This book presents novel data from endangered languages and cultures that are ever so often still not focused on. It combines different disciplines to capture the intricacies of spatial orientation and navigation. Also, the interplay between culture through language and practices presents new insights in the importance of combining cognitive semantics with cognitive anthropology. Hence, data is presented indicating the constructive process of figure-ground asymmetries upon shaping of spatial categorization.

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ACL
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Martin Thiering
SPATIAL SEMIOTICS AND SPATIAL MENTAL MODELS

DE G

DE GRUYTER
MOUTON

Martin Thiering

SPATIAL SEMIOTICS AND SPATIAL MENTAL MODELS

FIGURE-GROUND ASYMMETRIES IN LANGUAGE

APPLICATIONS OF
COGNITIVE LINGUISTICS

DE G

Für Susann

"...and these children that you spit on,
as they try to change their worlds are
immune to your consultations. They're
quite aware of what they're going through..."

(Opening Scene from *The Breakfast Club* by John Hughes 1985;
Lyrics originally David Bowie. Changes. 1971. *Hunky Dory*)

Acknowledgements

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Abbreviations

*	ungrammatical form
ʔ	glottal stop
[?]	unidentifiable morpheme meaning
ABL	ablative
ABS	absolutive
ACC	accusative
ALL	allative
AM	amorphous mass
AO	animate object
BP	body part
CL	classifier
CLV	classificatory verb
DIF	diffusive
DIR	direction
DOS	degree of specificity
DUR	durative
DYN	dynamic verb
EXIST	existential verb
FIG	figure
FO	flexible object
FUT.I/II/III	future I, future II, future III
GND	ground
HAB	habitual
HORT	hortative
IMPF	imperfective
INC	inceptive
INTNS	intensifier
LOC	locative
MAN	manner
MED	medial
MM	mass of mushy matter
N	north
NE	northeast
NEUT	neuter verb
NM	nominalizer
NW	northwest
PAST	past tense
PERF	perfective
PKT	punctative
POSS	possessive
POST	posture verb
RO	round, hard or compact objects

S	south
SC	scene
SO	single rigid stick-like object
SUF	suffx
SW	southwest
3SG.S	third person singular subject
3PL	third person plural
VOH	verbs of handling, manipulation, continuing manual contact
VOM	verbs of free movement

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Chapter 1: Setting the stage

> Because Cognitive Linguistics sees language as embedded in the overall cognitive capacities of man, topics of special interest for Cognitive Linguistics include: the structural characteristics of natural language categorization (such as prototypicality, systematic polysemy, cognitive models, mental imagery, and metaphor); the functional principles of linguistic organization (such as iconicity and naturalness); the conceptual interface between syntax and semantics (as explored by Cognitive Grammar and Construction Grammar); the experiential and pragmatic background of language-in-use; and the relationship between language and thought, including questions about relativism and conceptual universals. (Geeraerts and Cuyckens 2007: 4)

1.1 Introduction

Humans move in space on a daily basis and as a daily practice, they consciously talk about space, and unconsciously use spatial metaphors. As such, humans apply different cultural practices using different semiotic systems (see Holland and Quinn 2000; Palmer 1996). Bickel argues more specifically

> that the cultural forms of social practices do indeed show 'affinities' to linguistic patterns. I argue that Whorfian effects of language on thought can be fully understood only once we take seriously the role of sociocultural practice. This is not only important […] with regard to sociocultural practices in artistic discourses but also in nonverbal activities from weaving and house-building to ritual and settlement habits. (Bickel 2000: 161–162)

They impose mediate and immediate spatial relations encoded as symbolic, analogue[1] and digital structures (Nöth 2000: 178, 200; see also Morris 1938; Ogden and Richards 1923). Symbolic structures can be words, pictures, gestures or verbal, graphic and pictorial coding systems.[2]

Spatial encoding mechanisms are essential prerequisites for spatial orientation as a daily routine (Bickel 1997)[3].

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1 Analogue codes can also be pictures, diagrams, films, construction models (Nöth 2000: 218).

2 Note that the difference between symbolic and analogue is not as clear-cut as it seems here. For a comprehensive overview the reader should consult the three comprehensive volumes of *A Handbook on the Sign-Theoretic Foundations of Nature and Culture*, edited by Roland Posner, Klaus Robering and Thomas A. Sebeok (1997–2003).

3 "Orientation is, like topology, very well suited for a qualitative approach. In everyday (non-technical) communication, orientation of spatial entities with respect to other spatial entities is usually given in terms of a qualitative category like "to the left of" or "northeast of" rather than using a numerical expression like "53 degrees" (which is certainly more common in technical communication like in aviation). Unlike the topological approaches we

> Performing a mundane activity, such as walking to a library, selecting a book from the collection, bringing it to the circulation desk, checking it out, and taking it home, is of complexity far outstripping any known formal description of it. Such routines involve the coordination of multiple acts of sensing, perceiving, moving, and conceptualizing in a three-dimensional world. It is these mundane activities that are most likely to reveal the basic features of human thought and language. Walking to the library already depends on a long history of simpler experiential patterns filtered through culture [and hence language; M.T.] and the individuals it claims as its own. (Oakley 2007: 214)

Different knowledge systems are at work at the conceptual level. These are understood as underlying categorization patterns of spatial orientation processes.

Linguistically, people in different languages and cultures use different encoding devices to relate spatial information.

> The world consists of a virtually infinite number of discriminably different stimuli. One of the most basic functions of all organisms is the cutting up of the environment into classifications by which nonidentical stimuli can be treated as equivalent. (Rosch 1977: 212) […] every language reflects a certain perspective on the world and encoding strategies. (Wolff and Malt 2010: 4)

Language as a semiotic system thus plays a crucial role in the instantiation of immediate and mediate spatial relations, but language is certainly only one part of the spatial story. This present spatial story combines, among other aspects, linguistic and cognitive structures based on mental images and environmental input.

Humans mark different aspects of spatial scenes, they mentally rotate relationships and they include a variety of aspects based on their knowledge systems, that is, encyclopedic knowledge, declarative and procedural cognitive systems (Anderson 2010). Therefore it is fair to state that spatial language and spatial cognition are constant companions in daily life (see Jackendoff and Landau 2002).

In a nutshell, the human capacity for constructing and relating objects in space depends not only on objectively given features, but also, if not primarily, on subjective encoding decisions. The hypothesis is that the parallels between language, cognition and visual perception indicate a bridging element between those levels of human conceptual organization (Gibson 1986: 147–237). I argue that there is no neutral or absolute construal, but either a construal that either mention the vantage point of the speaker or does not. This means that the speaker's perspective is ex-

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discussed in the previous section, orientation of spatial entities is a ternary relationship depending on the located object, the reference object, and the *frame of reference* which can be specified either by a third object or by a given direction" (Renz and Nebel 2007: 172–173; emphasis original).

pressed in some languages, and not in others. These assumptions are surveyed with respect to spatial language and spatial cognition. Or to put it another way

> [r]ather than depending on a logical or geometrical system of description, I will offer a description of spatial words based on functional concepts that are tied to the extralinguistic knowledge of space shared by the speakers of one language. […] I use *functional* in the sense of *utilitarian.* Geometrical and logical analysis describe spatial terms by means of formal concepts that are independent of context […] In contrast, a functional description–I might even say a "utilitarian" description–depends also on nonspatial factors that are determined by the context and by the circumstances of the use of the prepositional terms. (Vandeloise 1991: 13 and footnote 6, page 239; highlight original)

Vandeloise points out that, rather than logical descriptions of spatial relations, we should instead focus on functional or rather language usages (for a rather logical-based description see Knauff 2013). This could be termed a cognitive pragmatics approach. Other semiotic and non-semiotic factors also play a crucial role in spatial semiotics. Hence, I will present nonspatial factors as well, such as practices and the speaker's choice of vantage points.

This book also explores the degree to which environmental experience and spatial orientation are reflected in texts, myths, language and practices as joint action procedures. It is argued that non-linguistic information as cultural practice and implicit knowledge system has an impact on spatial language and categorization. Topographical information, but also scale, scope, distance of the immediate environment, are represented as spatial mental models of topographical coordinates.[4] Data will show the constructive process of environmental landmarks and cultural heritage on mediate shaping of spatial categorization, but also speakers' choice of immediate spatial construals in figure-ground relations.

4 "As psychological representations of real, hypothetical, or imaginary situations, mental models were first postulated by the Scottish psychologist Kenneth Craik (1943), who wrote that the mind constructs "small-scale models" of reality to anticipate events, to reason, and to underlie explanation. The models are constructed in working memory as a result of perception, the comprehension of discourse, or imagination (see Marr 1982; Johnson-Laird 1983). A crucial feature is that their structure corresponds to the structure of what they represent. Mental models are accordingly akin to architects' models of buildings and to chemists' models of complex molecules" (Johnson-Laird 1999: 525–526). Nöth presents a very clear definition of a mental picture that is similar to a mental model in its representative function: "Unter einem (mentalen) Bild versteht auch die kognitive Psychologie die mentale Reproduktion oder Repräsentation einer nicht gegenwärtigen perzeptuellen Erfahrung" (Nöth 2000: 232). Basically, Nöth summarizes cognitive psychological theories on mental models as mental reproductions and representations of a non-present visual experience. By that, it is also an ethnogeographic account of place names, distances between cities or other localities, or coastlines etc. (Mark et al. 2011; Smith and Mark 2001).

> Hence, we cannot take for granted the "real world" as the domain of entities to which language refers. Rather, the information that speakers can convey must be about their *construal* of the external world, where one's construal is the result of an interaction between external input and the means available to internally represent it (Jackendoff 1988: 83; emphasis original).

Previously published papers which focus on spatial language and spatial cognition in general are also presented.[5] So this book offers not just empirical linguistic data on the spatial conceptualization of specific spatial relations, but also spatial practices[6]. Different coding devices are used in mastering spatial orientation and spatial coordination, that is, "given the fundamental nature and importance of spatial cognition, it is of considerable interest to determine the ways in which it connects to language" (Peterson, Nadel, Bloom and Garrett 1996: 553). My approach is therefore an "investigation into the meaning of spatial language that regards language as an integrated part of human cognition" (Zlatev 2007: 318). Certainly, languages of space or ideas of space point to cognitive structures and categorization processes of spatial mental models. Language serves as a semiotic system, as do practices of joint action as seen in place names, frames of reference, geometric relations and the like, that is, language as semiotic form externalizes the cognitive construction of the vision of the world (Lucy 1996: 38). John Lucy calls this idea the hypothesis of semiotic relativity (Lucy 1996: 39).

It is argued that language as a semiotic system externalizes implicit knowledge representations: these are mental models or cultural models (see Gentner and Stevens 1983; Palmer 2007: 1046). Moreover, language as a semiotic system is also "an integral part of human cognition".[7]

For large-scale orientation, landmarks on land and at sea are used as proximate course-maintaining devices. These landmarks shape and determine a detailed topographical mental model of the environment as represented via language and various practices (Bickel 2000).

"Landmark" refers to any kind of culture-specific environmental reference point. This could be a mountain, a river, a house, trees, reefs,

5 These papers have been extensively revised to fit the general structure of this book.

6 Gumperz and Levinson highlight the importance of practices, arguing one "cannot think of a "world-view" as inherent in a language, somehow detached from all the practices established for its use" (Gumperz and Levinson 1996: 230; emphasis original). Conceptualization is used here as a "cover term that refers to fundamental cognitive processes such as *schematization* and *categorization*" (Sharifian 2011: 4; emphasis original). With respect to practices Levinson (2003) also uses the idea of *experiencing-for-thinking* based on Slobin's (1996) *thinking-for-speaking* argument.

7 As noted above, "[a]n account of linguistic structure should therefore articulate with what is known about cognitive processing in general […]" (Langacker 1987: 13).

waves, islands or roads. Landmarks are point references external to the person. (Kettunen, Irvankoski, Krause and Sarjakoski 2013: 245)

In a city, landmarks may be distant buildings or geographical features that can be seen from many angles and distances, or they may be more local features, such as buildings, signs, trees, storefronts, doorknobs, and other urban details (Burgmanis, Krisjane and Skilters 2014; Golledge, and Rushton 1976; Lynch 1960). Landmarks are unique configurations of perceptual events. They identify a specific geographical location.

