above the table.’
- e.                      FIG                      EXIST                      LOC                      GND                      English (100%)  
*The lamp is above the table.*  
 the lamp                      3sg.S.IMPF.be                      above the table  
 ‘The lamp is above the table.’

<sup>36</sup> The prefix *na-* here probably has a spatial meaning as in ‘in place of’ and ‘down from up’; it may also have a temporal meaning being aspectual or iterative ‘again’ (customary) (Li 1946). However, it is believed here that in the prefix most probably expresses the FIGURE hanging down from above.

<sup>37</sup> Moreover, the prefix *na-* is also used in different active themes such as ‘to take FIGURE down’ vs. ‘to put FIGURE in’ (Cook 2004: 245). It has thus thematic meaning indicating a semantic difference between the two actions.

f.	FIG	LOC[DOS]	LOC+GND	Totonac (100%)
	<i>a'htín</i>	<i>lámpara</i>	<i>waká'lh</i>	<i>nakchik</i>
	a'htín	lámpara	waká'lh	nak=chik
	cls-one	lamp	be.high	loc=house
	'A lamp is up in the house.'			

In the Dene expression in (8a), the primary object—the table—is encoded as being the FIGURE, which is unusual because it is the larger object in the picture and is referred to in the question as the secondary object. In other words, there is a FIGURE/GROUND reversal. In the Dene example (8b) as in all the other examples, the lamp is encoded as the FIGURE being in an ‘above’ relation to the GROUND, i.e., the table. In (8a), the Dene construer aligned the FIGURE with respect to his/her body as an anchor. The FIGURE is not only above the horizontal GROUND, but also ‘up’ there. This expression indicates the instantiation of a speaker-dependent vector specifying the vantage point. In the Totonac expression in (8f), a degree of specificity with respect to the distance between lamp and the ceiling (house) is expressed. The table is not mentioned as the reference point. In (8b-d) as opposed to (8e-f), the use of the verbs with the meaning ‘hang’ specifies the position of the FIGURE. In (8b), this is emphasized by the additional use of the prefix *na-* here probably meaning ‘down from up’. The larger object, i.e., the table, is the FIGURE or the profiled entity in an ‘under’ relation to the smaller one, the lamp.

In all the examples except (8a), the FIGURE is located above the GROUND in a certain distance without being in contact (as opposed to, e.g., ‘on’-relations); in (8a), there is also a distance between FIGURE and GROUND, but the FIGURE/GROUND relation is reversed. Still, the general idea is a spatial relation where a specific distance is assumed between the FIGURE and the GROUND in a non-attached relation and in a limited scope. The cohort profiles the FIGURE without contact to the GROUND and refers to a canonical knowledge of the scope in that particular spatial frame.

The next section presents inferior relations of the FIGURE to the GROUND.

### 3.3.5. FIGURE Inferior to/Enclosed by GROUND

The next example presents two interesting cases in Dene as opposed to the examples given in the European languages. Once again, there is a FIGURE/GROUND reversal in (9b+c); in the expression given by a Dene speaker in (9c), a dynamic process is encoded in addition to this reversed relation.

*Figure 9: BUTTER ON KNIFE*  
 Prompt: *Where is the butter?*

- |        |  |   |                  |
|--------|--|---|------------------|
| (9) a. | GND    LOC    FIG  | POST=STAT[FIG]  | Dene (60%)       |
|        | <i>bes    k'e    tkes</i>  | <i>the-tk'é</i>   |                  |
|        | knife    on    greasy.substance  | IMPF.3sg.S- MM.handle.controlled(exist/lie)             |                  |
|        | 'The butter is on the knife.'  |   |                  |
| b.     | FIG    GND   | LOC    POST=DYN[FIG]                                    | Dene (20%)       |
|        | <i>bes    tkes</i>   | <i>yaghe    he-ʔa</i>                                   |                  |
|        | knife    greasy.substance  | under    IMPF.3sg.S- SO.handle(exist/lie)               |                  |
|        | 'The knife is covered by the butter (= knife under butter).' <sup>38</sup> |   |                  |
| c.     | FIG    GND   | LOC    POST+LOC=DYN[FIG]                                | Dene (20%)       |
|        | <i>beschok    tkes</i>   | <i>yaghe    he-ʔ-tth'er</i>                             |                  |
|        | sword/knife    greasy.substance  | under    IMPF.3sg.S-CL- SO.handle.controlled(fall into) |                  |
|        | 'The knife falls into the butter' (= knife is covered by butter).'         |   |                  |
| d.     | FIG    EXIST   | LOC    GND  | German (100%)    |
|        | <i>Die Butter ist</i>  | <i>auf dem Messer.</i>                                  |                  |
|        | the butter 3sg.S.IMPF.be   | on the knife  |                  |
|        | 'The butter is on the knife.'  |   |                  |
| e.     | FIG    EXIST   | LOC    GND  | Norwegian (100%) |
|        | <i>Smør-et er</i>  | <i>på kniv-en.</i>                                      |                  |
|        | butter-the 3sg.S.IMPF.be   | on knife-the  |                  |
|        | 'The butter is on the knife.'  |   |                  |
| f.     | FIG    EXIST   | LOC    GND  | English (100%)   |
|        | <i>The butter is</i>   | <i>on the knife.</i>                                    |                  |
|        | the butter 3sg.S.IMPF.be   | on the knife  |                  |
|        | 'The butter is on the knife.'  |   |                  |
| g.     | BP+LOC[=DOS]   | FIG    GND  | Totonac (100%)   |
|        | <i>lakapi:xwaká'lh</i>   | <i>kuchílu    tzamá:    mantequilla</i>                 |                  |
|        | <i>laka-pi:x-waká'lh</i>   | <i>kuchílu    tzamá:    mantequilla</i>                 |                  |
|        | face-neck-be.high  | knife    that    butter                                 |                  |
|        | 'The butter is up on the flat edge of the knife.'                          |   |                  |

The Dene expression in (9a) encodes a static topological relation between the FIGURE and the GROUND that is consistent with the expressions used by English, Norwegian, German as well as Totonac speakers, i.e., the greasy substance of the butter is located 'on' the solid surface of

<sup>38</sup> The prefix *he-* (3PL./DL.) encodes modality and inceptive information. It requires the momentaneous stem.

the knife. In Dene, this relation is profiled by a postposition and an existence marker. The FIGURE is in a static relation to and supported by the horizontal GROUND. As opposed to this, the FIGURE/GROUND relation in (9b-c) is reversed. The greasy substance—‘butter’—is now the prominent reference point in the speaker’s perspective as opposed to the larger and hence more prototypical background. In addition, the cohort implies that the FIGURE—here being the knife and not the butter—is inseparably related to the GROUND, i.e., there is an occlusion or a containment-by-encircling-GROUND relation (Pederson et al. 1998). The substance of the FIGURE matters in this occlusion relation encoded in the Dene expressions. Moreover, a rather dynamic process is encoded here, as encoded by the dynamic verb stem used, meaning ‘fall (into)’.

As opposed to the Dene examples in (9b-c), in (9d-g) a static topological relation is profiled. The FIGURE is in an ‘on’-relation to the GROUND, i.e., the GROUND supports the FIGURE from below. It is the general reference point and limits its scope. A certain degree of specificity is profiled in the Totonac example in (9g) that expresses the exact location of the FIGURE on the GROUND, i.e., ‘upon the flat edge of the knife’.

In the examples given so far, there have been cases in which the contextualization of certain FIGURE/GROUND asymmetries has resulted in a dynamic encoding, e.g., in the case of ‘butter on knife’ or ‘arrow in apple’. In these examples, the cohort conflates the general location and the direction of the FIGURE. The adposition, if used at all, bears temporal implications in addition to its locative function. The examples presented profile a selection of language-and cultural specific spatial and temporal processes (see for the latter Brée & Pratt-Hartmann 2002).



The two Dene examples in (10a-b) present a motion of the FIGURE in an uncontrolled manner. All elder speakers encoded such a dynamic pattern. In (a) the FIGURE is encoded as moving by the verb stem and the particle *hu-*, the FIGURE is therefore not in a static, but in a dynamic ‘above’- and uncontrolled motion relation to the GROUND. The causer of the movement, i.e., the wind, is only implied here. The semantic value of the causer, the initial physical force driving the motion, is a displacement feature in the motion event. In (10b), a “partially controlled action” is profiled (S. Rice 1997: 103). Here the cohort profiles the wind causing the motion of the FIGURE. Example (10a) does not profile the agent as opposed to (10b), but in both cases, it is not only the relation between FIGURE and GROUND that is at issue, but the motion event of the FIGURE as well.

In the elicitation session Dene speakers were asked specifically whether they could locate the FIGURE as being in a static relation to the GROUND. The Dene speakers argued that the FIGURE cannot be a non-moving static entity in a position aligned above the GROUND, i.e., both objects are not vertically aligned. They did not accept the idea of a static topological relation of the FIGURE being above the GROUND and claimed that this would be an unnatural or idealized description of the displayed event.

The expressions in (10a-b) encode a movement (implicitly or explicitly referring to the causer or agent) indicating that there is a space-time frame. The spatial relation in this is rather secondary. As opposed to the examples given above, in (10c-e) the FIGURE is profiled as being in an unattached ‘above’-relation to the GROUND, and no motion is expressed. Copular or existential verbs are used here to encode the FIGURE/GROUND asymmetry. The Totonac examples in (10f+g) also specify the distance of the FIGURE to the GROUND as being high or close respectively, but there still is enough distance to express an ‘above’ notion. However, the body part system in (10g) implies that the FIGURE is in a close position to the top of the hill. In (10f), the GROUND (i.e., the mountain) is left or only inferred, only the location of the cloud as high above is expressed.

The next example presents several different construction type patterns of one scene.

*Figure 11: BOAT ON WATER*

Prompt: *Where is the boat?*

- (11) a. FIG VFM=DYN[FIG] Dene (70%)  
*ts'i ghe-ʔ-úʔ*  
 boat IMPF.3sg.S-CL-SO.raft (uncontrolled.motion/being.on.water)  
 'The boat rafts (on water).'<sup>42</sup>
- b. FIG LOC+GRD POST=DYN/STAT[FIG] Dene (10%)  
*ts'i tusʃ the-ta*  
 boat into.water IMPF.3sg.S-SO.exist/lie  
 'The boat is/lies in the water.'
- c. FIG GND VFM=DYN[FIG] Dene (10%)  
*ts'inʃbale t'ats'i ghe-shiʔ*  
 sail because.of.boat IMPF.3sg.S-SO.uncontrolled.float (because.of.air)<sup>43</sup>  
 'The boat floats because of the wind (wind causing the motion).'<sup>44</sup>
- d. FIG LOC VFM=DYN[FIG] Dene (10%)  
*ts'inʃbalits'i k'e ghe-shiʔ*  
 boats.sail on IMPF.3sg.S-SO.uncontrolled.float(because.of.air)  
 'The sailing boat floats (on) by the wind.'
- e. FIG EXIST LOC GND German (100%)  
*Das Boot ist auf dem Wasser.*  
 the boat 3sg.S.IMPF.be on the water  
 'The boat is on the water.'
- f. FIG EXIST LOC GND Norwegian (100%)  
*båt-en er på vann-et.*  
 boat-the 3sg.S.IMPF.be on water-the  
 'The boat is on the water.'
- g. FIG EXIST LOC GND English (100%)  
*The boat is in/on the water.*  
 the boat 3sg.S.IMPF.be in/on the water  
 'The boat is in/on the water.'
- h. FIG POST LOC+GND Totonac (50%)  
*párku wi:lh nakxká:n*  
*párku wi:lh nak=xká:n*  
 boat sit LOC=water  
 'The boat is/sits on the water'
- i. LOC+BP GND MOV+FIG Totonac (25%)  
*naxhélhni' xka:n a'ma:lh pu:takítini'*  
*nak=ix-hélh-ni' xka:n a'-má:lh pu:takítini'*  
 LOC=3PO-mouth-NM water go-PRG boat  
 'The boat goes on the water.'

<sup>42</sup> Another related paradigm is the expression *kón naregheʔúʔ*: third singular subject is rafting (floating wood).

<sup>43</sup> The stem encodes also an inchoative event in addition to the perfective and telic event.

<sup>44</sup> Another related paradigm is *gheleʔ* which roughly means 'He is floating'.

j.	FIG	LOC+BP+MOV	LOC+BP	GND	Totonac (25%)
	<i>barco</i>	<i>helha'má:lh</i>	<i>naxhélhni'</i>	<i>xká:n</i>	
	barco	helh-a'n-má:lh	nak=ix-héllh-ni'	xka:n	
	boat	mouth-go+PRG	LOC=3PO-mouth-NM	water	
	'The boat is going on the water.'				