> Landmarks are important as reference points for understanding spatial structure through relations as well as identifying decision points and monitoring progress during navigation […]. Consequently, the level of landmark knowledge has important implications for all human spatial activities. Landmark knowledge can be acquired through direct experience with the environment or through external representations of the environment, such as verbal descriptions, photographs or maps […]. (Kettunen, Irvankoski, Krause and Sarjakoski 2013: 245)

A person's account of his/her spatial representation generally begins with landmarks, and these function as the strategic foci to and from which the person moves or travels. Hence, they identify not only beginnings and endings, but also assist in maintaining one's course.

Landmarks can be construed to the convenience of the traveller as seen in the way members of some Micronesian cultures navigate by referring to a phantom island (see below). I argue that landmarks are used as proximate course-maintaining devices in the encoding of figure-ground asymmetries. I further argue that these landmarks shape and determine a detailed topographical map of the environment as represented via semiotic systems such as language and practices. Burenhult and Levinson specifically examine how landscape features appear as nameable objects and, particularly, whether universal categories can be applied (Burenhult and Levinson 2008: 136). Moreover, they argue that landmarks, or rather environments are, interesting features of (spatial) categorization (see also Mark, Turk, Burenhult, and Stea 2011).

One aim of this book is to present some of the most fundamental spatial notions based on environmental or regional landmarks as transmitted and represented in different empirical sources to apply figure-ground parsing construals of immediate and mediate spaces in the encoding of spatial relations.

The point of departure is a closer investigation of spatial mental models based – although not exclusively – on linguistic cues. Spatial mental models are cognitive knowledge structures based on perceptual and phenomenological experience.[8] These models map spatial structures onto conceptual structures (Oakley 2007: 215). Spatial mental models represent, among other knowledge systems, spatial information at an abstract conceptual level of cognitive representation. They are a cognitive layout of the spatial environment and human experience as represented in long-term memory (Burgmanis, Krisjane and Skilters 2014; Wilson and Keil 1999: 25). Knowledge about space (and time) must be integrated to enable human orientation in the environment. Humans are capable of forming sophisticated representations of spatial relations integrated as mental models. Some more central mental representations appear to be closely tied to perceptual systems (Ehrenfels 1890; Jastrow 1899; Pinna 2010; Rubin 1921; Thiering 2011; Wertheimer 1923).

The representation of cognitive cues is modeled in cognitive psychology as schemas, frames, scenarios, scripts, mental models, mental frames, slots and cognitive maps.[9] I argue that spatial mental models in particular are often collections of, and based on, toponyms, landmarks, frames of reference and other cues. Indeed, I argue that these models are based on gestalt principles that help to mentally triangulate a reference or coordinate system. Spatial cognition is thus the mental abstract representation of such knowledge systems via spatial mental models.

Minsky points out that human beings always have mental models of the world construed on the basis of brain functions. This reduction to brain function is nowadays bridged by situated, enacted or embodied cognition, and distributed cognition (see Gallagher 2005; Robbins and Aydede 2009; Varela, Thompson and Rosch 1991; Zlatev 2010). Hence, cognition is a mediator between the phenomenological world and the semiotic representation, and spatial mental models are the actual constructing devices, or rather abstract mental representation, of the projected or "real" world (Cienki 1989: 19–23; Jackendoff 1983, 1996; Johnson-Laird 1983; Krumnack, Bucher, Nejasmic, Nebel and Knauff 2011; Minsky 1994; Bloom, Peterson, Nadel and Garrett 1996, Chapter 15).

8 This connection between languages as symbolic systems and cognition is summarized by Palmer. He argues that "language is the play of verbal symbols that are based in imagery. Imagery is what we see in our mind's eye, but it is also the taste of a mango, the feel of walking in a tropical downpour […]" (Palmer 1996: 3).

9 "Another important function of visual imagery is to help us figure out and remember the spatial structure of our environment. Our imaginal representations of the world are often referred to as cognitive maps. The connection between imagery and action is particularly apparent in cognitive map. We often find ourselves imaging our environment as we plan how we will get from one location to another" (Anderson 2010: 106; see also Mark et al. 1999).

My hypothesis is that linguistic cues are symbolic systems reflecting patterns of thought, but that they do not mirror conceptual representations. There is no simple, direct relation between conceptual representation and linguistic expression, but rather a much more complex relation which can be understood in terms of the cultural-cognitive view of language[10]. In the introductory quote, the editors of the *Oxford Handbook of Cognitive Linguistics* pinpoint one of the major issues in current cognitive linguistic approaches as the relationship between language and thought and the question of linguistic relativism as opposed to conceptual universals. Evans and Green are very explicit in their *Cognitive Linguistics: An Introduction*, arguing that

> […] language reflects patterns of thought. Therefore, to study language […] is to study patterns of **conceptualization**. Language offers a window into cognitive function, providing insights into the nature, structure and organization of thoughts and ideas. (Evans and Green 2007: 5; emphasis original)

They further argue that "language reflects patterns of thought, and can be seen as a means of encoding and externalizing thought" (Evans and Green 2007: 98). The common thread in my approach is indeed an assumed interrelation between language (culture), cognition and perception, but to claim that "to study language is to study patterns of conceptualization" might be overstating the case. Language is only one of the many externalized semiotic patterns necessary for the instantiation of spatial mental models. Nonetheless I subscribe to the dictum, widely held in the field of cognitive linguistics, that languages reflect conceptual structure and that variations across languages encode different conceptual systems (Evans and Green 2007; Everett 2013; Langacker 1987; Levinson 2003; Levinson and Wilkins 2006; Talmy 2000; Thiering 2009b). I also subscribe to Humboldt's *Weltansichten* (he also refers to *Weltanschauung* and *Weltbild*; see Humboldt 1963a,b; Miller 1968; Underhill 2013) or the better known Neo-Whorfian concept that culture influences thought through language (see below).

As I understand it, this can be interpreted as extension of Ray Jackendoff's statement that "to study semantics of natural language is to study cognitive psychology" (Jackendoff 1983: 3; emphasis original). Ray Jackendoff's concept of generative cognitivism (personal communication) presents a fully-fledged model of semantic structure and conceptual struc-

10 I would like to thank the anonymous reviewer who referred to my approach as a "cultural-cognitive" view of language. This does indeed accurately define the current approach and I could not have spelled it out any more clearly.

ture.[11] Jackendoff proposes a projected, or mental, world (Jackendoff 1983: 23–29), hence, cognition is a mediator between the speaker and the phenomenological world.

Complementing Miller and Johnson-Laird's (1976) fundamental survey of language and perception, Jackendoff's models in 1983 (19–22) and 1996 (1–13) laid the groundwork for an understanding of spatial representation in language and cognition. Jackendoff also specifically introduces a gestalt theory approach to visual perception, but persists with modular systems that are connected via an intermediate module. He bases his analysis on rule systems that are similar to Johnson-Laird's syllogisms (Johnson-Laird 1983: 64–93). I believe that these systems can only be regarded as the starting point in spatial description. Here it is essential that phenomenological approaches and gestalt principles be addressed more seriously.

There has been much discussion about the influence of culture — through language — on cognition. This discussion is associated in the canon with the Sapir-Whorf theory and, since the 1990s, Neo-Whorfian theory (Deutscher 2010; Everett 2013; Gumperz and Levinson 1996: 1–18, 21–28; Lucy 1992:a 11–68, 84–187; Levinson 2003: 24–111, 280–325; Levinson and Wilkins 2006: 1–23, 512–552; Niemeier and Dirven 2000; Penn; 1972; Thiering 2013b; critical accounts come from Gipper 1972 and his Ph.D. student Malotki 1979; Pullum 1991). According to Neo-Whorfian hypothesis, languages influence or even determine the shaping of cognitive structures, hence, different linguistic encodings present different categorization processes (see Everett 2013 for a comprehensive overview). More specifically, "culture through language affects the way we

11 Jackendoff's work is based on some of the early 1980s theorists in cognitive psychology and related areas (Johnson-Laird 1983; Fodor 1983; Marr 1982). A general introduction to cognitive psychology is presented in Neisser (1976: 1–78, 177–195; see also Neisser 1987), Schank and Abelson (1977: 1–21, 36–68), and specifically the work on categorization by Rosch and Lloyd (1978). Jackendoff (1983: 23–37) starts with gestalt theory approaches based on Wertheimer, Köhler, Koffka (see the chapter on *Figure-Ground Reversals in Language* in this book), but also Wittgenstein's duck-rabbit figure (Jackendoff 1983: 23–29). Note that the origin of the duck-rabbit is Jastrow 1899. Jastrow's *The mind's eye* introduces a number of optical illusions that foreshadow later experimental designs as outlined by Köhler, Koffka, and Wertheimer in the 1920s and 30s (see also Jastrow 1899; Müller-Lyer 1889). As early as 1890, Von Ehrenfels introduced *Gestaltqualitäten* (gestalt qualities) which are *positive Vorstellungsinhalte, welche an das Vorhandensein von Vorstellungscomplexen im Bewusstsein gebunden sind, die ihrerseits aus von einander entfernt sind* 'gestalt qualities as mental content or representation which are bound to mental or conscious representations'; Ehrenfels 1890: 262).

think, especially perhaps our classification of the experienced world" (Gumperz and Levinson 1996: 1).[12]
Returning to the introductory quotation, I agree that language, cognition and culture are somehow interlocked. Decades before the Sapir-Whorf theory came into being, Wilhelm von Humboldt and others (e.g., Herder, Steinthal, Wundt; see Penn 1972 and Miller 1968 for an overview) were already focusing on the relationship between culture, language and thinking (the term "cognition" was not then in use). According to Wilhelm von Humboldt, different languages encode different worldviews, or *Weltansichten* (for an extensive review see Thiering 2013b; Trabant 2012; on the different concepts of the German meanings see Underhill 2013; in his criticism of the Sapir-Whorf theory Malotki analyzes Hopi spatial terms and uses the term *Raumbilder*, that is, ideas of space, instead of *Weltansichten*). In accordance with Wilhelm von Humboldt and Franz Boas – if only loosely – I argue that language is a form of symbolic encoding pattern based on spatial mental models. As such, languages also follow perceptual, experiential and environmental input. It is not only language and visual perception which influence cognition, but conversely, too, cognition influences language.

Indeed cognitive grammarian Ronald Langacker argues that general cognitive abilities shape language and that language structures relate directly to cognitive processing (Langacker 1987: 5). As Ray Jackendoff puts it, semantic structure is isomorphic with conceptual structure (Jackendoff 1983). I submit that different languages point to different encoding decisions based on culture-specific spatial mental models. I also argue that different cultures have different strategies for encoding these spatial relationships. Moreover, the different chapters in this book pursue the idea that cultural knowledge as symbolic practices, as I call them, is interwoven with cognitive structures and cognitive semantics in particular. The aim is to employ spatial mental models which establish the correspondence be-

12 "[i]t's an old question. Does language affect how we think? [...][t]he central question addressed by this book [*Linguistic Relativity: Evidence Across Languages and Cognitive Domains*; M.T.] is whether differences between languages affect the nonlinguistic cognition of their speakers. We have found strong evidence for a positive answer to this question. Nevertheless, many of realistic effects we have discussed are subtle in nature. Still, the majority oft he data we have examined suggest that systematic differences in linguistic practice can and do create divergent cognitive habits. And like all habits, they may be hard to break" (Everett 2013: 1, 275). Everett presents different Whorfian effects in different categories or cognitive domains. Hence, language affects different domains in a different manner. Some effects are rather subtle, others are more obvious as in the spatial domain. To dismiss Whorfian effects in general is hence a simplification of the different cultural-specific influences upon cognition.

tween "real world" cues, such as objects and places, and their symbolic equivalents in the models.