In the Dene examples (11a-d), the FIGURE is not only encoded as being on or supported by the GROUND, but its movement is profiled as well by the verb stem. In (a), (c) and (d), the GROUND is inferred since to raft or to float here implies that the FIGURE moves on or in water. This means that the topological relation between FIGURE and GROUND is only implied, but not lexicalized as in the English transitive construction 'the boat is on the water' or the German *das Boot ist auf dem Wasser*. The example in (b), however, does locate the primary object as being in the GROUND. The postposition encodes the specific location of the FIGURE. As opposed to (a), the relation of the FIGURE to the GROUND is expressed by the use of a posture verb stem. However, the locative in (b) expresses rather a temporal or an inchoative motion event. The examples (c) and (d), on the other hand, encode not only a motion, but the causation of the motion event—the wind.

These examples show that Dene speakers, when asked to describe the location of the FIGURE, explicitly lexicalize a spatial-temporal event via the cohort system, i.e., they explicitly describe a rafting or floating event caused by air. In contrast to this, English, Norwegian, or German speakers (11e,f,g) do not represent this knowledge in their encoding of the scene. A default spatial relation is given, assuming that the FIGURE—the boat—is typically moving on a liquid surface. This information is apparently not necessary or important for an English, Norwegian or German speaker. S/he is likely to idealize the FIGURE/GROUND asymmetry as a static relation between FIGURE and GROUND by using a copular verb and a locative. In contrast, two of the given Totonac examples (11i,j), encode a movement by using a dynamic verb.

This section presented the contextualization of certain supposedly static spatial situations as dynamic events. Topological 'on'-relations are explicitly given or implicitly

referred to in all of the examples. However, in (11a), the motion event is predominant, whereas in (11c,d), it is the movement and its causer that is predominantly profiled.

This section indicated how presumably static and topological relations are encoded as primarily dynamic motion events. The idealization of the scene in locating the FIGURE on/in the GROUND does not refer to the inherent or ‘natural’ motion feature of the FIGURE in relation to the (liquid) GROUND. This information is relevant for the Dene speakers and the static scene is therefore contextualized and encoded as a dynamic event and by that as a temporal process being atelic and in an uncontrolled manner. Furthermore, many non-linguistic factors are expressed overtly by the Dene speakers, like the causation of the motion.

### 3.5. *Intermediate Conclusion*

So far, the data present a selected range of spatial topological encoding patterns present in the languages under study. A description of selected spatial topological relations in Dene has been presented in comparison to a small set of other languages. Using the *Topological Relations Picture* elicitation instrument, the semantic scope of individual spatial devices has been determined. Not surprisingly, one initial and crucial result is that Dene Chipewyan and Totonac carve up spatial and temporal events differently from the Germanic languages.

Typologically close languages such as German, English, and Norwegian manifest subtle differences in the expression of topological spatial relations, not to mention the larger differences evident between them and Dene or Totonac. These differences are indications of language-specific, if not construction-specific, systems for encoding spatial relations. Moreover, these systems rely on the speaker’s world knowledge in his/her entrenched orientation based on particular mental models (Dutke 1994; Emmory & Fromkin 1988; Harras 1995; Johnson-Laird 1983).

The languages under survey differ with respect to the the choice of morphosyntactic elements, semantic diversity and the perspectivity of their spatial encoding systems. Dene

(and to a lesser degree also Totonac) is far more descriptive than the more abstract spatial encoding systems of the European languages represented here. In addition, Dene speakers tend to encode their specific perspective by means of a deictic expression. Such expressions are understood here as subjective instantiations in the FIGURE/GROUND asymmetries as opposed to qualities that are characterized as being objective or externally given qualities.

The examples given above also show differences in the description of FIGURE/GROUND relations as manifested in the distribution of static-dynamic encoding patterns. The term dynamic (contextualized) is used in this paper with respect to the FIGURE's trajectory being encoded via a motion cohort versus a static relation. The latter expresses the FIGURE/GROUND asymmetry via a static verb system and a locative marker. In a dynamic encoding strategy, the self-propelled or caused motion of the FIGURE is profiled and enters into the description. In a 'purely' spatial and static encoding, the most semantically neutral type of verb, i.e., a copula verb inflected in a simple present tense is used. For example, the locative 'through' in addition to the verb 'to shoot' has been assessed as profiling a dynamic motion event, implying that the FIGURE is somehow related to the GROUND via a locative, but this resulting spatial relation may only be secondary to the dynamic event by which the FIGURE and GROUND come to be related spatially in the first place. In addition, the regular inclusion of temporal information, at least by Dene speakers, suggests that topological relations are not that basic or even readily apparent, and if they are, they are by no means speaker-neutral nor necessarily derivable from physical or topological features of the objects being related.

In Dene and Totonac, the various expressions are dominated by the encoding of the degree of specificity and rather contextualized construal patterns. Moreover, Dene speakers reverse the FIGURE and GROUND elements in some of the examples. Therefore, it is assumed here that a 'natural' background does not necessarily emerge to serve as an objectively given reference point. In addition, Dene speakers also frequently leave out any explicit mention of the GROUND, whatever they take the GROUND to be.

In Dene, the drawings are often described based on the function of the FIGURE being located or classified depending on its animacy, texture, material, and shape in relation to the GROUND. In addition, the GROUND imposes certain interpretations; for example, water as the GROUND for a boat implies that the FIGURE cannot exist statically in a location. Therefore, the drawings are described as contextualized situations. Contextualized indicates the influence of extra-linguistic and functional knowledge of the speaker's real world. This influence is mirrored in the various morphosyntactic paradigms a speaker can choose from or the various affordances that go into an utterance.

Situations such as 'a boat on water' or 'a cloud above a mountain' are frequently described by Dene speakers as involving moving or floating objects, i.e., as dynamic motion events. Moreover, the movements of these objects are described as being caused—in these cases by the wind. In such a scene, it is not a spatial or even topological relation that is being expressed through a stative verb and locative, but the expression of caused motion and, thus, a dynamic event that unfolds over time.

In English, Norwegian, or German, it is not necessary to specify that a bottle is standing in an upright position in relation to the horizontal GROUND. However, German speakers often select a verb from a rich posture verb inventory that does specify the specific orientation of the reference object—a bottle 'stands' on the table, whereas a cloth 'lies' on it. Only certain objects can stand, but the verb stem does not change because of specific inherent features of the FIGURE itself as in Dene, only if a different orientation is imposed as in 'the bottle lies on the table' (meaning that it is turned on its side).

As mentioned above, Dene speakers tend to encode 'spatial' relationships between FIGURE and GROUND objects through a cohort of morphosyntactic devices, including classificatory verbs, directional verb prefixes, and postpositions. If a locative marker is used, it only expresses generic spatial information about the FIGURE/GROUND relation. The nature and identity of the FIGURE is signaled through the classificatory verb stem plus a variety of

tense/aspect, thematic, valency, and directional verb prefixes. Hence, the Dene verb system provides a variety of additional information about the FIGURE and its particular spatial alignment which is often regarded as secondary or incidental in the *TRM* study.

The next section presents a different elicitation task based on the *TRM* findings and its limitations.

#### 4. THE SPATIAL CATEGORIZATION ELICITATION TOOL

In this section, data from a new elicitation tool will be presented to capture the more language-specific objects to be encoded; objects that are more familiar to speakers with Non-European cultural background.

##### *4.1 The Elicitation Tool*

The results seen so far show inconsistent encoding patterns in Dene as opposed to English, German, Norwegian, or Totonac for that matter. It is argued here, that the test invited speakers to provide open-ended expressions. This range is not necessarily language-dependent, but might be prompted simply by the task itself, namely, the highly abstract drawings promoted a variety of encodings or encoding possibilities. This might not be due to the fact that Dene has different spatial encoding operations, but simply that the drawings invite for non-coherent expressions. The very westernized pictures of the *Topological Relations Markers Series*, the *Motion Event* and the *Caused Position* tasks (other elicitation tools developed at the MPI in Nijmegen, and used used by the author, are not presented here) might not suit the current research agenda. Most speakers had serious problems in even identifying the displayed objects, e.g., ‘papers on spike’, ‘hose on a stump’. It is therefore important to extend the test to more realistic stimuli meaning consisting of objects or contexts of their everyday life environment. In addition, the interest in this survey is especially to vary the objects in terms of animate/non-animate FIGURES, different shapes

and sizes of the FIGURE and various GROUNDS in a dynamic situation to the FIGURE, e.g., ‘a cloud above water’ to exhaust the various positional verb paradigms. Therefore the spatial categorization tool has been developed by the author to go beyond the material limitations of the MPI elicitation tasks.

The *Spatial Categorization Elicitation tool (SPACE)* developed by the author is based on 95 short video clips (approximately 10 seconds per clip) presented in random order. As a set, the clips are supposed to exploit a number of imaging parameters in addition to the general FIGURE/GROUND asymmetry. The scenes vary with respect to the FIGURES’ various shapes, sizes, and materials. Moreover, some FIGURE/GROUND alignments have been manipulated, i.e., the speaker’s potential perspective, metrical properties such as scope, scale, proximity, functionality, and finally deictic and vectorial spatial information.

The tool’s primary aim is to determine more specifically the options speakers have in their choice of language to describe spatial topological relations, proximity/distance relations, and frames of reference. *SPACE* is designed to provide a more refined picture of what is actually going into the encoding of presumably topological spatial relations. To elicit different cohorts and to explore the various morphosyntactic affordances in the various languages, the encoding of different FIGURE/GROUND asymmetries is at focus in *SPACE*. Hence, a number of FIGURE/GROUND situations have been developed including different animate and inanimate objects in relation to dynamic and static reference points. Some of the objects are stone(s) on the ground or in a vessel, stick(s) on the ground, bottle(s) on a table/ground or a moving surface (birds on water, leaves on water, boat on water). In addition, the elicitation images consist of singular, dual or plural human FIGURES in different static positions, e.g., ‘sitting on a rock’, ‘on the ground’, ‘leaning against a tree’, and in different dynamic situations, e.g., ‘walking away from or towards the viewer’. In addition, different distances to the camera have been explored, i.e., three different viewing distances were used to extract the semantics of different deictic perspectives between the vantage point and the FIGURE: (a) proximate, (b)

medial and (c) distal. Different orientations are imposed to reveal more insights into the frames of reference used by Dene and other speakers, but also to show the well known aspect that the viewer is crucial in the construction of the FIGURE/GROUND relation (see Langacker's stage model (1987)).

## *4.2 Method*

### *4.2.1 Participants*

10 native speakers of Dene, solicited primarily from the Cold Lake First Nation Reserve in east-central Alberta, Canada, served as paid language consultants for this study. Both native and near-native speakers of this language were interviewed (only the elder speakers can be actually considered as bilingual, speaking English as well as Dene on a daily basis; cf. Thiering 2009) at their convenience in Edmonton or in Cold Lake. Of the 10 speakers who were interviewed, 7 were female and 3 male. Only one is affiliated with academia and has also been the language consultant. The Dene speakers ranged in age from 35 to 85 years, but the majority of the speakers interviewed in this test were over 55 years old. As for the selected examples below, only results from elder speakers are used for the reasons given above (see Thiering 2009 on language attrition in Dene).

For comparative purposes, 10 speakers of standard German (aged 30-61 years, all with academic background), 10 speakers of Canadian English (aged 24-45; including 3 undergraduate students of linguistics at the University of Alberta and 7 speakers not affiliated with linguistics or academia), and 4 speakers of standard Norwegian (Bokmål) (aged 22-65; 2 speakers not affiliated with linguistics or academia) were asked. As in the *TRM* study, the range of speakers depended on the availability of speakers.

#### 4.2.2 Materials

The *SPACE* test is designed as an offline task presenting 95 video clips or stills. 60 of the presented situations are static relations such as ‘sticks in sand’, ‘rocks on ground’, ‘fruits on table’, while 35 are short films presenting ‘people walking down the lane’, ‘ducks on water’, or ‘man cutting wood’. Dene speakers from Cold Lake participated as actors in these scenes. They were filmed while carrying out daily activities such as ‘putting on a jacket or shoes’, ‘chopping wood’ or ‘inserting/removing a screw in/from a piece of wood’. Common objects in a natural environment are used that can be realistically manipulated or interacted with by persons of almost any cultural background. The rationale is that if indeed objective and speaker-independent parameters exist then the spatial relations being expressed should be fairly consistent cross-linguistically, except from morphosyntactic differences among the languages.

The majority of FIGURES are stick-like objects, living beings, plural objects, round, flexible and amorphous mass objects. This selection is by far not exhaustive for Dene classificatory verb stems or for topological spatial relations in general, but it enables a closer look into the various components that go into presumably spatial topological descriptions.

#### 4.2.3 Design and Procedure

If a scene was presented by a static clip, the researcher prompted the speaker by the question “Where is object X?”. If dynamic descriptions were expected as in ‘two people walking’ or ‘ducks swimming on water’, speakers were asked to provide the best or most natural/spontaneous description of the scene in addition to the “Where”-question above.<sup>45</sup> Note that for the actual paper the author only includes static topological scenes since the focus

---

<sup>45</sup> The researcher is encouraged in any future tests to ask speakers for alternatives and comparison between scenes. For example, one might say: “In that situation you said something like X, this situation seems similar to Y, so what is the difference between X and Y?”

here is not on distance or frames of reference in particular, but to add more data points to the *TRM* study described above.

The protocol has been implemented into an i-Movie program on a Power Book G4 laptop. The results of these field sessions were recorded through the built-in microphone of the Power Book G4 laptop computer using Sound Studio as an audio recording tool (Audacity works fine as well; it is a free download tool). In addition, the sessions were transcribed by the author and a native-speaker confederate, and entered into an Excel score sheet.

### *4.3. SPACE Responses*

This section presents some selected examples ranging from most prototypical to less prototypical examples in Dene.

#### *4.3.1 Static FIGURES Supported by Horizontal Surface*

This section presents static topological relations between FIGURE and GROUND. The results are prototypical relations between a FIGURE located with reference to a horizontal GROUND. Prototypical here means that a rather simple or generic FIGURE/GROUND asymmetry is shown. Various situations and manipulations of objects in different relational events are presented, i.e., a variety of FIGURE/GROUND situations in which a prominent and salient GROUND serves as the supporting reference point positioned below the FIGURE are presented. Hence, the smaller FIGURE is situated with respect to a larger horizontal surface such as ‘table’, ‘shore’/‘beach’, ‘stump’, etc. In other words, the focus is on the various degrees of specificity. The most important question is with respect to the encoding processes: What is the precise semantic information involved in the encoding processes of spatial information, i.e., what are the characteristic aspects of the profiled semantic field and, hence, specific cognitive structure or mental models?

Based on the *Topological Relations Markers series* by Bowerman et al. (1998), the first situation presents a horizontal GROUND—‘table’—on which two objects are placed: a plate in the foreground and a cup located to its right (assuming a relative frame of reference anchored to the speaker/viewer). The assistant is asked to prompt the speaker with the question “Where is the cup?” (you can also ask “where is the plate” of course; also it is possible to rate which localization is preferred). A projective relation might be expected here, i.e., ‘next to’, ‘right/left of’, ‘beside’, as a response to the question, since the topological relation between the cup and the table is not directly queried.

The FIGURE in the following example is an open container filled with liquid. This information might influence the instantiation of the FIGURE with respect to the GROUND, at least in the case of the Dene speakers.

*FIGURE 1: GLASS BESIDE/LEFT OF PLATE*<sup>46</sup>  
 Prompt: *Where is the glass?*

- |         |   |                  |                      |   |                  |
|---------|---|------------------|----------------------|---|------------------|
| (12) a. | GND   | LOC              | FIG                  | DEIC+POST[FIG]                          | Dene (100%)      |
|         | <i>tthaikale</i>  | <i>gah</i>       | <i>tue</i>           | <i>da-the-ka</i>                        |                  |
|         | plate   | beside           | water                | up-IMPf.3sg.S-OC.exist/lie(with liquid) |                  |
|         | ‘The open container filled with water is beside the plate.’ <sup>47</sup> |                  |                      |   |                  |
| b.      | FIG   | POST             | LOC                  | GND <sub>1</sub> (GND <sub>2</sub> )    | German (100%)    |
|         | <i>Das Glas</i>   | <i>steht</i>     | <i>auf dem Tisch</i> | <i>(neben dem Teller).</i>              |                  |
|         | the glass   | 3sg.S.IMPf.stand | on the table         | (beside.the.plate)                      |                  |
|         | ‘The glass stands on the table (beside the plate).’                       |                  |                      |   |                  |
| c.      | FIG   | POST             | LOC                  | GND                                     | Norwegian (100%) |
|         | <i>Glass-et</i>   | <i>er</i>        | <i>på</i>            | <i>bord-et</i>                          |                  |
|         | glass-the   | 3sg.S.IMPf.be    | on                   | table-the                               |                  |
|         | ‘The glass is on the table.’  |                  |                      |   |                  |
| d.      | FIG   | EXIST            | LOC                  | GND <sub>1</sub> (GND <sub>2</sub> )    | English (100%)   |
|         | <i>The glass</i>  | <i>is</i>        | <i>beside the</i>    | <i>plate (on a table).</i>              |                  |
|         | the glass   | 3sg.S.IMPf.be    | beside the           | plate (on.a.table)                      |                  |
|         | ‘The glass is beside the plate (on a table).’                             |                  |                      |   |                  |

In example in (12a) the classificatory verb specifies the FIGURE being an open container containing liquid. The Dene language or rather the speakers in this test mark a difference between a container that does not contain anything and a container that does contain something like liquid. Additionally, a relative (but non-specific as opposed to ‘to the right/left

<sup>46</sup> See Appendix B for the stimuli pictures.

<sup>47</sup> The stem *-ka* encodes ‘to handle liquid in a vessel’.

of the plate’) frame of reference is profiled by the postposition *gáh* ‘beside’. Dene speakers consistently prefer the verb stem expressing the open container with liquid content in (12a), (12b) is used to a lesser degree.

The European speakers expressed the FIGURE via an existence (English and Norwegian) or posture verb. German speakers tended to use a posture verb to relate the FIGURE to the horizontal surface in addition to the preposition *auf* ‘on’. Roughly the same encoding scheme is found in the majority of Norwegian and to English responses. Some speakers relate the FIGURE, i.e., the glass, to the secondary FIGURE, i.e., the plate, both being on the horizontal GROUND. All examples, from Dene to English, encode static relations. Additionally, some speakers profile a relative frame of reference followed by a topological relation, i.e., the figure is spatially related with respect to the viewer.

The next set is similar to the former, but now a plural object is related to the GROUND, while no additional reference point is encoded (although shown in the stimulus).

FIGURE 2: POTATOES ON TABLE  
 Prompt: *Where are the potatoes?*

- |         |  |                         |                               |                            |                  |
|---------|--|-------------------------|-------------------------------|----------------------------|------------------|
| (13) a. | FIG  | GND                     | LOC                           | DEIC+ POST[FIG]            | Dene (100%)      |
|         | <i>labada</i>                              | <i>bek'esh'ich'elyi</i> | <i>k'e</i>                    | <i>da-the-la</i>           |                  |
|         | potatos                                    | table                   | on                            | up-IMPF.3pl.S-PO.exist/lie |                  |
|         | '(The) Potatos are/lie up on the table.'   |                         |                               |                            |                  |
| b.      | FIG  | POST                    | LOC                           | GND                        | German (100%)    |
|         | <i>Die Kartoffeln</i>                      | <i>liegen</i>           | <i>auf dem Tisch.</i>         |                            |                  |
|         | the potatos                                | 3pl.S.IMPF.lie          | on the table                  |                            |                  |
|         | 'The potatos are/lie on the table.'        |                         |                               |                            |                  |
| c.      | FIG  | EXIST                   | LOC                           | GND                        | Norwegian (100%) |
|         | <i>Potet-er</i>                            | <i>er</i>               | <i>på bord-et.</i>            |                            |                  |
|         | potatos-the                                | 3pl.S.IMPF.be           | on table-the                  |                            |                  |
|         | 'The potatos are on the table.'            |                         |                               |                            |                  |
| d.      | FIG  | EXIST                   | LOC (DOS)                     | GND                        | English (100%)   |
|         | <i>The Potatos</i>                         | <i>are</i>              | <i>on (top of) the table.</i> |                            |                  |
|         | potatos                                    | 3pl.S.IMPF.are          | on (top of) the table         |                            |                  |
|         | 'The potatos are/lie on top of the table.' |                         |                               |                            |                  |

In all examples, the FIGURE is simply aligned to the horizontal GROUND in a general orientation. The German set presents the usage of a posture verb and includes the general location of the FIGURE via the locative marker *auf* (‘on’). The examples (b-d) do not impose

any perspective. The plural FIGURES are aligned to the horizontal GROUND in a static fashion. All results except (13a) use a locative marker aligned with the verb system to encode a static topological spatial relation. In (13a), not only a general orientation of the plural FIGURE is encoded, but also a deictic and hence perspectivized construction.

Another plural object encoding is presented in the next example. The FIGURES—the stones—are aligned vertically to the GROUND—the tree stump. We see that it is at least as much a topological relation that is at focus for Dene speakers as the degree of specificity, the exact number of objects, and the perspective (via the deictic marker *da-*).

FIGURE 3: STONES ON STUMP (PILED UP)  
 Prompt: *Where are the stones?*

- (14) a. GND LOC FIG DEIC+ POST[FIG] Dene (40%)  
*dechen k'e the da-the-la*  
 stump on stone up-IMPF.3.pl.S-PO.exist/lie  
 ‘Stones lie up on the stump.’
- b. FIG MNR LOC+DOS DEIC+POST[FIG] Dene (60%)  
*tthe dih niIzi da-the-la*  
 stone four.times in.presence.of/close.proximity up-IMPF.3pl.S-PO.exist/lie  
 ‘Four stones lie up close to each other.’
- c. FIG EXIST DOS+LOC LOC German (100%)  
*Die Steine sind übereinander aufgetürmt.*  
 the stones 3pl.S.IMPF.be above.each.other piled.up  
 ‘The stones are piled up above each other.’
- d. FIG EXIST/POST LOC GND Norwegian (100%)  
*Sten.er er/ligger på stubb.en.*  
 stone.the 3pl.S.IMPF.be/lie on stump.the  
 ‘The stones are/lie on the stump.’
- e. FIG EXIST LOC DOS LOC LOC GND English (100%)  
*The stones are above each other/piled up on the stump*  
 the stones 3pl.S.IMPF.be above each other/piled up  
 ‘The stones are (lying) above each other/piled up on a stump.’

The examples show the range of encoding devices available to speakers for the purpose of encoding a FIGURE/GROUND asymmetry in Dene as well as in the European speakers’ languages. The utterances in (14b,c) encode the close proximity of the FIGURES to each other. The German expression gives even more precise information than the Dene one by encoding the exact position of the stones. Hence, in these examples it is not so much the general location of the FIGURES on the horizontal GROUND, but the relation among the plural FIGURES

that is at stake here. This is to some extent also true for the English example in (14e), although here the horizontal GROUND is referred to as well.

The Dene example in (14a), however, presents only the general topological orientation of the FIGURE to the GROUND, but expresses additionally some deictic information via the prefix *da-*. The plural FIGURE is in a static topological relation to the GROUND (note that a plural FIGURE is encoded by the verb stem and is not a round object, i.e., the number instead of the shape is at focus).

The general location is profiled by the verbal cohort, also in German, Norwegian, and English. The cohort specifies the topological vertical alignment. By contrast, Dene presents a subtle difference in the encoding of the general orientation of the participants and the degree of specificity in which the FIGURES are related. In the European examples, this variety is rather limited.

The next set uses a similar FIGURE, only here it is a singular one. This example is presented simply because of the degree of specificity in the encoding of the FIGURE/GROUND asymmetry. In one Dene example, the FIGURE is profiled as being of a specific size and also on a specific GROUND. This is a clear difference from German and English.