Here I refer to Nunberg with respect to the impact of (symbolic) practices. He argues that

> [n]otwithstanding the title of this essay [The Pragmatics of Reference; M.T.], or the fact that I will be spending the largest part of it in discussing the ways in which speakers bring non-linguistic information to bear in interpreting utterances, its subject is linguistic knowledge: specifically, speaker's knowledge of the conventions that govern the use of words. [...] knowledge of word-meanings can only be treated as an inseparable part of knowledge of other kinds of conventions and social practices, from which it cannot, even in theory, be isolated. (Nunberg 1978: 1)

Hence, as Heeschen and others also claim (see below), semantics, more specifically spatial semantics, and semiotics have to be viewed as "an inseparable part of knowledge of other kinds of [semiotic; M.T.] conventions and social practices". I believe that this is crucial in a theory of spatial mental models. Social practices as outlined by Heeschen are, in accordance with Wittgenstein's "meaning as use" in language, at least with respect to word classes

> [f]or a large class of cases–though not for all–in which we employ the word "meaning" it can be defined thus: the meaning of a word is its use in the language. (Wittgenstein 2006: 20; § 43)

Actual practices in spatial orientation refer to a number of spatial information systems which are not only linguistically available, but are encoded in the actual usages or applications as joint action (for example, in the collective construction of a house in Eipo). In a nutshell, this research addresses questions of universality and culture-dependence of spatial thinking in societies which codify spatial knowledge almost exclusively by means of spoken language and joint action. These questions are addressed through a comparison of spatial languages and practices in three independent non-literate societies, Eipo, Dene Chipewyan, and Upper Necaxa Totonac, located in a mountainous region (Eipo), the prairies of Western Canada (Dene) and the valley of the Necaxa River, Mexico, respectively. Data evidence from other languages is also included where appropriate.[13]

The book takes these very basic assumptions as its starting point. It is the result of five years of research and fieldwork I conducted between

13 I encountered the languages just like "Whorf, [who] in contrast to these two [Boas and Sapir; M.T.], moves into foreign languages more as a crusader moves into the unknown, and there is a latent radicalism in his thought which surfaces at times to give a dogmatic turn to the way he expresses the differences in nature between languages (Underhill 2013: 14–15). This work is less dogmatic, but opens up for new perspectives.

2002 until 2006, looking at spatial semantics and spatial cognition from a broad interdisciplinary and cross-cultural perspective. It includes not only descriptions of linguistic spatial encoding patterns and cognitive structures, but also spatial language as practices and environmental landmarks of spatial orientation[14] as encoded in toponyms, stories and sacred sites. Surveys variously cover micro-scale, immediate cognitive structures, such as figure-ground reversals, and macro-scale, mediate structures, such as toponyms.

The aim of this introduction is to provide, along with a few prefatory remarks, a guide through the different chapters, topics and scopes, and to present a coherent overarching argumentation of the topic at hand. I survey different spatially relevant parameters in different cultures and languages to present a kaleidoscopic rendering of spatial cognition from an essentially non-European linguistic point of view (see Casad and Palmer 2003). Key words include figure-ground asymmetries, degrees of specificity, frames of reference, cognitive maps, spatial mental models, landmark orientation, ethnolinguistics, ethnogeography, and the linguistic relativity principle. These different analytical and disciplinary concepts form the framework for this book.

1.2 Behind the stage I: theoretical preliminaries

This chapter begins with a high-level summary of the history of cognitive linguistics. A long-standing tradition in philosophy argues that language must be grounded in reality (Davis 2003; Hershenson 1999; Marr 1982). This idea of language as a mirror of reality is known as "linguistic realism" or "naive realism" (Lehar 2003). Wittgenstein rejects this view, as do others (Wittgenstein 2006; Monk 1990; Mulhall 1990; Rundle 1990; Sluga and Stern 1996; Tyler and Evans 2003; Vohra 1986; Zlatev 1997). He claims that in acquiring language, humans also acquire the objects of the projected external world (Piaget 1976; 1992; Piaget and Inhelder 1956; Heidegger 1985; Schmidt 1994, 1996, 1998; Watzlawick 1981).

I then address the idea, to which most cognitive linguists subscribe, that language is not only anchored in an objective reality. The question,

14 With respect to orientation, Palmer further states that "recent studies demonstrate the importance of culture in structuring space and spatial orientation" (Palmer 2007: 1064).

then, is whether it is in direct contact with cognition through sense perception. Indeed, it is only our language as a semiotic system which presents an essential means of external representation and cognitive apparatus which influences the kind of contact and interpretation we have with or of reality (Svorou 1993: 32). Cognition, then, or more specifically mental spaces, are understood here as a mediator (Fauconnier 1994, 1997; Jackendoff 1983; Knauff 2013) through which we perceive the outside world, even when the objects and their spatial location seem stable and real (Fauconnier 1997: 34). We will see that environmental aspects do indeed play a crucial role in language and cognition, at least in the languages and cultures under review.

Most classic approaches to the modeling of cognitive processes as human information mechanisms are based on the Turing machine analogy (Penrose 1991: 28–71; Strube, Becker, Freksa, Hahn, Opwis and Palm 1996). This serial computer metaphor regards the brain as an input-output device having both long-term and working-memory capacity (Anderson 1983, 2010; Arbib, Caplan and Marshall 1982; Baddeley 1990). This approach is based on the idea of an information transmission device (Anderson 1983, 1996; Baddeley 1990; Gathercole and Baddeley 1993; Penrose 1991). This implies that representational units are stored in the brain isomorphic to events in the real world (Aitchison 2003; Emmorey and Fromkin 1988; Rumelhart and McClelland, 1986; Schreuder and Flores d'Arcais 1989; Tergan 1989; Spektrum der Wissenschaft 1994). Within such a model, language serves merely as a code, transmitting information between cognition and the outside world (Penrose 1991). I argue, however, that language has a constructive character in that it serves as a device to develop and maintain mental spaces. These in turn are influenced by cultural, social, historical, phylogenetic and ontogenetic factors within one's community.

The dominant philosophical tradition in the cognitive sciences has long claimed that all languages share the same underlying universal grammar and, by logical extension, the same conceptual structure (Chomsky 1965; Fodor 1983, 1998; Fodor and Katz 1964; Hillert 1987; Wierzbicka 1972, 1992, 1996). According to this view, the conceptual structure is based on perception, and visual perception of space in particular is regarded as an externally-cued input system which transmits information through our senses. Cognition is considered the interface between the world "out there" and the internal mental representations we have of it (Anderson 1983; Damasio and Damasio 1994; Dunbar 1991; Dutke 1994; Engelkamp 1991, 1995; Fauconnier and Turner 2002; Gillett 1992; Hershenson 1999; Jackendoff 1983, 1987). These representations are said to have developed out of physiological factors and to be genetically determined structures of the brain (Schnelle 1994; Spektrum der Wissenschaft 1994; Sucharowski 1996; Strohner 1995; Spitzer 1996; Tergan 1989).

In other words, the focus has been on the brain as the organ in which all human activity is located, whereas the issue of embodiment – the idea that the human body serves as the anchor for all experience – has received less attention (on cognition, brain and memory, see Dunbar 1991; Ender 1994; Engelkamp and Pechmann 1988). In conclusion, perception is not assumed to be affected by language or culture alone, but also individual affordances which depend on one's experience with mediated reality (Allwood and Gärdenfors 1998; Neisser 1987).

Slobin emphatically argues that perception and language are related and that the way human beings perceive the world is affected by the way they talk about it (see also Miller and Johnson-Laird 1976: 2).

> [W]e can only talk and understand one another in terms of a particular language. The language of languages we learn in childhood is a subjective orientation to the world of human experience, and this orientation affects the ways in which we think while we are speaking. (Slobin 1996: 91)[15]

Furthermore, it is claimed that it is not just the brain, but the whole human body which serves as an anchor for human experience. Hence, the interaction between semiotic systems – such as language and gestures – and perception is a basic process of mediation performed by, and based on, the human body (Johnson 1987; Zlatev 1997, 2010).

Some of the main features of cognitive linguistics were introduced in the early 1980s by George Lakoff, Ronald Langacker, and Leonard Talmy (Lakoff 1987a; Langacker 1987, 1988, 1990, 1991, 2000; Talmy 1978, 1983, 2000). They place spatial meaning at the center of language and cognition, and so it is only natural to refer to this framework in this book (see Gentner and Goldin-Meadow 2003). In addition, proponents of cognitive linguistics refer specifically to the semiotic tradition as outlined by Ferdinand de Saussure and others (Saussure 2013). Langacker bases his framework on the semiotic tradition of the arbitrary sign and different binary systems such as *langue* versus *parole*, *signifier* versus *signified*, and *synchronic* versus *diachronic*. A crucial factor here is that for many grammatical categories, membership is essentially arbitrary from a semantic point of

15 Beside Slobin's known "thinking-for-speaking" online processing, other authors have added "thinking-for-understanding", "categorizing" and "remembering" (Clark 2003), and Levinson "experience-for-speaking" (2003). I add actual (semiotic) "practices-for-speaking".

view, which contradicts traditional truth-conditional semantics based on propositional value (Kreitzer 1997).

One of the major hypotheses in cognitive psychology (which was the precursor to cognitive linguistics) is the idea of mental representations as abstract schemas, or mental spaces, or mental models (Gentner and Stevens 1983; Johnson-Laird 1983, 2005; Knauff 2013; Penrose 1991; Ritter, Martinez and Schulten 1991; Schade 1992; Schreuder 1989; Strube et al. 1996). As the gestalt psychological approach suggests, such schemas are universal and not language-specific. Moreover, they are abstract representations of human thoughts and events, that is, they are non-linguistic. They are extracted from more specific structures and categorize such structures through relations of full or partial schematicity. Language is thus regarded as a cognitive phenomenon represented in the mental lexicon, that is, a storage metaphor which implies abstract structures (Aitchison 2003; Ender 1994; Engelkamp 1991, 1994, 1995; Handke 1995; Schwarz 1994, 1995).

The idea of abstract representation leads more specifically to the general claim in cognitive linguistics that all grammatical structures are symbolic and that lexicon, morphology, and syntax form a continuum of symbolic units, each residing in the association of a semantic and phonological structure, or "pole" (Langacker 1987).

Moreover, the meanings of linguistic expressions are conceptualizations shaped in accordance with the given linguistic system. In addition, all facets of our general knowledge of a conceived entity contribute to the meaning of an expression which designates this entity, meaning that a rigid distinction between semantics and pragmatics is superfluous (Nunberg 1978; Sweetser 1990). According to this view, semantics is not an autonomous cognitive entity, nor is the overall linguistic system.

It has been claimed that semantic structures are predications characterized relative to cognitive domains such as time, space and color. Most domains of linguistic relevance are non-primitive, meaning that they are interrelated networks (Wender 1980; Zell 1994). As such, they involve cognitive structures of indefinite complexity, offering layers of interrelated networks which can be modeled in a connectionist manner (Bechtel and Abrahamsen 1991; Birbaumer and Schmidt 1993; Edelman 2002; Hillert 1987, 1992; Kandel and Hawkins 1994; Murre and Goebel 1996). Any cognitive structure can function as the domain for predications (Langacker 1987: 56).

Moreover, meaning is conceived as cognitive processing, and even expressions used to describe an ostensibly objective situation may differ in meaning depending on how the situation is construed. This is known from figure-ground reversals as described below (Thiering 2011). An expression imposes a particular image on its domain. Imagery is used as a technical term for the cognitive capacity for construing a cognitive domain in different ways.

Foreshadowing the figure-ground asymmetry, the basic definition claims that a physical object is located, or moves, with respect to another object which serves as a reference point (Talmy1978: 627)[16]. This asymmetry is embedded in schematization. Schematization is the process by which specific aspects of a reference point of a scene representing the whole gestalt are profiled (Talmy 2000; Sinha and Kuteva 1995). The empirical evidence presented below also supports this observation.