*Figure 4: stone on stump*

Prompt: *Where is the stone?*

- |         |   |               |                |                            |                  |                    |                               |
|---------|---|---------------|----------------|----------------------------|------------------|--------------------|-------------------------------|
| (15) a. | GND                                       | LOC           | FIG            | DEIC+ POST[FIG]            | Dene (70%)       |                    |                               |
|         | <i>dechen</i>                             | <i>k'e</i>    | <i>tthe</i>    | <i>da-the-ʔa</i>           |                  |                    |                               |
|         | wood                                      | on            | stone          | up-IMPF.3sg.S-RO.exist/lie |                  |                    |                               |
|         | 'The stone lies up on the wood.'          |               |                |                            |                  |                    |                               |
|         |   |               |                |                            |                  |                    |                               |
| b.      | FIG                                       | FIG           | GND            | GND                        | LOC              | DEIC+POST[FIG]     | Dene (30%)                    |
|         | <i>tthe</i>                               | <i>aze</i>    | <i>tthe</i>    | <i>delk'ozaze</i>          | <i>xás</i>       | <i>k'e</i>         | <i>da-the-ʔa</i>              |
|         | stone                                     | small         | stone          | bark.small                 | stump            | on                 | up-IMPF.3sgS-RO.lie.exist/lie |
|         | 'A small stone lies up on a small stump.' |               |                |                            |                  |                    |                               |
|         |   |               |                |                            |                  |                    |                               |
| c.      | FIG                                       | POST          | LOC            | GND                        | German (100%)    |                    |                               |
|         | <i>Der</i>                                | <i>Stein</i>  | <i>liegt</i>   | <i>auf</i>                 | <i>einem</i>     | <i>Baumstumpf.</i> |                               |
|         | the                                       | stone         | 3sg.S.IMPF.lie | on                         | a                | tree.trunk         |                               |
|         | 'A stone lies on a tree trunk.'           |               |                |                            |                  |                    |                               |
|         |   |               |                |                            |                  |                    |                               |
| d.      | FIG                                       | EXIST         | LOC            | GND                        | Norwegian (100%) |                    |                               |
|         | <i>Sten-en</i>                            | <i>er</i>     | <i>på</i>      | <i>trestubb-en.</i>        |                  |                    |                               |
|         | stone-the                                 | 3sg.S.IMPF.be | on             | tree.trunk-the             |                  |                    |                               |
|         | 'The stone is on the trunk.'              |               |                |                            |                  |                    |                               |

e.	FIG	EXIST	LOC	GND	English (100%)
	<i>The stone is</i>		<i>on the</i>	<i>stump.</i>	
	the stone	3sg.S.IMPF.be/lie	on the	stump	
	'The stone is on the stump.'				

In (15b), sizes of FIGURE and GROUND are specified, hence, the additional information indicates some language- or culture-specific affordances to encode the full grammatical paradigm. The German, Norwegian and English examples as well as the Dene example in (15a) only encode the general location of the FIGURE aligned to the GROUND.

*FIGURE 5: ROCKS ON GROUND (VERTICAL AXIS/HEADLONG)*

Prompt: *Where are the rocks?*

(16) a.	LOC	FIG	POST[FIG]	Dene (100%)
	<i>tambaqe</i>	<i>tthe</i>	<i>da-the-la</i>	
	along.the.shore	stone	3pl.S.IMPF-PO.exist/lie	
	'Stones lie along the beach.'			
b.	FIG	EXIST/POST	LOC GND	German (100%)
	<i>Die Felsen sind/liegen</i>		<i>am Strand.</i>	
	the rocks	3pl.S.IMPF.be/lie	on.the beach	
	'The rocks are/lie on the beach.'			
c.	FIG	EXIST	LOC GND	Norwegian (100%)
	<i>Fjell-ene er</i>		<i>på strand-en.</i>	
	rocks-the	3pl.S.IMPF.be	on beach-the	
	'The rocks are/lie on the beach.'			
d.	FIG	EXIST	LOC GND	English (100%)
	<i>The rocks are</i>		<i>on the beach.</i>	
	the rocks	3pl.S.IMPF:be	on the beach	
	'The rocks are on the beach.'			

The example in (16a) presents the FIGURE being placed on the shore. Note that here The distributive prefix *da-* encodes the plurality of the subject or object. It can also be used adverbially (Li 1946: 417). What is at stake here is a projective cohort in addition to the general orientation. This orientation is encoded by the verb stem in addition to prefixes that determine the FIGURE's orientation. This orientation is related to the secondary GROUND, the shoreline, rather than to the primary GROUND, the ground itself. Especially the English and Norwegian speakers locate the FIGURE on the GROUND in a static and topological 'on'-relation. However, it should be noted here that German speakers use the dative prepositional phrase *am (an dem) Strand* which expresses something like the English 'along'. Hence, the German results can also be described similar to the Dene answer above.

In the next set, the distance of the FIGURE to the GROUND is manipulated as well as the distance of the viewer.

*FIGURE 6: ROCKS ALONG COAST LINE (PROXIMAL)*

Prompt: *Where are the rocks?*

- (17) a. LOC+DOS+GND FIG POST[FIG] Dene (100%)  
*tabqé tthecho dá-the-la*  
 near.shore.line rock 3pl.S.-IMPF-PO.exist/lie  
 ‘The rocks lie near the shore line.’
- b. FIG EXIST/POST DOS+MNR LOC GND German (100%)  
*Mehrere Felsen sind/liegen aufgereiht am Strand.*  
 some rocks 3pl.S.IMPF.lie lined.up on.the beach  
 ‘Some rocks lie lined up on the beach.’
- c. FIG EXIST LOC GND Norwegian (100%)  
*Fjell-ene er på strand-en.*  
 rocks-the 3sg.S.IMPF.be on beach-the  
 ‘The rocks are on the beach.’
- d. FIG EXIST LOC GND English (100%)  
*The rocks are on the beach.*  
 the rocks 3pl.S.IMPF.be on the beach  
 ‘The rocks are on the beach.’

The Dene example in (17a) profiles the close vicinity of the FIGURES to the GROUND. The preposition ‘near’ may also encode a topological relation, relating the FIGURES to the shoreline. In Norwegian and English, the general orientation of the FIGURE is encoded via an existential marker or a posture verb in addition to a locative marker. In these languages, a topological ‘on’-relation is profiled.

The next set presents the same FIGURE, but now the distance of the viewer to the FIGURE and GROUND as well as the distance between the FIGURE and the GROUND has been manipulated.

*Figure 7: ROCK IN WATER (DISTAL)*

Prompt: *Where is the rock?*

- (18) a. GND FIG POST[FIG] Dene (80%)  
*tué tthechogh the-ʔa*  
 water rock IMPF.3sg.S-RO.exist/lie  
 ‘The rock is/lies (in) the water.’
- b. FIG LOC+DOS POST[FIG] Dene (10%)  
*tthe tajághe the-ʔa*  
 rock lake(in.the.middle.of) IMPF.3sg.S-RO.exist/lie  
 ‘A rock is/lies in the middle of the lake’

- c. DOS GND LOC FIG POST[FIG] Dene (10%)  
*yatthé tué ke tthe the-ʔa*  
 north water on rock IMPF.3sg.S-RO.exist/lie  
 ‘The rock lies north on the water.’
- d. FIG EXIST LOC GND German (100%)  
*Der Felsen ist im Wasser.*  
 the rock 3sg.S.IMPF.be in.the water  
 ‘The rock is in the water.’
- e. FIG EXIST LOC GND Norwegian (100%)  
*Fjell-et er i vann-et.*  
 rock-the 3sg.S.IMPF.be in water-the  
 ‘The rock is in the water.’
- f. FIG EXIST LOC GND English (100%)  
*The rock is in the water.*  
 the rock 3sg.S.IMPF.be in the water  
 ‘The rock is in the water.’

In (18a), the spatial scope of the FIGURE/GROUND asymmetry is specified in a neutral orientation. No locative marker expresses the FIGURE being ‘in’. This is different from example (18b) in which the FIGURE is profiled with a certain degree of specificity in relation to the GROUND. This relation depends on the viewer’s perspective. Hence, the FIGURE is now ‘in the middle of’ the GROUND. The ‘in’ relation is not encoded by a locative marker, but rather inferred. The SCOPE is based on the distal perspective of the viewer, i.e., ‘in the middle of’ indicates a specific location of the FIGURE to the GROUND. In other words, the viewer is far away enough to locate the FIGURE being in the middle of the lake, which is usually a comparatively large GROUND.

The static relation is marked with the yellow arrow. The distance of the FIGURE with respect to the viewer does not matter as opposed to the Dene examples in (18b-c). Again, Dene seems to leave open more alternatives to profile the FIGURE/GROUND asymmetry. Hence, the FIGURE is not described only in a topological relationship to the GROUND, but also expressed with a certain lateral perspective and degree of specificity. European speakers did not offer alternative results, they behaved consistent throughout the test.

Finally, Dene example (18c) encodes the relation of the FIGURE to the GROUND by using the cardinal system, i.e., an absolute frame of reference. Not only the topological

relation is at focus here, but also the specific location of the FIGURE. The FIGURE is aligned to the viewer in a lateral axis expressing a certain cardinal direction. This might be due to the fact that the Dene speakers who used this expression recognized the displayed scene as being on the southern shore of Cold Lake. The north alignment also implies a distal perspective. Again, the researcher's question was simply "Where is object X?".

So far, various situations in which objects have been manipulated minimally in terms of perspective and FIGURE/GROUND alignments have been presented. Dene seems to give more freedom in the choice of profiling the FIGURE/GROUND relationship as opposed to the choices European speakers have. Some of the presumed static relations have been encoded as dynamic in Dene. Besides, some of the examples profile various other relationships in addition to topological orientations. Additionally, FIGURE/GROUND reversals and certain degrees of specificity that differ from the European languages have been shown. The differences show nicely the language-specific morphosyntactic regulations that govern the speaker's behavior, but also the influence of extra-linguistic knowledge. This knowledge tends to be encoded by the Dene speakers and less so by the European ones. The speakers may also limit the scope of a scene. This is not so in the encoding of a topological relation in which the FIGURE is only related to the GROUND, but not with respect to the surrounding visual or perspective information.

The next section presents stick-like objects in various situations. Again, some subtle manipulations will be apparent that reveal the general cognitive semantics and its affordances in the encoding process.

#### *4.3.2. FIGURE Coincident with GROUND-Relations*

In this section, objects will be presented that are stick-like in different situations. Different objects in manipulated constellations have been used. The aim is to elicit a range of perspectives in predominantly topological relations. In addition, the interest here is in

exploring how speakers limit the scope of the perspective and how they determine the general FIGURE/GROUND alignment.

The first picture presents a hatchet leaning against a tree stump. In other words, the FIGURE stands beside or to the right of the GROUND (relative frame of reference).

*Figure 8: hatchet beside stump*

Prompt: *Where is the hatchet?*

- (19) a. FIG GND LOC DEIC+LOC+POST[FIG] Dene (40%)  
*tthé kón ke da-ni-ni-ʔa*  
 hatchet stump on up-back.of/behind-[?]-IMPF.3sg.S-SO.lean.against<sup>48</sup>  
 ‘The hatchet leans up against/back of the stump.’
- b. GND LOC FIG [?]+LOC+POST[FIG] Dene (30%)  
*kón kezì tthé ná-ni-the-ʔa*  
 stump over hatchet [?]<sup>49</sup>-[?]IMPF.3sg.S-SO.lean.against  
 ‘The hatchet leans against (on the other side of/over there) the stump.’
- c. FIG GND LOC [?]+POST[FIG] Dene (30%)  
*tthé dechen gah ná-ghe-tthí*  
 hatchet wood near/beside [?]-IMPF.3sg.S-SO.stand.upright  
 ‘The hatchet stands (upright) near/beside the wood.’
- d. FIG POST LOC GND German (100%)  
*Die Axt steht/lehnt neben dem Baumstumpf.*  
 the hatchet 3sg.S.IMPF.stand/lean beside the stump  
 ‘The hatchet stands/leans beside the stump.’
- e. FIG EXIST/POST LOC LOC GND Norwegian (100%)  
*Øks-en er/stand på siden av trestubb-en*  
 hatchet-the 3sg.S.IMPF.be/stand on side of tree.trunk-the  
 ‘The hatchet is/stands on the side of the tree trunk.’
- f. FIG POST/EXIST LOC GND English (100%)  
*The axe leans/is beside (to the right of) the stump.*  
 the axe 3sg.S.IMPF.lean/be beside the stump  
 ‘The axe leans/is beside (to the right of) the stump.’

The posture verb ‘stand’ used in (19c-e) profiles the vertical alignment of the FIGURE to the ground; the relation between the hatchet and the stump is either encoded as parallel and unattached (‘standing beside’) or nearly parallel and partly attached (‘leaning against’). The former expression encodes a projective relation. Examples (19c-f) present a relative frame of reference, i.e., the viewer’s perspective is at stake here. Example (19b) may differ from this,

<sup>48</sup> Among many other meanings the local and adverbial prefix *ní-* (nasalized [i]) encodes a terminative state as in ‘arriving at’ (= coming to its end point). It is also possible that the prefix is a postposed particle encoding past tense, or an event of thing in the past.

<sup>49</sup> The prefix *ná-* requires the continuative stem, e.g., *-ʔa* as in *nághjʔa* ‘it’s standing upright’.

because it presents the relation of the FIGURE being ‘on the other side of’ the GROUND. Since from the viewer’s perspective, the hatched stands beside rather than on the other side of the stump, this may indicate an intrinsic frame of reference instead of a relative one. Another possibility, however, would be that the locative marker simply means ‘over there’ and would then imply deictic information. The viewer here serves as the reference point to align the FIGURE in a projective relation to the GROUND. Hence, a relative frame of reference is invoked. This FIGURE/GROUND relation holds for the Dene example in (19c) as well as for the European speakers.

The next set presents the same FIGURE in a slightly different relation to the GROUND. If perceived in a relative frame of reference, as the German, Norwegian and English speakers do, the hatchet is now in front of the stump.

*FIGURE 9: HATCHET IN FRONT OF STUMP*

Prompt: *Where is the hatchet?*

- (20) a. FIG      GND    LOC    DEIC+POST[FIG]      Dene (60%)  
*tthɛʔ    k'ɔ̃n    k'e    da-ni-nj-ʔɑ*  
 hatchet stump on up-[?]-[?]IMPF.3sg.S-SO.lean.against.it  
 ‘The hatchet leans up against (on) the stump.’
- b. GND    FIG      LOC                      POST[FIG]      Dene (40%)  
*tthɛʔ    dechen    ʔuzi                      the-tɑ*  
 hatchet wood on.the.other.side IMPF.3sg.S-SO.exist/lie  
 ‘The wood is/lies on the other side of the hatchet.’
- c.            FIG      POST                      LOC                      GND      German (100%)  
*Die Axt    steht                      vor                      dem Baumstumpf.*  
 the hatchet 3sg.S.IMPF.stand in.front.of the stump  
 ‘The hatchet stands in front of the stump.’
- d. FIG            EXIST                      LOC      GND      Norwegian (100%)  
*Øks-en    er                      foran    trestubb-en*  
 hatchet-the 3sg.S.IMPF.be on tree.trunk-the  
 ‘The hatchet is in front of the tree trunk.’
- e.            FIG            EXIST                      LOC                      GND      English (100%)  
*The hatchet is in front of the stump.*  
 the hatchet 3sg.S.IMPF.be in.front.of the stump  
 ‘The hatchet is in front of the stump.’

The Dene example in (20a) presents the orientation of the FIGURE being in a partly attached relation (leaning against) to the vertical GROUND. The location of the FIGURE is not specified with regard to the viewer’s perspective. In the European examples (20c-e), the FIGURE is

encoded as being in an upright (standing) position by the use of a posture verb. It is also described as being in an ‘in front of’-relation to the GROUND. In other words, the European examples are encoded on the basis of a relative reference frame, with a frontal axis between the viewer and the objects to be encoded. The Dene example in (20b), however, indicates a FIGURE/GROUND reversal again. The stump is now the FIGURE, whereas the hatchet is the GROUND. The verb stem indicates that the stump lies behind the hatchet (‘on the other side’). Hence, here the first object serves as the reference point. As in the European examples, there is a relative reference frame to be seen here.

In the next examples, the FIGURE is in a projective relation being ‘behind’ the GROUND, at least when a relative frame of reference is profiled.

*FIGURE 10: HATCHET BEHIND STUMP*

Prompt: *Where is the hatchet?*

- (21) a. FIG GND LOC DEIC+LOC+POST[FIG] Dene (60%)  
*tthéł̥ k'ón ʔuzj da-ni-nj-ʔa*  
 hatchet stump on.the.other.side up-back.of/behind-[?]IMPF.3sg.S-SO.lean.against.it  
 ‘The hatchet leans up against (back.of) the stump (on the other side).’
- b. GND LOC LOC FIG DEIC+LOC+POST[FIG] Dene (20%)  
*kón gha k'edhe tthéł̥ da-ni-nj-ʔa*  
 stump near/close/beside alongside hatchet up-back.of/behind-[?]IMPF.3sg.S-SO.lean.against.it  
 ‘The hatchet leans up against beside/alongside (back.of) the stump.’
- c. DEIC FIG GND [?]+LOC+POST[FIG] Dene (20%)  
*eyer tthéł̥ kón na-ghe-tthi*  
 there(medial) hatchet stump [?]-IMPF.3sg.S-SO.stand.upright  
 ‘There stands a hatchet (by/at) the stump.’
- d. FIG EXIST/POST LOC GND German (100%)  
*Die Axt ist/steht hinter dem Baumstamm.*  
 the hatchet 3sg.S.IMPF.be/stand behind the stump  
 ‘The hatchet stands behind the stump.’
- e. FIG EXIST LOC LOC GND Norwegian (100%)  
*Øks-en er bak av trestubb-en*  
 hatchet-the 3sg.S.IMPF.be back of tree.trunk-the  
 ‘The hatchet is behind the tree trunk.’

- f. FIG EXIST LOC GND English (100%)  
*The hatchet is behind the stump.*  
 the hatchet 3sg.S.IMPF.be behind the stump  
 ‘The hatchet is behind the stump.’

Whereas in (21c), only a general topological relation between FIGURE and GROUND is encoded, in (21a), the FIGURE is aligned in a frontal axis to the speaker’s perspective by means of the postposition meaning ‘on the other side’. Hence, a relative frame of reference is profiled. The European examples encode this relation by means of a locative meaning ‘behind’, hence also profiling a relative reference frame. In all examples, the position of the FIGURE as being in an upright position is encoded. In (21b), however, quite similar to the example in (21b), a different frame of reference seems to be instantiated, indicating a ‘beside’ or ‘alongside’ relation between FIGURE and GROUND. The viewer aligns the FIGURE/GROUND asymmetry with respect to the frontal axis instantiated by the relative frame of reference.

The next set uses a different FIGURE. A bottle is placed on a stump in a standing position.

*FIGURE 11: BOTTLE ON STUMP (STANDING)*  
 Prompt: *Where is the bottle?*

- (22) a. FIG GND LOC [?]+LOC+POST[FIG] Dene (100%)  
*tutili decheŋ k'e na-ghj-ʔa*  
 bottle stump on in.place.of[?]-IMPF.3sg.S-SO.stand.upright  
 ‘The bottle stands on the stump.’
- b. FIG POST/EXIST LOC GND German (100%)  
*Die Flasche steht/ist auf dem Baumstamm.*  
 the bottle 3sg.S.IMPF.stand/be on the tree.trunk  
 ‘The bottle stands/is on the tree trunk.’
- c. FIG EXIST LOC GND Norwegian (100%)  
*Flask-en er på stubb-en.*  
 bottle-the 3sg.S.IMPF.be on stump-the  
 ‘The bottle is on the stump.’
- d. FIG EXIST LOC GND English (100%)  
*The bottle is on the stump.*  
 the bottle 3sg.S.IMPF.be on the stump  
 ‘The bottles is on the stump.’

All examples encode the FIGURE being in a static topological relation to the GROUND. The European speakers use an existence or posture predicate and the Dene speakers a classificatory verb system.

The next set uses the same FIGURE, but now its orientation is in a parallel, fully attached relation to the horizontal GROUND and the distance between viewer and scene is changed.

*Figure 12: BOTTLE ON TABLE (PROXIMAL)*  
 Prompt: *Where is the bottle?*

- (23) a. FIG GND LOC DEIC+POST[FIG] Dene (70%)  
*tutili bek'eshich'elyj k'e da-the-tq*  
 bottle table on up-IMPF.3sg.S-SO.exist/lie  
 'The bottle is/lies up on the table.'
- b. FIG GND LOC [?]+LOC+POST[FIG] Dene (30%)  
*tutilaze bek'eshich'elyj k'e na-ghj-tq*  
 bottle.small table on in.place.of[?]-IMPF.3sg.S-SO.exist/lie  
 'The small bottle is/lies on the table.'
- c. FIG POST LOC GND German (100%)  
*Die Flasche liegt auf dem Tisch.*  
 the bottle 3sg.S.IMPF.lie on the table  
 'The bottle lies on the table.'
- d. FIG EXIST LOC GND Norwegian (100%)  
*Flask-en er på bord-et.*  
 bottle-the 3sg.S.IMPF.be on table-the  
 'The bottle is on the table.'
- e. FIG EXIST LOC GND English (100%)  
*The bottle is on the table.*  
 the bottle 3sg.S.IMPF.be on the table  
 'The bottle is on the table.'

All examples encode the FIGURE as being in an 'on'-relation to the horizontal GROUND. All examples except the English one do it be means of a posture verb and a locative. Moreover, the Dene example in (23a) specifies the location of the reference object (and the FIGURE) as being in a certain elevated position to the ground by means of the deictic marker *da-*. The FIGURE is in a coincident relationship with the GROUND. The scheme shows also that the GROUND is in an elevated position by means of the solid black arrow indicating the deictic marker 'up'. The European speakers encode a similar topological relationship, but without the specification that the FIGURE/GROUND relation is in a certain 'up'-position with regard to the ground or viewer.

The next set differs in terms of the GROUND's height. As opposed to the table forcing the FIGURE to be in a certain elevated position, now the earth or soil is the GROUND.

*Figure 13: BOTTLE ON GROUND (DISTAL)*

Prompt: *Where is the bottle?*

- (24) a. FIG GND LOC POST[FIG] Dene (70%)  
*tutli tthai k'e the-tq*  
 bottle sand on IMPF.3sg.S-SO.exist/lie  
 'The bottle is/lies on the sand.'
- b. FIG GND+LOC POST[FIG] Dene (30%)  
*tuteli nih k'e the-tq*  
 bottle ground.on IMPF.3sg.S-SO.exist/lie  
 'The bottle is/lies on the ground.'
- c. FIG EXIST/POST LOC GND German (100%)  
*Die Flasche ist/liegt auf dem Boden.*  
 the bottle 3sg.S.IMPF.be/lie on the ground  
 'The bottle is/lies on the ground.'
- d. FIG EXIST/POST LOC GND Norwegian (100%)  
*Flask-en er/ligger på grunn-en*  
 bottle-the 3sg.S.IMPF.be/lie on the ground-the  
 'The bottle is/lies on the ground.'
- e. FIG EXIST LOC GND English (100%)  
*The bottle is on the ground.*  
 the bottle 3sg.S.IMPF.be on the ground  
 'The bottle is/lies on the ground.'

The Dene responses are similar to the European results in that in all of the responses, the FIGURE is aligned to the horizontal GROUND in a static and topological relation. Note that the Dene speakers do not use the prefix *da-* as in the above example. As mentioned before, this prefix is used when the FIGURE is in a certain elevated position.

The next set is only varying the FIGURE's orientation to the GROUND, i.e., an elevated orientation to the horizontal GROUND.

*Figure 14: BOTTLE ON GROUND (STAND)*

Prompt: *Where is the bottle?*

- (25) a. FIG GND LOC [?]+LOC+POST[FIG] Dene (100%)  
*tutuli tthai k'e ná-ghj-ʔa*  
 bottle sand on in.place.of[?]<sup>50</sup>-IMPF.3sg.S-SO.stand.upright  
 'The bottle stands upright on the sand.'
- b. FIG EXIST/POST LOC GND German (100%)  
*Die Flasche ist/steht auf dem Boden.*  
 the bottle 3sg.S.IMPF.be/stand on the ground  
 'The bottle is/stands on the ground.'
- c. FIG EXIST LOC GND Norwegian (100%)  
*Flask-en er på sand-en.*  
 bottle-the 3sg.S.IMPF.be on sand-the  
 'The bottle is/stands on the sand.'
- d. FIG EXIST LOC GND English (100%)  
*The bottle is on the ground.*  
 the bottle 3sg.S.IMPF.be on the ground  
 'The bottle is on the ground.'

In all examples, the FIGURE is vertically aligned to the horizontal GROUND, i.e., the bottle is in a static and topological relation 'standing' on the ground.

The next set shows a dynamic event in addition to the spatial orientation of the FIGURE to the GROUND.