1.3 Behind the stage II: theoretical preliminaries in cognitive linguistics

Building on cognitive psychological research in the 1970s, cognitive semantics and cognitive grammar were introduced in the early 1980s by Leonard Talmy (1983, 2000), Ronald Langacker (1982, 1987, 1991, 2008), and George Lakoff (1987a,b), all trained in the school of generative grammar. The idea that languages are based on visual gestalt structures and cognitive processes conflicts with the idea that language is a modular inner entity. This also raises the issue of whether there is a language faculty, and to the extent to which language structures are universal.

More specific work on spatial semantics by Annette Herskovits (1985, 1986), Claude Vandeloise (1990, 1991) and mental spaces theory by Gilles Fauconnier (1985) and mental models by Philip Johnson-Laird (1983) and the volume edited by Gentner and Stevens (1983) provided stimulus and a great deal of inspiration for this book.[17] Although rather formal and modular, Ray Jackendoff's work on semantics and cognition is of particular significance. As highlighted above, Jackendoff introduces and adopts gestalt theory approaches to visual perception, especially in his model of conceptual structure and spatial representation (Jackendoff 1983, 1996; see also Miller and Johnson-Laird's book on language and perception 1976).

16 On experimental evidence of figure-ground perception, see Peterson and Skow (2008).

17 Current approaches on the Neo-Whorfian idea of language and cognition and spatial frames of reference also influenced this book (Everett 2013; Levinson 2003; Levinson and Wilkins 2006; see also Sinha and Kuteva 1995; Thiering 2013b; Zlatev 1997, 2007).

However it is important not to rely too heavily on these assumptions of universals as opposed to relativism in spatial cognition. For now, the heuristic solution would be to avoid defining these two strands as a dichotomy, but – in line with Lev Wygotski[18] and the later Wittgenstein – as oscillating systems. Wygotski argues that thinking and language (as well as speaking) are not separate processes running in parallel, but rather interdependent asymmetries (Wygotski 1964: 255). All this boils down to the early Wittgenstein's claim that "the limits of my language are [not] the limits of my world", but are one part of one's world in addition to other semiotic systems, as I argue (thus I have added "not" to the quotation). In other words, "some aspects of spatial meaning cannot be expressed linguistically, just as some aspects of language do not correspond to spatial notions" (Peterson, Nadel, Bloom and Garrett 1996: 555).[19] As argued above, the later Wittgenstein presents a detailed adaptation of gestalt theory and phenomenologist processes of visual construals in the second part of his *Philosophical Investigations*. I believe that these construals are much more complex than Talmy's figure-ground usage based on gestalt theory models as outlined below. Some of these complexities are presented in this book.

There is a particular focus on spatial cognition and spatial semantics bridged by what is known as a "semiotics of space" approach. In 1987, the founder of space grammar (later cognitive grammar), Ronald Langacker, was already arguing that

> [l]anguage is symbolic in nature. It makes available to the speaker–for either personal or communicative use–an open-ended set of linguistic **signs** or **expressions**, each of which associates a semantic representation of some kind with a phonological representation. (Langacker 1987: 11; emphasis original)

This book makes use of this very basic sign definition, that "language is symbolic in nature" as determined by Ferdinand de Saussure, the founder of structuralism. He introduces the dyadic *signifié* 'signified' and *signifiant* 'signifier', the concept/word asymmetry (Saussure 2013), which is extended here to more triadic models in line with Karl Bühler and others to include language as practice (or Wittgenstein's idea that "meaning is language in use" and his aforementioned *Aspektsehen* and *Aspektwechsel*) as

18 In the following I will cite the original German version of Wygotski (note the English spelling Vygotsky).

19 As Senft notes "the intimate relation between language, perception, and cognition–especially with respect to space–is generally acknowledged in the cognitive sciences, especially in linguistics, psychology, neurology, and ethnology, but also in anthropology and in philosophy, of course" (Senft 1997: 2–3).

well (see also Barthes 1981; Eco 1987; Muhall 1990). Heeschen concludes that

> [s]pace can be recognized as an underlying principle of language and speech in two different ways. Firstly, movement in space and the spatial organisation and arrangement of things around us lie at the base of much abstract vocabulary, and secondly, the speech situation–that is, the triad of speaker, hearer and their shared perceptual field with the inclusion 'of the thing meant'–is directly reflected in that part of language structure which Bühler (1934) called "Zeigfeld" (deictic field). (Heeschen 1982: 81)

Heeschen elaborates on the triadic function of a speech act in spatial deixis.[20] Langacker again specifically combines the semantic and phonological pole to give meaning to the central focus of linguistic description as embedded in space. Consequently Langacker, too, highlights 'the thing meant', that is, that meaning is the focus of cognitive linguistics.

Most researchers in the cognitive sciences start from scratch, arguing in favor of one of the physical spaces, either Newtonian or Leibnizian, that is, absolute as opposed to relative space. In 2003, Levinson begins with "Ideas about spatial cognition in the Western tradition", going on to mention Newton, Leibniz and of course Kant (Levinson 2003: 27; see Levinson 1996: 128; Levinson and Wilkins 2006: 1). Zlatev asks why spatial meaning is important to cognitive linguistic research. Beyond the simple fact that Langacker, the founder of cognitive grammar, originally wanted to call this new linguistic approach "space grammar", Zlatev argues that space "pertains to a central and universal aspect of human experience, and thus constitutes a good searching ground for linguistic universals" (Zlatev 2007: 318). In his overview Zlatev points out that space is assumed in cognitive linguistics as the center of conceptualization, hence spatial categorization is arguably "the key to human conceptual categorization" (Zlatev 2007: 319).

With specific reference to geometrical spatial encoding patterns, the section on lexical-semantic encoding patterns below presents a selection of rule systems as established in the literature. However some imaging

20 Levinson claims that spatial deixis is not based on frames of reference (Levinson 2003: 71). "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). I use the term deixis as an element that has no stable referent but receives its semantic content from the situation or context of an utterance (Bal 1996: 72); Bühler 1999 [1934] makes the point that deixis or the *deiktisches Feld* is crucial in our daily communication).

features depart from these systems with respect to the cognitive conditions involved in figure-ground asymmetries and their cognitive semantic detail (see below).

1.4 Spatial cognitive semantics and spatial practices

This section presents some very basic preliminary remarks on spatial cognitive semantics. It argues that cognitive semantic descriptions must include spatial practices as a form of semiotic encoding processes that are not merely necessarily linguistic encodings. In cognitive semantics and cognitive anthropology[21], semantic components also include or are based on cognitive maps, scripts, scenes, image schemas, frame systems and mental models (see Palmer 2007: 1046 on the intersection of cognitive grammar and idealized cognitive models; see also Duranti 2007; Foley 1997; Palmer 1996). These representational structures encode culture-specific factors, and these different factors are both semantic and cultural. Langacker maintains that semantic elements or units are "relative to cognitive domains" (Langacker 1987: 63). He claims that "linguistic semantics is held to be encyclopedic […] the meaning of an expression typically involves specifications in many cognitive domains" (Langacker 1987: 63). The main point here is that language systems are not separate, autonomous modules of cognitive processes, but that language and cognitive structures are closely connected through a battery of analogue and symbolic systems.

Cognition is also enacted and transcends the body as posited in situated cognition theories (Robbins and Aydede 2009; Zlatev 2010).

> In recent years there has been a lot of buzz about a new trend in cognitive science. The trend is associated with terms like *embodiment*, *enactivism*, *distributed cognition*, and the *extended mind*. […] First, cognition depends not just on the brain but also on the body (the embodiment thesis). Second, cognitive activity routinely exploits structure in the natural and social environment (the embedding thesis). Third, the boundaries of cognition extend beyond the boundaries of individual organisms (the extension thesis). Each of these theses contributes to a picture of mental activity as dependent on the situation or context in which it occurs, whether that situation or context is relatively local (as in the case of embodiment) or relatively global (as in the case of embedding and extension). (Robbins and Aydede 2009: 3; emphasis original).

The importance of embodiment and distributed cognition is shown in the chapter on symbolic practices in Eipo and Dene. In this chapter, language

21 On cognitive anthropology see specifically Beller, Bender and Medin 2012.

is only one part of the spatial story. The actual habitus of applying cognitive knowledge structures is at issue in the joint actions presented (Bourdieu 1976). In other words, spatial language refers to spatial usages based on spatial mental models. These spatial mental models are molded by symbolic systems, that is, language, practice, pictures, environment and the like (see below for an example).

The interplay of these different practices is best described in an analogy by Gibbs. He uses the practice of windsurfing as a metaphor for situated cognition.

> The windsurfer continually affects and is affected by the set of the rig, so the behavioral intention to successfully windsurf emerges as a result of interaction between the person and the environment. Focusing on the agent alone, or on how the agent responds to the environment, fails to capture the complex nuances of windsurfing behavior. Just as it is important to understand the significance of paper and pencil when one does long division, where the cognition of doing long division is in part "offloaded" into the environment, the intentionality in windsurfing is best understood as a distributed cognitive behavior involving a person, a device, and the environment. (Gibbs 2001: 117–118)[22]

The interesting aspect here is the interplay of the agent and the environment with respect to spatial orientation. This example foreshadows the idea that figure-ground relations are not just cognitive constructions based on perceptual input, but also extend to environmental coordinates and joint action procedures. In Gibbs' analogy the agent is the figure and the environment is the ground (see below). Depending on whether we are constructing the spatial mental models of people or showing how humans move in space, we must identify their a priori or implicit conceptual notions about symbolic and linguistic space.

The idea that cognition is structured as spatial mental models goes back to Tolman's findings which suggest that animals and humans go beyond the information given when they go directly to a goal after having learned an indirect path (Tolman 1932, 1948; Wang and Spelke 2002). Applying an indirect path also means that they are using cognitive maps as abstract representations of their surroundings. That conclusion is strongest when the spatial cues marking the goal location are not visible from the starting position (Wilson and Keil 1999: 135; see also below on navigation techniques in cultures which don't use nautical instruments and specifically the concept of a third, phantom or emergency island). These are

22 As Sharifian highlights, "[h]uman conceptualization is as much a cultural as it is an individual phenomenon". […] and conceptualization can be found at the "cultural level of cognition." Moreover the term distributed applies "across the minds constituting a cultural group" (Sharifian 2011: 4).

all important features of spatial mental models as cognitive computation mechanisms and processes in particular.

Palmer states that "[a]ll orientations are relative to cultural models [or spatial mental models; M.T.] of spatial structure. Often, languages provide grammatical instantiations of salient spatial schemas" (Palmer 2007: 1059). Languages do indeed provide such instantiations, but a further interesting aspect comes when languages fail to provide such information. This implicit aspect is also of interest, as are practices exemplified by implicit knowledge structures as outlined in the second chapter on spatial mental models.

1.5 Spatial semiotics and cognitive anthropology

The chapters in this work are inspired by Boas' cultural-anthropological approach based on current cognitive semantic analytical tools.[23] It also addresses Humboldt's idea of different languages and their different worldviews (Humboldt 1963b [1830–1835]; Trabant 2012).[24] Boas cautions readers that it is unreasonable to posit a direct relationship between a culture or community and the language they speak, but he allows that "the form of the language will be molded by the state of culture[25], but not in so far as a certain state of culture is conditioned by morphological traits of the language" (Boas 1997[1911]: 67).[26] I opt for a combination of cog-

23 The title could also be *Semantics and Cognition* based on Jackendoff's book (1983). My reasons for choosing "Spatial semiotics and cognitive anthropology" are outlined below.

24 Die Sprache ist das bildende Organ des Gedanken. Die intellectuelle Thätigkeit, durchaus geistig, durchaus innerlich und gewissermassen spurlos vorübergehend, wird durch den Laut in der Rede äusserlich und wahrnehmbar für die Sinne. Sie und die Sprache sind daher Eins und unzertrennlich von einander (Humboldt 1963: 426).

25 I use Geertz's essentially semiotic use of the term 'culture' (Geertz 1973: 5). Since the term culture has several meanings and theoretical backgrounds, I adopt the specific idea of culture from Clifford Geertz's *Interpretation of Culture*: "The concept of culture is essentially a semiotic one. Believing that man is an animal suspended in webs of significance he himself has spun, I take culture to be those webs, and the analysis of it to be therefore not an experimental science in search of law but an interpretative one in search of meaning" (Geertz 1999: 5). Such webs of basic spatial categorization are shown in the cultures presented below.