*Figure 15: BOTTLE ON WATER*

Prompt: *Where is the bottle?*

- (26) a. FIG GND LOC POST+DYN[FIG] Dene (80%)  
*tutuli tue k'e ghe-l-eʔ*  
 bottle water on PRG.3sg.S-CL-SO.float  
 'The bottle is floating on water.'
- b. FIG [?]+POST+DYN[FIG] GND Dene (10%)  
*tuteli na-ghe-beʔ tue*  
 bottle [?]-PRG.3sg.S-swim water  
 'The bottle is swimming (on the) water.'
- c. LOC+GND LOC FIG POST+DYN[FIG] Dene (10%)  
*tahetjhe k'e tuteli ghe-ʔuʔ*  
 on.the.waves(empty container) on bottle PRG.3sg.S-SO.float  
 'The empty bottle is floating on the waves.'

<sup>50</sup> The prefix *na-* has, as stated earlier, different meanings. It can express the FIGURE is 'in place of', 'across', 'in front of'. The prefix is also used as an iterative as in 'again', 'back again' or as a continuative as in 'here and there', 'about' (Li 1946: 417). It is difficult to determine the exact meaning in this example and the most likely *na-* as 'in place of' will be used.

- d. FIG DYN LOC GND German (100%)  
*Die Flasche treibt auf dem Wasser.*  
 the bottle 3sg.S.IMPF.float on the water  
 ‘The bottle floats on the water.’
- e. FIG EXIST LOC GND Norwegian (100%)  
*Flask-en er på vann-et.*  
 bottle-the 3sg.S.IMPF.be on water-the  
 ‘The bottle is on the water.’
- f. FIG EXIST LOC GND English (100%)  
*The bottle is on the water.*  
 the bottle 3sg.S.IMPF.be on the water  
 ‘The bottle is on the water.’

In Dene, the FIGURE is in motion as it is in the European languages except in Norwegian and English. This is indicated by a dynamic verb, meaning ‘to float’ or else ‘to swim’. The difference is that in Dene the locative marker is not used frequently: For example, it is left out in (26b). Here no locative marker expresses a topological relation. Indeed, speakers said that the expression in (26b) is sufficient to indicate that the FIGURE is moving on water. This may also be indicated by the prefix *na-* which can mean ‘here and there’, implying a movement. In (26c), Dene speakers profile the specific character of the GROUND being not only water, but also in motion by expressing it as waves.

*FIGURE 16: LOG IN WATER (FLOAT)*  
 Prompt: *Where is the log?*

- (27) a. GND LOC FIG POST+DYN[FIG] Dene (70%)  
*tue k'e dechenkalé ghe-l-eʔ*  
 water on wood.? PRG.3sg.S-CL-float<sup>51</sup>  
 ‘The wood is floating on water.’
- b. FIG [?]+POST+DYN[FIG] Dene (30%)  
*dechen na-ghe-beʔ*  
 wood [?]-PRG.3sg.S-swim  
 ‘The wood is swimming.’
- c. FIG DYN LOC GND German (100%)  
*Das Brett treibt auf dem Wasser.*  
 the board 3sg.S.IMPF.float on the water  
 ‘The board floats on the water.’

<sup>51</sup> The classifier *-l-* expresses passive, medio-passive, and reflexive. This classifier is derived from the *-ʔ* class verbs (Li 1946: 411). It can be used also as a repetitive event, i.e., ‘again’.

- d. FIG            EXIST/DYN            LOC    GND            Norwegian (100%)  
*Brett-en er/svømmer på vann-et.*  
 board-the 3sg.S.IMPF.be/swim on water-the  
 ‘The board is/swims on the water.’
- e.            FIG    EXIST/DYN            LOC        GND            English (100%)  
*The board is/floats in the water.*  
 the board 3sg.S.IMPF.be/float in the water  
 ‘The board is/floats in the water.’

In the European languages, a locative marker is mandatory to profile the FIGURE in relation to the GROUND. In most examples, the figure moves in an uncontrolled manner, i.e., it ‘floats’ or ‘swims’ ‘in’ or ‘on’ the ground. In the Dene example in (27b), the dynamic event is primarily expressed while the FIGURE/GROUND relation is again inferred. The prefix *na-* here once again may indicate the movement of the FIGURE, i.e., an inceptive marker. The schema for this would thus be similar to the one above.

At the end of the section a set of different positions of another FIGURE (or better FIGURES), i.e., posts lined up and shown from different perspectives will be presented. The perspective has been slightly manipulated from scene to scene. The reason is to survey whether this manipulation is expressed at all. In the background of the scene, the shore is visible. The first example presents the posts lined up in a diagonal fashion with respect to the viewer.

*Figure 17: POSTS LINED UP (DIAGONAL)*  
 Prompt: *Where are the posts?*

- (28) a. GND            DOS+LOC FIG            [?]POST+LOC[FIG]            DOS            Dene (80%)  
*tɯlughá k'edhe dechen ná-da-t-the-ʔa tabq̄ghe*  
 side.road alongside wood [?]-up-CL-IMPF.3pl.S-SO.stand along.the.shore  
 ‘The wood stands alongside the road along the shore.’
- b. DOS+LOC            GND            FIG            [?]POST+LOC[FIG]            Dene (80%)  
*tabq̄e tɯlu ghá dechen ná-da-the-ʔa*  
 along.the.shore side.road wood [?]-up-IMPF.3pl.S-SO.stand  
 ‘The wood stands upright along the shore.’
- c.            FIG    POST            DOS        LOC        LOC        GND            German (100%)  
*Die Pfähle stehen diagonal aufgereiht auf dem Boden.*  
 the posts 3pl.S.IMPF.stand diagonal lined.up on the ground  
 ‘The posts stand diagonally lined up on the ground.’

- d. FIG POST LOC GND Norwegian (100%)  
*Pæl-ene stâr på jord-en.*  
 posts-the 3pl.S.IMPF.stand on sand-the  
 ‘The posts stand on the ground.’
- e. FIG POST LOC GND English (100%)  
*The posts are on the ground.*  
 the posts 3pl.S.IMPF.be on the ground  
 ‘The posts are on the ground.’

Dene speakers express a high degree of specificity to align the plural FIGURES to the GROUND or rather with respect to the perspective. In (28a) the FIGURE is specified being positioned alongside the side road and the shore respectively. The FIGURES are in an upright position, and the orientation depends on the instantiation of the two reference points being (28a) the road, and (28b) the shore. In German, there is also information about how the FIGURES are positioned relative to the viewer’s perspective and in relation to each other by means of describing their position as being diagonally lined up. The Norwegian and English speakers behave differently in that they relate the plural FIGURE to the GROUND in a more general fashion. They do not give as much background information to limit the SCOPE of the FIGURE/GROUND asymmetry. In Norwegian, it does not matter where the FIGURES are located. It is enough information that they ‘stand’. In the English example, there is not even this information, but a simple ‘on’-relation between FIGURES and GROUND. This is different in Dene. It is mandatory to provide the reference frame to limit the perspective of the FIGURE. Apparently the perspective is not crucial for the Norwegian and English speakers.

*Figure 18: POSTS LINED UP (FRONTAL AXIS)*

Prompt: *Where are the posts?*

- (29) a. GND<sub>1</sub> LOC DOS+LOC FIG DOS GND<sub>2</sub> DOS+LOC Dene (50%)  
*iḷlu gha k’edhe dechɛn ɛtth’i tue dzak’ezj*  
 side.road near alongside wood straight water out.on(lake/prairie/flat.surface)  
 ‘The wood (standing straight up) is alongside the side road out on the water.’
- b. GND FIG [?]POST+LOC[FIG] Dene (50%)  
*nŷk’e dechen na-dá-the-ʔɔ*  
 island.on wood [?]-3pl.S.IMPF-SO.stand.against.it  
 ‘The wood stands upright on the island.’
- c. FIG POST DOS DOS LOC GND German (100%)  
*Die Pfähle stehen aufgereiht hintereinander (auf dem Boden).*  
 the posts 3pl.S.IMPF.stand lined.up behind.each.other (on the ground)  
 ‘The posts stand lined up (on the ground) one behind the other.’

- d. FIG POST LOC GND Norwegian (100%)  
*Pæl-ene stâr på jord-en.*  
 posts-the 3pl.S.IMPF.stand on sand-the  
 ‘The posts stand on the ground.’
- e. FIG POST DOS LOC GND English (100%)  
*The posts are headlong on the ground.*  
 the posts 3pl.S.IMPF.be headlong on the ground  
 ‘The posts are headlong on the ground.’

Again, Dene speakers express the scope of the perceptual orientation in terms of the various reference points such as the side road and the ‘alongside’ location. It is also worth mentioning that Dene speakers specify that the FIGURES are in an upright position with respect to the horizontal GROUND. This specificity decreases, if we want to impose a semantic hierarchy, from Dene to German, Norwegian, and finally English speakers. Again, if speakers were asked for a more specific description, they provided such a specification, but only when asked. Only Dene speakers frequently came up with the descriptions given above. These show very specific encoding patterns based on the morphosyntactic affordances of the language.

*Figure 19: POSTS LINED UP (LATERAL)*  
 Prompt: *Where are the posts?*

- (30) a. FIG [?]LOC+POST[FIG] Dene (60%)  
*dechen na-da-the-ʔa*  
 wood [?]-up-3pl.S.IMPF-SO.stand.against.it  
 ‘The wood stands upright.’
- b. GND FIG POST+LOC[FIG] Dene (30%)  
*nŷk’e dechen na-da-the-ʔa*  
 island.on wood [?]-up-3pl.S.IMPF-SO.stand.against.it  
 ‘The wood stands upright on the island.’
- c. GND LOC GND+POST+LOC[FIG] Dene (10%)  
*tue ts’en ne-l-ʔa*  
 water towards [?]-CL-IMPF.SO.stand.against.it  
 ‘The posts stand towards the water.’
- d. FIG POST DOS LOC GND German (100%)  
*Die Pfähle stehen aufgereiht auf dem Boden.*  
 the posts 3pl.S.IMPF.stand lined.up on the ground  
 ‘The posts stand lined up on the ground.’
- e. FIG POST LOC GND Norwegian (100%)  
*Pæl-ene stâr på jord-en.*  
 posts-the 3pl.S.IMPF.stand on sand-the  
 ‘The posts stand on the ground.’

f.	FIG	POST	LOC	DOS	English (100%)
	<i>The posts</i>	<i>are</i>	<i>lined up</i>	<i>(sideways).</i>	
	the posts	3pl.S.IMPF.be	lined up	(sideways)	
	‘The posts are lined up (sideways).’				

In the first two Dene examples (30a-b), the speakers focus on the specific position or location of the FIGURES rather than the perspective. The posts are located ‘standing upright (on the GROUND)’. In (30c), however, speakers profile the orientation of the FIGURES with respect to a secondary GROUND as well, i.e., water serving as the background information here. The FIGURES are aligned with respect to the water, heading towards it.

The Norwegian speakers only encode the very general orientation of the FIGURE standing on the GROUND. The posture verb expresses the vertical alignment of the FIGURE to the horizontal GROUND. The German utterances, however (30d), also encode the relationship between the FIGURES as being ‘lined up’. In some of the English answers (30f), this is even more specified by the expression of the perspective of the viewer on the FIGURES, i.e., they are positioned ‘sideways’.

This section presented a variety of FIGURE/GROUND relations as depicted in stimulus material that provided different perspective manipulations. Dene speakers provide more specific information as opposed to the European speakers. Especially the degree of specificity of the FIGURE’s alignment has been proven to be more relevant in Dene than in the European languages. Dene speakers encode specific information for morphosyntactic reasons. European speakers seem to be usually not that specific.

#### 4. GENERAL DISCUSSION

In this paper on spatial topological relations it has been shown that such relations are not only encoded on the basis of purely objective coordinates given by external and thus speaker-neutral spatial parameters. Instead, if spatial language is used in Dene or Totonac, it is inclined to encode a rather perspectivized construal as opposed to a more static and objectivized one that is generally assumed for topological relations (see Tversky and Lee

(1998) on the schematization of classed elements such as, e.g., ‘at’, ‘on’, and ‘in’; also Jackendoff & Landau 1993; Herskovits 1986)<sup>52</sup>. And the same pattern, although to a lesser degree, holds also for the other languages being compared.

Dene speakers do indeed use highly spatial language (as do Hopi (Malotki 1979) and Eipo (Heeschen 1998); Dene (Thiering 2009)), but the focus in many cases is on the encoding of rather perspectivized or functional construals of the objects as opposed to static and objectivized ones, as is prevalent in most European languages, at least in the given situations or stimuli. The speakers’ responses give a good indication of the considerable richness in the semantic range of devices used to describe relations that were presumed by the MPI group to be static spatial relations between a FIGURE and GROUND object. In addition, the data support the hypothesis that, in Dene and Totonac, speakers’ descriptions of purportedly topological relations do not rely on locative devices exclusively. Indeed, space is often only a secondary aspect in the instantiation of the FIGURE/GROUND asymmetry and less important than temporal or more causal processes.

Moreover, with regard to Langacker’s stage model (Langacker 1987) of widespread use in cognitive linguistics, various coordinates are instantiated to limit the scope of the FIGURE/GROUND asymmetry. This stage model implies that the scope of the FIGURE to be localized depends on various different qualities of the GROUND. The cohort systems have proven to encode a wide range of spatial and temporal parameters. The semantic information is spread throughout the utterance and includes inferred extra-linguistic knowledge. To a lesser degree, this is also the case in the other languages.

In Dene, the scenes presented by the *TRM* and *SPACE* video clips are described based on the specific characteristics of the FIGURE being located in relation to the GROUND, depending on its texture, material, size, and shape. This means that the language, or rather the

---

<sup>52</sup> A first analysis of Navajo (Young & Morgan 1980), Hopi (Malotki 1979), and Eipo (Heeschen 1998; Thiering 2009) and Slave (Thiering forthcoming) suggest similar encoding patterns and semantic quality in the encoding of spatial relations.

classificatory verb system, forces the speaker to elaborate and exhaust the morphosyntactic affordances to encode the various FIGURE/GROUND asymmetries. In addition, the GROUND imposes certain interpretations; for example, water as the GROUND for a boat implies that the FIGURE cannot exist statically in its location. Therefore, the clips are described as contextualized situations. Contextualized implies the influence of extra-linguistic knowledge or practice that is included in the description of the scene as additional information to specify the participants of a scene. This influence is mirrored by the various morphosyntactic paradigms a speaker can choose from. As opposed to the *TRM* tool, *SPACE* presents more realistic data points and by that allows some insight into the intricacies of the language and its morphosyntax. These language-specific affordances force the speaker to express the various participants as the result of a certain perceptive input. As such, Dene and Totonac tend not to reduce the semantic load. It is expressed as distributed semantics across an utterance, i.e., cohort. Moreover, naturalistic or even familiar settings prompt the speakers to give a range of paradigms encoding a variety of FIGURE/GROUND asymmetries, perspective information, and a high degree of specificity.

These observations lead to the assumption that languages in general present language-specific affordances deviating from other languages. Nonetheless, also the control languages present language-specific patterns, only they are less specific. Since Dene and Totonac present construal mechanisms that differ from the European languages, it can be speculated whether the cognitive entrenchment of the various FIGURE/GROUND asymmetries depends on those affordances.

As mentioned above, Dene speakers tend to encode ‘spatial’ relationships between FIGURE and GROUND objects through a cohort of morphosyntactic devices, including classificatory verbs, directional verb prefixes, and postpositions. If a locative marker is used, it only expresses generic information about the spatial relation between FIGURE and GROUND; in fact, when asked, speakers revealed that the locative marker can even be dropped. The

nature and identity of the FIGURE is signaled through the classificatory verb stem plus a variety of tense/aspect, thematic, valency, and directional verb prefixes. Hence, the Dene verb system provides core information about the FIGURE and its particular spatial alignment. If at all given, this information is only inferred in the European languages, usually in cases in which a posture verb system is used.

Current models of topological spatial relations propose a consistency across languages in terms of how objects of a scene are related, i.e., it is usually assumed that objective spatial features trigger the relation. Using the *TRM* and *SPACE* tools, the complex interplay between conceptual reasoning, language, culture, and contextual factors has been exemplified. This paper is hence supporting Jackendoff's claim about conceptual structure as quoted in the introduction implying the importance of world knowledge and context. Moreover, the intricate interplay between language and thought (or cognition, for that matter) has been scratched at the surface in this paper (Levinson 2003; Vygotski 1934; Whorf 1956).

## 5. BIBLIOGRAPHY

- Armstrong, S.L., Gleitman, L. & Gleitman, H. 1983. What some concepts might not be. *Cognition*, 13, 263-308.
- Bal, M. 1996. *Double Exposures: The Subject of Cultural Analysis*. New York/London: Routledge.
- Beck, D. 2004. *Upper Necaxa Totonac*. München: Lincom Europa.
- Bennet, D.C. 1975. *Spatial and Temporal Uses of English Prepositions: An Essay in Stratificational Semantics*. London: Longman.
- Boas, F. 1997 (1911). *Handbook of American Indian Languages*. London: Routledge.
- Bowerman, M. & Choi S. 2001. Shaping meanings for language: Universal and language-specific in the acquisition of spatial semantic categories. In M. Bowerman & S. Levinson (eds.). *Language Acquisition and Conceptual Development*. Cambridge: Cambridge University Press, 475-511.
- Brée, D. S. & Pratt-Hartmann, I.E. 2002. Temporal semantics of prepositions in context. In S. Feigenbaum & D. Kurzon (eds.). *Prepositions in their Syntactic, Semantic and Pragmatic Context* (Typological Studies in Language 50). Amsterdam/Philadelphia, PA: J. Benjamins, 75-115.
- Brugmann, C. 1988. *The Story of Over. Polysemy, Semantics, and the Structure of the Lexicon*. New York: Garland.
- Bühler, K. 1934. *Sprachtheorie: die Darstellungsfunktion der Sprache*. Jena: Fischer.
- Buschmann, J.K. 1855. Der athapaskische Sprachstamm. *Abhandlungen der Königlichen Akademie der Wissenschaften zu Berlin*. Berlin: Akademie der Wissenschaften, 144-319.
- Carlson, L.A. 2000. Object use and object location: the effect of function on spatial relations. In E van der Zee & U. Nikanne (eds.). *Cognitive Interfaces: Constraints on Linking Cognitive Information*. Oxford/New York: Oxford University Press, 94-115.
- Carlson, L.A. & Logan, G.D. 2001. Using spatial terms to select an object. *Memory and Cognition*, 29, 883-892.
- Carlson-Radvansky, L. & Irwin, D. 1993. Frames of reference in vision and language: Where is above? *Cognition*, 46, 223-244.
- Carlson-Radvansky, L. & Carlson-Radvansky, G.A. 1996. The influence of functional relations on spatial term selection. *Psychological Science*, 7, 56-60.
- Carter, R. 1976. Chipewyan classificatory verbs. *IJAL*, 42, 24-30.
- Cienki, A. 1989. *Spatial Cognition and the Semantics of Prepositions in English, Polish, and Russian*. Munich: Sagner.
- Clark, H.H. 1968. On the use and meaning of prepositions. *Journal of Verbal Learning and Verbal Behavior*, 7, 421-431.
- Cook, E.D. 2004. *A Grammar of Dene Sgmine (Chipewyan)*. Winnepeg/Manitoba: Algonquian and Iroquoian Linguistics.
- Coventry, K.R. & Garrod, S.C. 2004. *Saying, Seeing and Acting. The Psychological Semantics of Spatial Prepositions*. Hove, East Sussex/New York: Psychology Press.
- Crangle, C. & Suppes, P. 1989. Geometric semantics for spatial prepositions. *Midwest Studies in Philosophy*, 14, 399-421.
- Crawford, L.E., Regier, T. & Huttenlocher, J. 2000. Linguistic and non-linguistic spatial categorization. *Cognition*, 75, 209-235.
- Cresswell, M.J. 1978. Prepositions and Points of View. *Linguistics and Philosophy* 2/1, 1-41.
- Cuyckens, H. 1994. Family resemblances in the Dutch spatial preposition *op*. In M. Schwarz (ed.). *Kognitive Semantik/Cognitive Semantics. Ergebnisse, Probleme, Perspektiven*. Tübingen: Narr, 179-195.
- Cuyckens, H. 1997. Prepositions in Cognitive Lexical Semantics. In D. Haumann & S.

- Schierholz (eds.). *Lexikalische und grammatische Eigenschaften präpositionaler Elemente* (Linguistische Arbeiten 371). Tübingen: Niemeyer, 63-82.
- Cuyckens, H. & Radden, G. (eds.) 2002. *Perspectives on Prepositions* (Linguistische Arbeiten 454). Tübingen: Niemeyer.
- Davidson, W., Elford, L.W. & Hoijer, H. 1963. Athapaskan classificatory verbs. In H. Hoijer et al. (eds.). *Studies in the Athapaskan Languages*. Berkeley: University of California Press, 30-41.
- Dirven, R. 1982. Spatial relations in English. In G. Radden & R. Dirven (eds.). *Kasusgrammatik und Fremdsprachendidaktik*. Trier: Wissenschaftlicher Verlag. (Anglistik und Englischunterricht 14), 103-132.
- Dirven, R. 1993. Dividing up physical and mental space into conceptual categories by means of English prepositions. In C. Zelinsky-Wibbelt (ed.). *The Semantics of Prepositions. From Mental Processing to Natural Processing*. Berlin/New York: de Gruyter, 73-98.
- Dutke, S. 1994. *Mentale Modelle: Konstrukte des Wissens und Verstehens*. Göttingen: Hogrefe.
- Eisenberg, P. 1999. *Grundriß der deutschen Grammatik. Der Satz*. Stuttgart: Metzler.
- Faarlund, T., Lie, S. & Vannebo, K.I. 1999. *Norsk Referanse-Grammatikk*. Oslo: Universitetsforlaget.
- Fillmore, Ch. 1968. The case for case. In E. Bach & R.T. Harms (eds.). *Universals in Linguistic Theory*. New York: Holt, Rinehart & Winston, 1-88.
- Flores d'Arcais, G.B. 1986. Konzeptuelle Strukturen und das mentale Lexikon. In H.G. Bosshardt (ed.). *Perspektiven auf Sprache. Interdisziplinäre Beiträge zum Gedenken an Hans Hörmann*. Berlin: Mouton de Gruyter, 130-147.
- Goldberg, A. E. 1995. *Constructions: A Construction Grammar Approach to Argument Structure*. Chicago: University of Chicago Press.
- Gosztonyi, A. 1976. *Der Raum. Geschichte seiner Probleme in Philosophie und Wissenschaften* (Vol I + II). Freiburg: Alber.
- Gumperz, J.J. & Levinson, S.C. (eds.) 1996. *Rethinking Linguistic Relativity* (Studies in the Social and Cultural Foundations of Language, 17). Cambridge: Cambridge University Press.
- Hawkins, B. W. 1986. *The Semantics of English Spatial Prepositions*. Trier: L.A.U.T.
- Hayward, W.G. & Tarr, M.J. 1995. Spatial language and spatial representation. *Cognition*, 55, 39-84.
- Heeschen, V. 1998. *An Ethnographic Grammar of the Eipo Language*. (Mensch, Kultur und Umwelt im zentralen Bergland von West-Neuguinea 23). Berlin: Reimer.
- Helbig, G. 1999. *Deutsche Grammatik. Grundfragen und Abriss*. München: iudicium.
- Heller, M. 1990. *The Ontology of Physical Objects: Four-Dimensional Hunks of Matter*. Cambridge/New York: Cambridge University Press.
- Herrmann, T., Grabowski, J., Schweizer, K. & Graf, R. 1992. Die mentale Repräsentation von Konzepten, Wörtern und Figuren. In J. Grabowski, G. Harras & T. Herrmann (eds.). *Bedeutung, Konzepte, Bedeutungskonzepte: Theorie und Anwendung in Linguistik und Psychologie*. Opladen: Westdeutscher Verlag, 120-152.
- Herrmann, T. & Schweizer, K. 1998. *Sprechen über Raum: Sprachliches Lokalisieren und seine kognitiven Grundlagen*. Bern: Hans Huber.
- Herskovits, A. 1985. Semantics and pragmatics of spatial prepositions. *Cognitive Science*, 9, 341-378.
- Herskovits, A. 1986. *Language and Spatial Cognition: An Interdisciplinary Study of the Prepositions in English*. Cambridge: Cambridge University Press.
- Hofstadter, D. 1980. *Gödel, Escher, Bach: an Eternal Golden Braid*. New York: Vintage Book.
- Jackendoff, R. 1983. *Semantics and Cognition*. Cambridge, Mass.: MIT Press.