26 Whorf states that "just as cultural facts are only culturally determined, not biologically determined, so linguistic facts, which are likewise cultural, and include linguistic element of thought, are only linguistically determined. They are determined not merely by language, but by languages" (Whorf 1956: 67). In a later paper, Whorf goes on to say that the "[f]ormulation of ideas is not an independent process, strictly rational in the old sense, but is part of a particular grammar, and differs, from slightly to greatly, between different grammars. We dissect nature along lines laid down by our native languages. The categories and types that we isolate from the world of phenomena we do not find there because they

nitive semantic and cognitive anthropological approaches to language and culture as represented by landmarks, ethnogeographic and topographical accounts. This kaleidoscopic approach indicates the intricacies of different influences on spatial language and cognition. Consequently symbolic and analogue spatial encodings are also surveyed.

As far as spatial language is concerned, certain spatial and perceptive features are encoded in different languages via different grammatical constructions, such as case systems, adpositions, posture verbs, body parts and classificatory verbs. In other words

> [i]n some Papuan languages reference to space and direction (e.g. *upwards*, *downwards*) and to relative position of the referent to the speaker or hearer, is built into the verbal morphology […]" (Heeschen 1982: 82; emphasis original).

Culture, on the other hand, is not only represented in language or verbal morphology, but in actual practice, such as navigation through known or unknown environments or the joint action of building a house (Gladwin 1970; Hutchins 1996: 49–116; Gumperz and Levinson 1996: Part III; Levinson 2003: 216–279).

Levinson warns readers not to mix language and cognition, meaning that different linguistic systems do not necessarily suggest different underlying cognitive structures (Levinson: 2003: 63). He argues that

> [t]he inference we can make is only in the other, positive direction, namely from the presence of any linguistic distinction to the need for its support by underlying cognitive systems, and this will already take us very far in understanding the nature of non-linguistic spatial reasoning […]. (Levinson 2003: 63)

I would add that it is not only "from the presence of any linguistic distinction", but also from other encoding mechanisms, such as oral or actual hands-on practices. In contrast to Jackendoff, Levinson rightfully implies that there is no isomorphism between a word and a concept (but see below on Levinson's change of arguments between 2003 and 2006). This therefore represents a critical approach to the idea that "to study semantics of natural language *is* to study cognitive psychology" (Jackendoff 1983: 3; emphasis original; see also Jackendoff 1996 and above). This view, similar to the "window-view" above from Evans and Green, might

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stare every observer in the face; on the contrary, the world is presented in a kaleidoscopic flux of impressions which has to be organized by our minds–and this means largely by the linguistic systems in our minds. We cut nature up, organize it into concepts, and ascribe significances as we do, largely because we are parties to an agreement to organize it in this way–an agreement that holds throughout our speech community and is codified in the patterns of our language" (Whorf 1956: 213; see Everett 2013 for an actual review on the Sapir-Whorf hypothesis, and Thiering's 2013b special volume on the Neo-Whorfian theory).

be too radical at this point, but certainly the study of spatial language gives insights into the cognitive processes and shows "the way languages structure the spatial domain" (Levinson and Wilkins 2006: XV).

Jackendoff proposes that conceptual structure (CS) is universal, but that languages differ in their semantic patterns (Jackendoff 1996: 7). Jackendoff rightly points out that

> languages can have different strategies in how they typically bundle up conceptual elements into lexical items. […] languages can [also] differ in what elements of conceptual structure they *require* the speaker to express syntax. (Jackendoff 1996: 6–7; emphasis original)

He goes on to argue "that there *is* a language-independent and universal level of CS" […] (Jackendoff 1996: 8; emphasis original). Levinson and Wilkins indirectly oppose this assumption by stating that

> [t]he language of space becomes an important focus of research […] First, it may help to reveal the underlying conceptual structure in human spatial thinking […] [n]aturally, universals of spatial thinking should be reflected in universal conceptualizations in spatial language. Second […] the very variability of language promises an interesting insight into the possible cultural variability of spatial thinking. Third, this reasoning presumes a close correlation between spatial language and spatial thinking–essentially, a (possibly partial) isomorphism between semantics and conceptual structure. (Levinson and Wilkins 2006: 1)

This third point is much stronger than Levinson's claim some years prior "that we cannot a priori assume any isomorphism between linguistic (semantic) representations and non-linguistic representations […]" (Levinson 2003: 278). With reference to the quote above, I believe that a mediation between Jackendoff's and Levinson's approach is called for. So, once more, "some aspects of spatial meaning cannot be expressed linguistically, just as some aspects of language do not correspond to spatial notions" (Peterson, Nadel, Bloom and Garrett 1996: 555). Positing an isomorphism would be going too far at this point of research, but there is an interrelation between conceptual structure and spatial representation, just as Wygotski pointed out some decades ago in his writings on language and cognition in general (Wygotski 1964: 88–110, 255–306).

In Jackendoff's model this is called "vision" (see Marr 1982, chapters 3–5 on the human visual organization and his 2D and 3D model; Jackendoff 1996: 3, 8). In 1983, Jackendoff also calls for a bridge between a theory of language and theories of "other cognitive capacities such as visual perception and motor control" (Jackendoff 1983: ix). Jackendoff sketches a clear relationship between language and cognition (Jackendoff 1996: 2). He states that "we come at last to the mapping between CS [= conceptual structure; M.T.] and SR [= spatial representation; M.T.], the crucial link between the visual system and linguistic system" (Jackendoff 1996: 10).

As previously stated, my point of departure is that linguistic and other encoding structures are externalized cognitive representations. This is essentially the fundamental assumption of cognitive linguistics. It maintains that within a culture, linguistic and semiotic decisions are also decisions on how to parse space and apply culture-specific coordinates or reference systems. These linguistic decisions hint at implicit knowledge structures or spatial mental models.[27] Levinson and others also exercise caution in the face of such an emphatic assumption and consider the possibility "that culture, *through* language, affects the way we think" (Gumperz and Levinson 1996: 1, emphasis original; see also Slobin's "thinking-for-speaking", 1996: 76).

Different empirical sources are surveyed, not just to enable linguistic, grammatical and other descriptions, but also to include practices which are a form of meaning as language in use (to paraphrase the later Wittgenstein again) or speech acts and joint action (Austin 1962; Bühler 1999; Tomasello 2003, 2008, 2014). Language parallels semiotic accounts, according to Karl Bühler's pragmatic *Sprachtheorie* approach[28]. Different empirical sources are collectively regarded as semiotic representations of spatial cognition externally represented by spoken language, written texts, and actual practices (Bühler 1999; Thiering and Schiefenhövel 2013). This extended understanding of linguistics should come as no surprise considering that the current approach to language, culture, and cognition is bridged by approaches within situated or distributed cognition, or embodiment, enactivism and the extended mind (Gallagher and Schmicking 2010; Marmolejo-Ramos and D'Angiulli 2014; Robbins and Aydede 2010; Zlatev 1997, 2010).[29]

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27 The concept of cognitive maps, rather than coordinate systems in the mathematical sense, could also be used.

28 Bühler's sign is triadic in the sense that it combines a *Sender* (transmitter or a speaker), an *Empfänger* (receiver or hearer), and *Gegenstände* (things or objects) and *Sachverhalte* (situations or sets of facts) (Bühler 1999: 28). All three participants are combined in the sign in Bühler's *Organon* model of language/speech.

29 Trabant bridges language with embodiment theories stating that language generates or rather creates thought and is embodied thinking: "Sprache die Erzeugung des Gedankens [ist]. Sie ist nicht nur Bezeichnung des ohne Sprache Gedachten und Kommunikation dieses Gedachten an den Anderen mittels des Lauts. Sie ist zuvörderst verkörpertes Denken, in dem Stimme und Begriff, Signifikant und Signifikat als synthetische Einheit die Welt gestalten [...]. Sprache ist Resultat einer ganzen Reihe von Synthesen, Vermählungen [...]. Das Denken [bildet] sich nicht als Sprache im allgemeinen, sondern in vielen verschiedenen Sprachen. Der Mensch spricht immer eine ganz bestimmte Sprache und nicht

At the macro level, philosophy, cognition and language meet as equal partners (see Foreword in Malle, Moses and Baldwin 2001). Rohrer states that the most general definition of embodiment is that "the human physical, cognitive, and social embodiment ground our conceptual and linguistic systems" (Rohrer 2007:27).[30] I argue that, as semiotic devices, these linguistic symbols derive their meaning solely from their capacity to correspond to things, properties, and relations existing objectively "in the world" (Johnson 1987: xxii).[31] These symbols are therefore connected to spatial mental models and are so mediate between the subject's perception and the cognitive apparatus.

1.6 Gestalt theoretical foundations

At the beginning of this introduction I stated that one basic spatial procedure in everyday life is the process of orientation and navigation on land or at sea. These processes are based on cognitive fundamentals of mental triangulation and gestalt principles, such as figure-ground asymmetries (Metzler 1953). The point of departure for my analysis is the very basic visually based figure-ground distinction seen in gestalt theory. According to gestalt theory, certain gestalt principles apply, including proximity, similarity, good continuation, closure, convexity, exhaustiveness, symmetry, concision (German *Prägnanz*) and past experiences (as neatly summarized by Pinna 2010). Cognitive contours construe visual anchor points of the respective gestalt (see Kanizsa 1979, especially Chapter 12, and Marr 1982).

Moreover, Pinna concludes that figure-ground relations are specifically determined by surroundedness, size, orientation, contrast, symmetry, convexity and parallelism (and I would add scope, scale and the various stage construals as seen in the choice of frames of reference). Gestalt theory holds that humans constantly construe visually based relationships between a smaller, moveable object related to a larger, often not moving object. The crucial aspect is the ability to notice the different characteris-

die Sprache überhaupt. Die Synthesis des Denkens durch Sprache ist also immer *historisch particular*" (Trabant 2012: 313–315; emphasis original).

30 "In general it can be claimed, that human experience is embodied, that is, structured by the nature of the bodies they have and by their neurological organization […] the concepts we have access to and the nature of the 'reality' we think and talk about are a function of our embodiment: we can only talk about what we can perceive and conceive, and the things we can perceive and conceive derive from embodied experience" (Evans and Green 2007: 46).

31 Note Zlatev's criticism of the classic embodiment theories of the early 1980s, i.e., Johnson's image schema approach (Zlatev 2010).

tics of a spatial situation or of a speech act, that is, the ability to perceive a gestalt or to see aspects (*Aspektsehen*, as Wittgenstein calls these constructions). Monk concludes that

> [h]uman behavior does not consist in machine-tooled, precise repetitions of a limited repertoire of movements that is invariant between cultures or persons, but rather in irregularities and variations of texture which inflect culturally-relative paradigms of expressive behavior with a particular physiognomy–an individual style. (Monk 1990: 579)

Theories of perceptual constraints on visual perception and cognition arising from gestalt theory and phenomenological approaches mean that the impact of language and hence symbolic function on the construal of a visual scene is now only partially at issue (Ehrenfels 1890; Jastrow 1899; Koffka 1935; Köhler 1920, 1929; Merleau-Ponty 1974, 1976; Müller-Lyer 1889; Pinna 2010; Rubin 1921; Wertheimer 1923, 1925). This book takes gestalt principles at face value, arguing in favor of a constant interplay between different information cues.

The cognitive linguistic and cognitive semantic approach proposed by Langacker (1987) and Talmy (1978, 1983, 2000) adopts the figure-ground asymmetry (or in Langacker's technical term, "trajector-landmark"[32]) and applies it to cognitive linguistic analysis. Broadly speaking, the distinction follows the syntactic division of a sentence into subject and object, but not always (Langacker 1987: 231; see also Cienki 1989: 44–47).

Langacker argues that these asymmetries are staged construals, that is, in perceiving a visual scene human beings instantiate a stage model[33]. According to this analogy, visual perception can be compared to a theater stage on which different actors and objects are foregrounded based on backgrounded reference frames, and vice versa. These construals depend on scope, scale and other imaging features, as outlined below. These

32 A trajector is a "figure within a relational profile" and a landmark is "a salient substructure other than the trajectory of a relational predication or the profile of a nominal predication" (Langacker 1987: 490, 494). The profile determines the scope of the scene or sets the stage of the scene by introducing the hearer-speaker and the object to be located and the coordinate system, that is, a scene analogue to a stage situation.

33 "A different sort of archetype, the *stage model* [emphasis M.T.], pertains to how we apprehend the outside world. The term is meant to suggest that the general process is analogous to the special case of watching a play. We cannot see everything at once, so viewing the world requires the directing and focusing of attention. From the maximal field of view, we select a limited area as the general locus of attention (the analog of looking at the stage). Within this region, we focus our attention specifically on certain elements (analogous to actors and props). Of course, we are less concerned with vision as such than with the parallels it exhibits with conception overall (viewing in the broad sense). The stage model does seem broadly applicable. In particular, the maximal field of view, the onstage region, and the focus of attention correspond respectively to an expression's maximal scope, immediate scope, and profile" (Langacker 2008: 356).

staged references anchor the relevant spatial coordinate systems based on relative, intrinsic or absolute frames of reference.

> Just as actors move about the stage and handle various props, we tend to organize the scenes we observe in terms of distinct "participants" who interact within an inclusive and reasonably stable "setting". We further impose structure along the temporal axis, by chunking clusters of temporally contiguous interactions (particularly those involving common participants) into discrete "events".
>
> (Langacker 1990: 210)

Prototypically, such relations are mirrored in language as subject and object distinctions on the syntactic level. Figure-ground asymmetries specifically only encode nominals, so here it is important to introduce Langacker's trajector-landmark asymmetry which is inherently relational.[34] This subdomain of figure-ground relations is thus relational in nature.[35] As such, it is important to read the chapters concerning these more detailed cognitive semantic distinctions.

With respect to visual perception in the staging process, Pinna argues that

> [h]uman perception is more than figural grouping and segmentation, it also extends to the organization of shapes and meanings […]. Each perceptual object is made up of element components grouped and segregated, but further appears as a shape related to other shapes that convey and signify one or more meanings related to other shapes and meanings, thus creating a complex net of perceptual shapes and meanings that is the complex world perceived in everyday life. By perceiving people, cities, houses, cars and trees, we perceive at least three main kinds of organization (forms): grouping/figure-ground segregation, shape and meaning. (Pinna 2010: 12)

This summary of the gestalt theory approach to visual perception shows that the cognitive semantic adaptation proposed by Talmy lacks a number of these important perceptive features. According to Talmy, figure and ground are understood as

> […] the pervasive system by which language establishes one concept as a reference point or anchor for another concept. It posits the existence in language of two fundamental cognitive functions, that of the **Figure**, performed by the concept that needs anchoring, and that of the **Ground**, performed by the concept that does the anchoring. (Talmy 2000: 311; emphasis original)

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34 With respect to spatial orientation Palmer argues that "[e]very orientational expression necessarily contains in its base of predication a trajectory, a relation, and a landmark" (Palmer 2007: 1064).

35 Langacker argues that "[t]he trajector/landmark distinction is far more general and broadly applicable than the subject/object distinction as this is traditionally understood. […] trajector/landmark alignment pertains to the internal structure of relational predications, at any level of organization. Trajectors and landmarks need not be spelled out overtly, and are often relational (rather than nominal) in character" (Langacker 1987: 232).

I believe that we must return to the original sources of gestalt theory models – Von Ehrenfels, Jastrow, Müller-Lyer, Köhler, Koffka, Rubin, Wertheimer as well as the phenomenological approaches of Husserl, Merleau-Ponty, Polany and the later Wittgenstein. This is not meant mere name-dropping, but a call to reread the founders of these schools. In my view these approaches help us in analyzing the various spatial construals used in different languages and cultures, particularly those with a non-written tradition.

For the sake of simplicity, I argue (unsurprisingly) that different languages have different strategies for encoding these spatial relationships. There are additional spatial parameters which apply, such as scope, scale and other qualities of figure-ground asymmetries. Some of these additional features form part of Talmy's qualities of asymmetry (Talmy 2000: 315).

Table 1. Figure-ground qualities in visual perception

		Figure	Ground
Definitional characteristics	a.	Unknown spatial (or temporal) properties to be determined	Acts as a reference entity, having known properties that can characterize the figure's unknowns
Associated characteristics	b.	More movable	More permanently located
	c.	Smaller	Larger
	d.	Geometrically simpler (often pointlike) in its treatment	Geometrically more complex in its treatment
	e.	More recently arrived on the scene/in awareness	More familiar/expected
	f.	Of greater concern/relevance	Of lesser concern/relevance
	g.	Less immediately perceivable	More immediately perceivable
	h.	More salient, once perceived	More backgrounded, once figure is perceived
	i.	More dependent	More independent

Some of the aforementioned parameters have been the subject of controversy in the literature. Senft points out that Talmy's distinction between geometrically simpler and complex in (d) does not hold for Tzeltal, an indigenous language of Mexico. In this language the "Figure's geometry in spatial description is more complex than the Ground's" (Senft 1997: 16; see below data on classificatory verb systems in Dene below). Some of the languages presented in this book add further weight to Senft's claim. Still, Talmy's qualities of cognitive functions help us analyze linguistic patterns of spatial semantics and to pinpoint the relevant cognitive representational systems. I propose the following imaging parameters based on various previous accounts, in addition to the abovementioned gestalt principles.

Table 2. Imaging features used in spatial constructions[36]

	Construals	Specification
a.	Figure specification	Various shape, size, scale, scope and material constructions as well as the various universal gestalt principles presented above
b.	Figure-ground alignment	Figure-ground$_1$, ground$_2$
c.	Perspective/conceptualizer	1-,-2-, 3-dimensional; stage model
d.	Distance	Proximity (close, medial, distal), path (= channels along which people move, i.e. streets, walkways, transit lines, canals, rivers, railroads; linear, 1-D entities), goal, source
e.	Frames of reference	Relative, intrinsic, absolute
f.	Deixis	Vectorial information
g.	Degree of specificity	Amount of semantic detail in the figure-ground alignment
h.	Functional properties of the figure	Classificatory verbs, body part construction, posture verbs

This summary of different imaging features captures the fundamental spatial construction patterns in immediate and mediate spatial language and spatial cognition. In addition to contextual knowledge of the speaker/hearer, these imaging features profile the various semantic spatial parameters which languages encode for mediate orientation and spatial relations in general. In terms of the stage analogy above, these imaging patterns help us to zoom in or out the different reference points. Some of these, such as the size and shape of a figure, are implicit structures. Humans do not explicitly compute the different features of objects that might serve as figures. Humans also perceive implicitly different spatial parameters and judge those of importance as being foregrounded or backgrounded. Other aspects remain fuzzy or undetermined. This is only to be

36 See Langacker 1987, 2000; Levinson 2003; Marr 1982 ; Svorou 1993; Talmy 1978, 1983, 2000; Vandeloise 1991.

expected as the cognitive apparatus has limited capacity and time to construe a scene. Consequently, spatial mental models encode and store basic information about our environment and encyclopedic knowledge connected to events and the like.

It is worth noting once more that the general purpose is to survey various figure-ground relations, degrees of specificity, toponyms, landmarks, and reference points in various empirical sources to elucidate figure-ground asymmetries in spatial language and spatial cognition. As I and others have already argued, spatial language depends on cognitive information-processing systems of spatial orientation and visual perception (Gibson 1986; Marr 1982).

The next section presents some adaptations of gestalt principles in distributed cognition, that is, a Micronesian means of piloting based on dead reckoning systems, the star compass, so-called *etak* systems and other semiotic devices.

1.7 Figure-ground asymmetries in action: the case of Micronesian navigation

This section foreshadows the second chapter in which I examine navigation techniques used in cultures without nautical instruments in greater detail. At this point it is important to present some issues on large-scale figure-ground applications. As far as spatial mental models are concerned, an interesting example comes from surveys on orientation on water based on dead reckoning systems, that is, navigation without instruments (Hutchins 1996: 65–93; see also Hutchins 1983; Riesenberg 1972; Sarfert 1911; Schück 1882). This method of navigation requires that one determines one's position at any given time based on the distance and direction travelled since leaving the last known location (Gladwin 1970: 144).

A navigator monitors the motion of the boat to determine the displacement from a previous position (Hutchins 1996: 56). This mental computing or mental triangulation in space, that is, the transformation and propagation of representational states, is also arguably used on land under specific conditions (Hutchins 1996: 49). In addition to this method, travelers' reports, stories, symbols, icons, winds, roads and all other types of representation are surveyed to reconstruct spatial mental models of spatial orientation based on implicit and explicit knowledge systems.[37]

37 Note that novice Micronesian seafarers receive explicit instructions and information about star systems, water and wind conditions, etc. from elders over a long period of time. They

The rationale here is to argue in favor of spatial mental models based on gestalt-like figure-ground representations of spatial cues forming dynamic mental models. This suggests that different knowledge systems of an implicit (tacit knowledge) and explicit nature interact with each other to enable a traveller to find his/her way at sea or in vast terrains such as the mountainous region of the Eipo. As such they are of particular interest in surveying questions regarding universal – rather than culture-specific or historical – spatial encoding patterns. Not surprisingly, different cultures vary in this respect. What may be common to all cultures, and hence universal, is the gestalt-like constructive process of spatial mental models. These spatial mental models function as implicit knowledge systems for spatial orientation which enable people to explicitly navigate in a specific environment.

Humans use various forms of imagery based on visual, auditory and other perceptual systems to perform internal mental processes such as mental rotation (Kosslyn 1980; Shepard and Metzler 1977).[38] In mental rotation, objects are virtually translocated or manipulated.

One very specific spatial mental model combining implicit and explicit knowledge is the abovementioned practice of navigation at sea based on cognitive maps as a specific form of mental models seen in Micronesian cultures (see Kuipers 1978, 1982). These practices and cognitive processes are adapted to navigation or piloting techniques on land and as spatial practice at sea.

It is a feature of Micronesian cultures that they don't use instruments for navigating on open seas. Here, again, I argue that this technique is based on mental gestalt-like cognitive constructions based on various implicit and explicit knowledge cues. In this specific case the implicit cues are based on the construction of a so-called "star compass" (Gladwin 1970; Hutchins 1983, 1996). With reference to Gladwin, Hutchins and others, I argue that these implicit knowledge structures provide information cues in a cognitive process called mental triangulation. This mental triangulation is apparent in the usage of a so-called third, phantom or emergency island (Finney 1991; Gladwin 1970; Goodenough 1953; Oatley 1977; Riesenberg 1972; Sarfert 1911).[39] In addition, navigators need to

even use drawings in sand to illustrate various possible positions of the so-called *etak*. The *etak* system is explained below.

38 "Interlocuters reconstrue perspectives and fictive orientation by translocating or rotating maps, by zooming in and out, and perhaps even by shrinking or expanding maps" (Palmer 2007: 1064).

39 This mental triangulation is summarized neatly in the following description of the Micronesian navigator's techniques, which claims that "[w]hen the navigator envisions in his

know a number of islands (50–100 on average), reefs (as seamarks), drifts, winds, wave color and so on. In addition, elders explicitly train younger navigators to empirically accommodate, assimilate and finally equilibrate knowledge systems using a bird's eye perspective and different frames of reference (Piaget and Inhelder 1956; Thiering and Schiefenhövel 2013). They not only learn a vast number of explicit information cues, but also learn how to mentally represent maps and different routes.

An important feature in orientation is the spatial reference frame. These frames help to orient oneself in different environments (Levinson 2003). This orientation process is based on mental and perceptual course maintaining processes in different cultures which arguably rely on spatial mental models. This means that orientation techniques are processes of inference within the structure of cognitive maps. They are structures of spatial reasoning, which is an activity of unconscious inference (Helmholtz 1867: 576–613). As such, they have the ability to implement spatial knowledge from earlier experiences (see on spatial knowledge Lang, Carstensen, and Simmons 1991). They are instruments of deduction processes in the context of acquired knowledge (Renn and Damerow 2007: 313). They are also context-specific and combine past and present experiences to form cognitive networks. These cognitive networks require both cultural and linguistic knowledge. In the case of orientation, spatial mental models are similar to cognitive maps and these in turn provide mental clues about the traveller's trajectory in his/her environment.