- Jackendoff, R. 1996. The architecture of the linguistic-spatial interface. In P. Bloom, M.A. Peterson, L. Nadel & M.T. Garrett (eds.). *Language and Space*. Cambridge, MA: MIT Press, 1-30.
- Jackendoff, R. 2002. *Foundations of Language: Brain, Meaning, Grammar, Evolution*. Oxford/New York: Oxford University Press.
- Johnson, M. 1987. *The Body in the Mind: The Bodily Basis of Meaning, Imagination, and Reason*. Chicago: University of Chicago Press.
- Johnson-Laird, P.N. 1983. *Mental Models. Towards a Cognitive Science of Language, Inference, and Consciousness*. Cambridge, MA: Harvard University Press.
- Johnson-Laird, P.N. 1996. Space to think. In P. Bloom, M. Peterson, L. Nadel, & M. Garrett (eds.). *Language and Space*. Cambridge, MA: MIT Press, 437-62.
- Kari, J. 1979. *Athabaskan Verb Theme Categories: Athna*. Alaska Native Language Center Research Papers, 2. Fairbanks, Alaska: University of Alaska.
- Lakoff, G. 1987. *Women, Fire, and Dangerous Things: What Categories Reveal about the Mind*. Chicago: University of Chicago Press.
- Landau, B. & Jackendoff, R. 1993. "What" and "Where" in spatial language and spatial cognition. *Behavioral and Brain Sciences*, 16/2, 217-265.
- Lang, E., Carstensen, K.U. & Simmons, G. 1991. *Modelling Spatial Knowledge on a Linguistic Basis. Theory, Prototype, Integration*. (Lecture Notes in Artificial Intelligence). Berlin, Heidelberg, New York: Springer Verlag.
- Langacker, R.W. 1987. *Foundations of Cognitive Grammar. Vol. I: Theoretical Prerequisites*. Stanford, Calif.: Stanford University Press.
- Langacker, R.W. 2000. *Grammar and Conceptualization*. Berlin: Mouton de Gruyter.
- Levinson, S. 1998. From outer space: linguistic categories and non-linguistic thinking. In J. Nuyts & E. Pederson (eds.). *Language and Conceptualization*. Cambridge: Cambridge University Press, 13-45.
- Levinson, S. 2003. *Space in Language and Cognition. Explorations in Cognitive Diversity*. Cambridge: Cambridge University Press.
- Levinson, S. & Wilkins, D. 2006. *Grammars of Space*. Cambridge: Cambridge University Press.
- Levy, P. 1992. Body Part Prefixes in Papantla Totonac. In L. de Léon & S.C. Levinson (eds.). *Spatial Description in Mesoamerican Languages*. (Introduction). *Zeitschrift für Phonetik, Sprachwissenschaft und Kommunikationsforschung*, 45, 559-42.
- Lewin, K. 1936. *Principles of Topological Relations*. New York/London: McGraw-Hill Book Company.
- Li, F. 1946 (1928). Chipewyan. In Hoiijer, H. et al. (ed.). *Linguistic Structures of Native America*. New York: Viking Fund Publications in Anthropology, 398-423.
- Malotki, E. 1979. *Hopi-Raum. Eine sprachwissenschaftliche Analyse der Raumvorstellungen in der Hopi-Sprache*. Tübingen: Gunter Narr.
- McDonough, J. 2000. On a bipartite model of the Athabaskan verb. In T. Fernald & P. Platero (eds.). *The Athabaskan Languages*. Oxford: Oxford University Press, 139-166.
- Miller, G.A. & Johnson-Laird, P.N. 1976. *Language and Perception*. Cambridge, MA: The Belknap Press.
- Morris, Father A.G. 1890. The Déné languages. Considered in themselves and incidentally in their relations to non-American indioms. *Transactions of the Canadian Institute*, Vol. I., 170-212.
- Munnich, E., Landau, B. & Doshier, B.A. 2001. Spatial language and spatial representation: A cross-linguistic comparison. *Cognition*, 81, 171-207.
- Nuyts, J. & Pederson, E. (eds.) 1998. *Language and Conceptualization*. Cambridge: Cambridge University Press.

- Pederson, E., Wilkins, D. & Bowerman, M. 1998. *Static Topological Relations*. Unpublished manuscript.
- Peterson, M.A., Nadel, L., Bloom, P. & Garrett M.F. 1996. Space and languages. In P. Bloom, M. Peterson, L. Nadel & M. Garrett (eds.). *Language and Space*. Cambridge, MA: MIT Press, 553-577.
- Piaget, J. & Inhelder, B. 1956. *The Child's Conception of Space*. New York: The Humanities Press.
- Regier, T. 1996. *The Human Semantic Potential: Spatial Language and Constrained Connectionism*. Cambridge, MA: MIT Press.
- Regier, T. & Carlson, L.A. 2002. Spatial language: Perceptual constraints and linguistic variation. In N. Stein, P. Bauer & M. Rabinowitz (eds.). *Representation, Memory, and Development: Essay in Honor of Jean Mandler*. Mahwah, NJ: Erlbaum, 199-221.
- Rice, K. 1989. *A Grammar of Slave*. Berlin/New York: Mouton de Gruyter.
- Rice, S. 1997. Giving and taking in Chipewyan: The semantics of THING-marking classificatory verbs. In J. Newman (ed.). *The Linguistics of Giving* (Typological Studies in Language, 36). Amsterdam/Philadelphia, PA: J. Benjamins, 97-134.
- Rice, S. 2002. Posture and existence predicates in Dene Sgmin4 (Chipewyan): lexical and semantic density as a function of the 'stand'/'sit'/'lie' continuum. In J. Newman (ed.). *The Linguistics of Sitting, Standing, and Lying* (Typological Studies in Language, 51).
- Rice, S. & Wood, V. 1996. *Postpositions and lexicalization patterns in the Chipewyan verb*. Paper presented at the annual Athapaskan Languages Conference, University of Alberta, 15 June 1996.
- Rosch, E. & Lloyd, B. (eds.) 1978. *Cognition and Categorization*. Hillsdale, NJ: Erlbaum.
- Ruhl, C. 1989. *On Monosemy: A Study in Linguistic Semantics*. Albany: SUNY.
- Sapir, E. 1915. The Na-Dene languages. A preliminary report. *American Anthropological Association*, Vol. 17/3, 534-558.
- Senft, G. (ed.) 1997. *Referring to Space: Studies in Austronesian and Papuan Languages*. Oxford/New York: Clarendon Press.
- Sinha, C. & Kuteva, T. 1995. Distributed spatial semantics. In: *Nordic Journal of Linguistics*, 18, 167-199.
- Slobin, D. 1996. From 'thought to language' to 'thinking for speaking'. In J. Gumperz & S. Levinson (eds.). *Rethinking Linguistic Relativity*. Cambridge: Cambridge University Press, 195-217.
- Svorou, S. 1993. *The Grammar of Space* (Typological Studies in Language, 25). Amsterdam/Philadelphia, PA: J. Benjamins.
- Talmy, L. 1978. FIGURE and GROUND in complex sentences. In J. Greenberg, C. Ferguson & H. Moravcsik (eds.). *Universals of Human Language*. Stanford, CA: Stanford University Press, 627-649.
- Talmy, L. 1983. How to structure space. In H. Pick & L. Acredolo (eds.). *Spatial Orientation: Theory, Research, and Application*. New York: Plenum Press, 225-282.
- Talmy, L. 2000a. *Towards a Cognitive Semantics, Vol. I+II*. Cambridge, MA: MIT Press.
- Talmy, L. 2000b. How language structures space. In L. Talmy: *Towards a Cognitive Semantics, Vol. I*. Cambridge, MA: MIT Press, 177-254.
- Talmy, L. 2000c. Lexicalization patterns. In L. Talmy: *Towards a Cognitive Semantics, Vol. II*. Cambridge, MA: MIT Press, 21-146.
- Talmy, L. 2000d. FIGURE and GROUND in language. In L. Talmy: *Towards a Cognitive Semantics, Vol. I*. Cambridge, MA: MIT Press, 311-344.
- Taylor, J.R. 1989. *Linguistic Categorization: Prototypes in Linguistic Theory*. Oxford: Clarendon.

- Taylor, J.R. 1990. Schemas, prototypes, and models: in search of the unity of the sign. In S.L. Tsohatzidis (ed.). *Meaning and Prototypes: Studies in Linguistic Categorization*. London/New York: Routledge, 521-534.
- Taylor, J.R. & MacLaury, R.E. (eds.) 1995. *Language and the Cognitive Construal of the World* (Trends in Linguistics: Studies and Monographs 82). Berlin/New York: Mouton de Gruyter.
- Thiering, M. 2006. Topological Relations in an Athapaskan Language. *PETL: Papers in Experimental and Theoretical Linguistics* (Department of Linguistics Working Papers, 1). University of Alberta.
- Thiering, M. 2009. Language loss in spatial semantics: Dene Suliné. In J.N. Standford & D. R. Preston (eds.), *Variation in Indigenous Minority Languages*. IMPACT Studies in Language and Society 25. Amsterdam/Philadelphia: John Benjamins, 485-516.
- Tversky, B & Lee, P. 1998. How space structures language. In Chr. Freska, Chr. Habel & Karl Wender (eds.), *Spatial Cognition: An Interdisciplinary Approach to Representing and Processing Spatial Knowledge*. Berlin, New York: Springer.
- Tyler, A. & Evans, V. 2001. Reconsidering prepositional polysemy networks: The case of *over*. *Language*, 77/4, 724-65.
- Tyler, A. & Evans, V. 2003. *The Semantics of English Prepositions: Spatial Scenes, Embodied Meaning and Cognition*. Cambridge: Cambridge University Press.
- Vandeloise, C. 1984. *Description of Space in French*. Ann Arbor, Mich.: University Microfilms International.
- Vandeloise, C. 1991. *Spatial Relations: A Case Study from French*. Chicago: University of Chicago Press.
- Vygotsky, L. 1934. *Thought and Language*. Cambridge: Cambridge University Press.
- Whorf, B. 1956. *Language, Thought, and Reality. Selected Writings of Benjamin Lee Whorf*. Cambridge, MA: MIT Press.
- Young, R.W & Morgan, W. 1980. *The Navajo Language: A Grammar and Colloquial Dictionary*. Albuquerque: University of New Mexico Press.
- Zee van der, E. & Slack, J. (eds.) 2003. *Representing Direction in Language and Space* (Explorations in Language and Space, 1). Oxford: Oxford University Press.

6. APPENDIX

6.1 Appendix A: Topological Relational Markers Series (TRM)

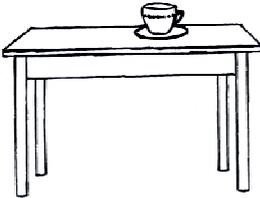


Figure 1



Figure 2

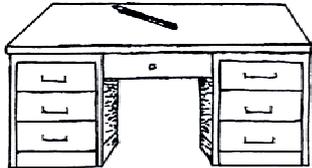


Figure 3

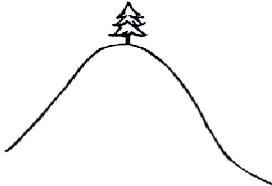


Figure 4

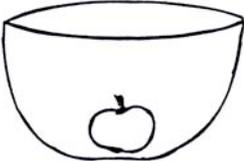


Figure 5

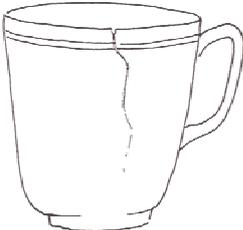


Figure 6

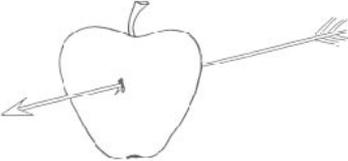


Figure 7



Figure 8

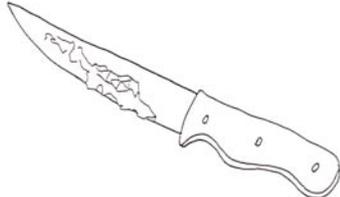
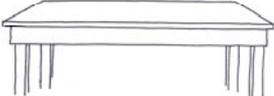


Figure 9



Figure 10

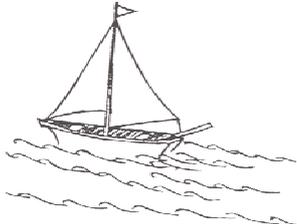


Figure 11

6.2 APPENDIX B: SPATIAL CATEGORIZATION ELICITATION TOOL (SPACE)



Figure 1



Figure 2



Figure 3



Figure 4



Figure 5



Figure 6



Figure 7



Figure 8



Figure 9



Figure 10



Figure 11



Figure 12



*Figure 13*



*Figure 14*



*Figure 15*



*Figure 16*



*Figure 17*



*Figure 18*



*Figure 19*