The trajectory is an image-schema transformation process which involves "mentally traversing the path of a continuously moving object" (Oakley 2007: 217). Cognitively this process can be a summary or sequential scanning mechanism (Langacker 1987: 144–146). The difference in the cognitive processes of summary and sequential scanning is analogous to that between a photo and a motion picture. Both conceptualization processes are based on gestalt-like structures. Summary scanning is additive: "each set of events contributing something to a single configuration all facets of which are conceived as coexistent and simultaneously available" (Langacker 1987: 145). In a footnote Langacker points out that this process is analogous to the fading in or fading out of different aspects of a visual scene, as seen in the stage model. Through perception we focus and direct our attention from one aspect to another (Langacker 1987: footnote

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mind's eye that the reference island is passing under a particular star he notes that a certain number of segments [*etak*; M.T.] have been completed and a certain proportion of the voyage has therefore been accomplished" (Gladwin 1970: 184).

21, p. 145). Sequential scanning involves "the transformation of one configuration into another" (Langacker 1987: 145).[40]

This book uses different facets to explore the degree to which environmental experience and spatial orientation is reflected in symbolic systems such as spoken and written language, and practices. It also surveys individual or subjective cognitive strategies for aligning mediate figure-ground relations. This brings it in line with current anthropological linguistic approaches which place language and other knowledge systems in their social and cultural contexts, and their cultural practices (Foley 1997; Mark et al. 2011).

> […] the analysis of space concepts and spatial reference in various cultures and languages must consider not only the linguistic context of an utterance but also the paramount cultural context in which such an utterance is produced and adequately understood. (Senft 1997: 22)

As such, spatial knowledge is not only encoded in mental concepts and categories, but is embodied in the lived histories of human beings, and their cultural and linguistic practices as encoded in texts and maps (Foley 1997: 177; Johnson 1987). I adopt the following premise which argues that

> […] descriptions of space, or allusions to space in language, must rest on two kinds of knowledge. The first appears to be based on models (maps, representations) which people construct to guide *spatial behavior*. The second appears to consist of a linguistic symbol-system that allows the models to be shared within a community of discourse. (Siegel and White 1975: 11; emphasis original)

This question concerns the relationship between non-linguistic information and spatial language, that is, environmental landmarks such as rivers, mountains, trees, winds, and the medium (time, distance, measurement data) between landmarks. The commonly accepted argument is that non-linguistic information has an impact on spatial language and categorization, i.e., reference to space and its relation to other semiotic systems. From those very general aspects, the following section focuses on lexical-semantics of spatial encoding decisions.

1.8 Lexical-semantic encoding patterns of spatial cognition: geometrical idealizations

Most of the research on spatial relations has been carried out on spatial markers such as adpositions. Languages differ fundamentally in the mor-

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40 For a critical review on these cognitive processes see Broccias and Hollmann (2007).

phosyntactic and semantic devices used in categorizing figure-ground relationships. For example, most Germanic languages use adpositions such as 'at', 'on', 'in' in English or *an*, *auf*, *in* in German, and posture verbs such as 'sitting', 'standing', 'lying' to denote staged relations, while in agglutinative languages, case – such as the absolutive, adessive and allative – encodes directions.

In the following, some simple cases of geometric prepositions and their rule systems are presented (see Miller and Johnson-Laird 1976: 378–398; Vandeloise 1991 presents an overview). It is important to have an overview of the research on geometric and spatial relations, largely carried out in the fields of linguistics and cognitive linguistics (see also Bennett 1968, 1972; Cienki 1989; Cooper 1968; Herskovits 1985, 1986; Svorou 1993; Lakoff 1987a; Leech 1969; Tyler and Evans 2003). All of these analyses essentially single out English locatives (with the exception of Cienki, who adds Polish and Russian, and Svorou's description of spatial grams in a number of languages) that arguably bear the geometrical and spatial information of the respective object to be related to.[41] An exception is Svorou who argues in favor of so-called "spatial grams" which cover diverse spatial encoding mechanisms in different languages (26 genetically different languages). Note that in most linguistic descriptions prepositions are defined as grammatical function words with little semantic content.

The prototypical English prepositions for simple geometric relations are 'at', 'on' and 'in'. 'In' and 'on' can be described as follows: the preposition 'in' profiles an area or volume containing a location between a figure and a ground. The preposition 'on' focuses on the reference object (ground) that supports the object whose location is to be indicated, which is the figure. Other prepositions, such as 'near', 'over', 'beside' and 'beneath' profile the direction in which an object lies with respect to a reference object. On the other hand, 'from here', 'over us', 'left of you', 'in front of me' are deictic systems which refer to the speaker. Bennett (1972)

41 "Existing approaches to the semantic analysis of locative particles (e.g. English spatial prepositions) presuppose a local semantics for these lexemes. 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, since contrastively-derived meaning components postulated for, e.g., prepositions, are components of prepositional meaning, and not of the meanings of other form classes. Indeed, the localist assumption, as applied to locative particle meaning, is simply a generalization from the traditional approach to lexical semantics which derives features from contrastive analysis." (Sinha and Kuteva 1995: 167)

presents three simple locative markers in English and their idealized rule systems.

Table 3. Simple rule systems for the topological relations 'in', 'on', 'at'42

	Relation		Rule System
a.	*in y*	=	LOCATIVE(INTERIOR(y))
b.	*on y*	=	LOCATIVE(SURFACE(y))
c.	*at y*	=	LOCATIVE (y)

The figure-ground relation varies according to the object's constraints, that is, the locative *in* can only be used to a certain point. In 1968, Cooper expands this simple rule system using specific constraints.

Table 4. Expanded rule systems for the topological relations 'in', 'on', 'at'

	Relation		Rule System
a.	*x in y*	=	*x* is located internal to *y*, with the constraint that *x* is smaller than *y*
b.	*x on y*	=	a surface of *x* is contiguous with a surface of *y*, with the constraint that *y* supports *z*
c.	*x at y*	=	*x* is near or in *y*, with the constraint that *x* is portable relative to *y* and *y* is not a geopolitical area

The constraints are more specific with respect to the geometrical complexities of the figure. The ground's variation in size or material also influences the figure-ground asymmetry; see also Leech (1969) rule systems in Table 5.

Table 5. Simple rule systems for the topological relations 'in', 'on', 'at'

	Relation		Rule System
a.	*x in y*	=	*x* is enclosed or contained either in a 2-D or a 3-D place *y*
b.	*x on y*	=	x is continuous with the place of y, where y is conceived of either as 1-D (a line) or as 2-D (a surface)
c.	*x at y*	=	*x at y* = *x* is contiguous of or juxtaposed to the place of *y,* where the dimensionality of *y* is not significant

42 "Topological distinctions between spatial entities are a fundamental aspect of spatial knowledge. Topological distinctions are inherently qualitative which makes them particularly interesting for qualitative spatial reasoning. […] Topological approaches to qualitative spatial reasoning usually describe relationships between spatial regions rather than points, where spatial regions are subsets of some topological space" (Renz and Nebel 2007: 170).

Here geometric properties profile the figure-ground asymmetry as seen in the following English examples.

(1) Figure-ground examples profiled by the locative of 'in':

a. *A city in Sweden.*
b. *The coffee in the cup.*
c. *The spoon in the cup.*
d. *The scratch in the surface.*
e. *The bone in the leg.*

Underlying all these uses of 'in' is a concept that Bennett refers to as "interior", Cooper as "internal location", and Leech as "enclosure/containment" (see Pederson, Wilkins and Bowerman 1998 on topological relations and their qualities, including containment).

Miller and Johnson-Laird having brought the above formal systems of geometrical relations to a conclusion, the prototypical schema for all usages of 'in' is:

in (*x,y*) = a referent *x* is in a relatum *y* if: [part(*x,y*) & inclusion(*z,y*)]

A figure is *in* a ground if (and only iff) one part of it is included by the ground.[43] Now consider the preposition *on* in the following examples (Miller and Johnson-Laird 1976: 386).

(2) Figure-ground examples profiled by the locative 'on':

a. *The house on the river.*
b. *The scratch on the surface.*
c. *The label on the box.*
d. *The picture on the wall.*
e. *The rug on the floor.*
f. *The table on the rug (on the floor).*
g. *The lamp on the table (on the rug on the floor).*

The ground or reference objects (except in 2a) seem to be the different static surfaces, the subdomain for profiling the figure-ground asymmetry

43 Herskovits presents a similar rule system based on Cooper and Miller and Johnson-Laird: In(X,Y) iff Included (Part(X),Y). X is in Y if and only if a part of X is spatially included in Y (Herskovits 1985: 342). For the preposition 'on' she states that "[f]or some prepositions, we have to allow for ambiguity. So for 'on', at least two meanings are needed, one for three-dimensional examples, like the book on the desk: On,(X,Y) iff Contiguous(X,Y) and Support(Y,X) and one for two-dimensional examples like the house on the lake: On,(X,Y) iff Contiguous(X, Boundary(Y))" (Herskovits 1985: 343).

is the region of the surface of the figure. The region profiles the domain, that is, to say x at y is to say that x is included in the region of $y = reg\ (w,y)$ (w = region of possible (perceptual) predicate with y).
In simple terms, observers construe the abovementioned (theatrical) stage with foregrounded and backgrounded cognitive concepts in idealized situations. Based on the relevant spatial relations which are to encompass the scope of the staged situations, different locatives profile different geometrical conditions. The locatives 'on' and 'at' in English require the following presuppositions:

Table 6. Rule systems for topological relations in English

		Relation		Rule System
a.	*on*	(x,y)	=	a referent (FIGURE) x is on a relatum (GROUND) y if:
		(i)		(INCLUSION(x, REGION(SURFACE(y))) & SUPPORT(y,x))
		(ii)		PATH(y) & by(x,y)
b.	*at*	(x,y)	=	a referent x is at a relatum y if:
		(i)		INCLUSION(x, REGION(y))
		(ii)		≠ (INCLUSION(y,REGION(x))

It has been argued that all of these geometrical descriptions seem to work for most Germanic languages in an idealized fashion, whereas most of the American Indian and First Nation languages and the Papuan language presented here use classificatory verb systems, while the Mesoamerican language Upper Necaxa Totonac refers above all to body-part constructions, and/or a mixture of various encoding systems (see below for different examples). These systems add more semantic detail or degree of specificity to the respective spatial situation.

Of course, we also see certain semantic granularity implicitly encoded in Germanic languages. Take the following example of the spatial relation between chewing gum and a table. In German the chewing gum is, or sticks under, the table (*Der/das Kaugummi ist/klebt unterm Tisch.*). Using the existential verb *sein* 'to be' in a different situation shows that also in German semantic granularity is encoded. *Die Schuhe sind/stehen unterm Tisch* ('The shoes are/are standing under the table') encodes a certain spatial distance between the figure and the ground. Chewing gum is in a direct contact relation to the ground whereas shoes are canonically at a certain distance from the reference object. This shows that in German, extralinguistic knowledge is added even in simple spatial situations.
Moreover, German posture verbs also encode figure-specific qualities since only certain objects can stick to a ground. It goes without saying that

these are idealized situations. The shoes could be in a more direct relation to the table if the table has an upper drawer, but they would rarely stick to the table directly (maybe in an art exhibition). Berthele highlights this very simple objection to linguistic exceptions or peculiarities in First Nation and other languages (Berthele 2006). As Berthele (personal communication) rightly points out, even in typologically close languages such as English, German and the Scandinavian languages, spatial adpositions differ drastically in their spatial semantics (see also Becker 1994).

With respect to geometrical spatial relations this book follows Lewin's definition of linguistic spatial topology, regarded

> […] as the most general science of spatial relations, [which] 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)

Lewin's gestalt psychology approach to topological relations has specific parallels to Köhler. In particular, the part-whole relationship cited resembles the figure-ground asymmetry introduced above (see Fiorini, Gärdenfors and Abel 2015; Pinna 2010). Topological relations are based on Euclidean geometry.[44] It is a mathematical construction that fails as a description of reality. Using this definition of topological relation on languages it is evident that in English (and most Germanic and Romance languages), for example, such relations are expressed by prepositions.

Pederson et al. (1998: 1) point out that topological relations must fulfill certain characteristics. In terms of the figure-ground asymmetry, these features include +/–contact, +/–inclusion, +/–adjacent and functional relations such as +/–support and +/–containment (see Herskovits 1986; Svorou 1993; Vandeloise 1991). In addition to these features, the range of prototypically assumed topological relations is summarized in Table 7 in accordance with Miller and Johnson-Laird (1976: 380–391) and Svorou (1994: 128–155). This table concludes the rule systems introduced above.

44 One of the major struggles in accounting for finite and abstract spaces is Euclid's parallel axiom. He claims that a point X on a line A that is parallel to a line B can never meet a point Y on line B in a finite space. In the 18th century, Carl Friedrich Gauss, János Bolyai and Nikolai Iwanowitsch Lobatschewski, among others, developed an alternative to Euclidean geometry (see Jammer 1954; Nerlich 1994a,b; Ray 1991; Reichenbach 1958; Sklar 1974).

Table 7. Summary of the topological spatial relations rule systems[45]

		FIG-GND asymmetry	Description
a.	*in*	FIG *in* GND = in(FIG, GND): referent FIG is *in* GND if: [part(FIG, z) & inclusion (z, GND)]	FIG = located internal to GND; FIG = smaller than GND; FIG is enclosed or contained either in a 2-D or a 3-D place (GND)
b.	*on*	FIG *on* GND = on(FIG, GND): referent fig is *on* GND if: (incl(FIG, region(surface(GND))) & support (FIG, GND)	surface of FIG is continuous with a surface of GND (GND supports FIG from below); x = contiguous with the place of GND where gnd is conceived of as either 1-D (a line) or 2-D (surface)
c.	*at*	FIG *at* GND = at(FIG, GND): referent FIG is *at* GND: inclusion/coincide(FIG, region(GND))	FIG is near or in GND, with the constraint that FIG is portable relative to GND; FIG = contiguous to the place of GND, where the dimensionality of GND is not significant
d.	*near*	FIG *near* GND	FIG and GND are separate and FIG is located internal to the space z which is contiguous with GND

This table presents four relational situations between a figure and a ground aligned by a locative marker, that is, 'in', 'on', 'at', and 'near'. Different locative markers are chosen depending on the particular alignment between the figure and ground.

Herskovits presents elementary spatial concepts as "ideal meaning" (Herskovits 1986: 55). She discusses five spatial concepts: (1) topological, (2) geometrical, (3) physical, (4) projective and (5) metric. According to Herskovits, topological relations are represented in English by prepositions such as 'at', 'on', and 'in' (dimensionality), or 'across' and 'through' (boundedness) (see Miller and Johnson-Laird 1976). The preposition 'on' encodes a relation of contiguity with line or surface, 'at' encodes the coincidence of two points, and so on. The alignment with direction is encoded via 'over' and 'under', and vertical directions are encoded via 'above' and 'below'. Projective relations behind', 'in front of' and 'to the right/left'. Finally, metric relations are distances expressed via 'near' or 'close to'. All these prepositions encode ideal meanings of a "geometrical ideal"

45 These systems are based on Miller and Johnson-Laird (1976) and Svorou (1993).

(Herskovits 1986: 56). These are therefore rather idealized formulas which only capture the semantics of a locative morpheme.

The rule systems introduced above are idealizations for the proposed figure-ground asymmetries in the languages under review. While these systems only partially apply to the specific languages and grammars in this book, they provide a good point of departure for spatial analysis. Again, these systems imply idealized situations in vision and language. Consequently, the degree of specificity of semantic detail and the selection of gestalt principles shifts significantly between languages and cultures[46]. This implies that the rule systems in fact only partially apply and require fundamental semantic expansions as presented in the imaging parameters.

This book tends not to reduce spatial relations to rule-governed systems or even syllogisms based purely on a simple spatial morpheme, rather it digs deeper into the intricacies of spatial semantics in concert with other cognitive and cultural systems. Some of these linguistic specificities are presented in the next section.

1.9 The languages of mountainous and prairie regions

The primary comparison here is that between Eipomek (in short: Eipo) and a Northern Athapaskan polysynthetic language, Dene Chipewyan (in short: Dene) which represent two unrelated and distinct cultures located in very different parts of the world (there is an additional focus on Upper Necaxa Totonac, Mexico). Eipo is spoken in the central mountains of Papua province, Indonesia, on the island of New Guinea which also includes the country Papua New Guinea. Dene is spoken in the prairie of Cold Lake, Alberta (Canada). These cultures represent contrasting environmental conditions and different development histories (Eipomek was relatively isolated until the 1970s, Dene was suppressed by white settlers as during the colonization of First Nations territory in Canada). The two groups contrast sharply in language, genetics and culture. The Dene have always been hunters and gatherers, while the Eipo live in hut settlements and cultivate fields. All of these factors make the two languages good candidates for comparison. A detailed look at the different languages and cultures is presented in the respective chapters below.

46 "[…] each language influences its speakers to see and think in a characteristic way on the premise that the 'conceptual partition of the world' and the manner in which this 'partition' is organized is different in each language" (Miller 1968: 13).

1.9 A sketch of the grammars

This chapter provides a brief introduction to the three grammars of the languages under review, starting with Dene followed by Upper Necaxa Totonac and Eipomek (data from Eipo is presented in the penultimate chapter). The focus is primarily on spatial encoding devices such as classificatory verbs, posture verbs, and body parts.

1.9.1 Dene Chipewyan

The Dene Cold Lake dialect is an endangered Athapaskan language spoken by about 2000 speakers in the subarctic region of Canada (Thiering 2009a). It is closely related to Slave, Beaver, Sekani and Dogrib, as well as its better-known cousin Navajo (see Hoijer 1951 on Navajo). There are only about 200 speakers who use the language on a daily basis and who can be classified as fluent speakers.

The typical Dene verb is polysynthetic and fusional in its morphology. The language features a predominant, consistent classificatory verb system which includes adverbial and directional prefixes as well as a postpositional inventory (see Li 1946; McDonough 2000; S. Rice 2002 on the general structure of the Athapaskan verb stem system). Such verbs have different morphological forms depending on the physical characteristics of the object to be encoded. This means that stems change with respect to shape, animacy and/or physical features of the object being located or handled, as well as the number of participants and distance (S. Rice 2002b: 69).

Cook argues that Dene has about 36 postpositions that morphologically function like nouns. They inflect with pronominal prefixes (Cook 2004: 92). Cook also points out that the determination of a postposition's meaning is as difficult as it is in English or any other language. This means it is often impossible to determine the precise meaning from the context (see Herskovits 1985). However it is widely acknowledged that these postpositional prefixes modify the meaning of the verb stem (S. Rice and Wood 1996).

The general focus here is on the motivation of certain semantic construction types and the encoding of figure-ground asymmetry as modified by the verbal cohort.

Making a choice from an appropriate set of verb stems has the effect of assigning the noun in 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; see also S. Rice 1997: 103ff.)

All Athapaskan languages exhibit an alternation of verb themes that is traditionally known as "classificatory". 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 being handled while the type of activity involved is expressed in the prefixes (K. Rice 1989: 779).

These stems profile existential situations or actions of certain categories of objects (Davidson et al. 1963). Table 8 summarizes the four classificatory verb categories.

Table 8. The different classificatory verbs[47]

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*

An example of how a particular stem ('to give') changes according to the quality of the figure is presented in Table 9. The data indicates the change of verb stem according to the actual object transferred from one person to another.

Table 9. Variations on the theme 'I transferred object X to him/her'[48]

a.	*be–gha–n–i–ł–ti*	'I gave animate being to him/her.'
b.	*be–gha–n–i–ʔa*	'I gave round/hard object to him/her.'
c.	*be–gha–n–i–ta*	'I gave sticklike object to him/her.'
d.	*be–gha–n–i–ł–chúdh*	'I gave flat object to him/her.'
e.	*be–gha–n–i–la*	'I gave plural objects to him/her.'
f.	*be–gha–n–i–ka*	'I gave open container to him/her.'
g.	*be–gha–n–i–chu*	'I gave unspecified object to him/her.'

47 The Table is based on S. Rice (1997: 103; 2002) and also Cook 1986; Davidson et al. (1963).

48 The parsed morphemes have the following grammatical functions: *be-* = 3person.singular.subject; *-gha-* = 'to'; *-n-* = momentaneous; *-i-* = 1person.singular.subject; *-ł* - = classifier (Dene has 4 classifiers: the zero, *-d-*, *-ł-*, and *-l-*. markers These classifiers profile the transitivity of the verb.) The underlined morpheme is the respective classificatory verb stem.

According to the above examples, the Dene verb stem changes with respect to the quality of the object to be encoded. Hence, the figure's characteristics such as shape, size, and the (in)animacy of the object determine the choice of verb stems.

As stated above, the Dene verb is regarded as polysynthetic. It also has fusional characteristics in its morphology, with a rich prefix system. The usual word order is SOV, but the Dene verb also has a propositional character, that is, subject and object prefixes are fused within the verb (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; S. Rice and Wood 1996; K. Rice 2000). Table 10 shows a general schema of the Dene verb plus stem pattern. Table 11 provides explanations of prefix abbreviations.

Table 10. Dene verb prefixes, including the verb stem

PP	ADV	ITE	INC	PRO	OBJ	MOD	ASP	$1_{ST}/2_{ND}$S	CLV	ST
1	2	3	4	5	6	7	8	9	10	

(Li 1946; McDonough 2000; S. Rice 2002; see also Kari 1989)

McDonough divides the verbal complex into a bipartite structure in which the positions 1–4 are the satellites, and the positions 5–10 are defined as stem positions (McDonough 2000; K. Rice 2000). The list in Table 11 summarizes the single positions in more detail.

Table 11. Prefix slots

1. Incorporated postposition	6. Pronominal objects
2. Local and adverbial prefixes	7. Modal prefixes
3. Iterative prefix (distributive)	8. Aspectual prefixes
4. Incorporated noun stems	9. 1st/2nd person pronominal subjects
5. 3rd person pronominal subjects	10. (Valency) classifiers
	11. Stem

(Li 1946; McDonough 2000)

The positions 1–4 (= disjunctive prefixes) and 5–6 (= pronominal subjects/objects) are part of the disjunct or lexical zone and have derivational functions. The positions 7–10 are termed the conjunct or grammatical zone and include obligatory inflectional categories such as tense, aspect, modality, subject agreement and valency (Li 1946: 409). Classifiers encode the transitivity of the verb (Broschart 1997). They denote the valency of the verb.

It is argued that Dene provides semantic information in a way that is not aligned with lexical units or parts of speech in a specific morphosyntactic order, but in a more scattered fashion in which the semantic load is distributed throughout the phrase (Thiering 2007; Zlatev 1997). Consequently, the template above is merely an idealized categorization into discrete morphemes. This assumption is in line with Li's very insightful sketch of Dene grammar. Li claims that the Dene verb "is a complicated structure, consisting of a stem and a number of prefixes" (Li 1946: 404). Furthermore, he states that it is not possible to parse verbs into prefix and stem, for example, to determine the meaning. For instance, the verb 'to dream' is com-posed of the prefix ná- and the stem -te. The former means something like 'here and there, about' and the latter 'a living being lies around'. Li argues that parsing náste 'I dream' into its components does not result in the English understanding of dreaming from the morpheme's meanings alone. Here Li foreshadows constructon grammar approaches that analyze not isolated chunks of meanings.

1.9.2 Upper Necaxa Totonac

Upper Necaxa Totonac (UNT), spoken by about 3000 in East-Central Mexico is a morphologically complex agglutinative language featuring particularly rich inflectional markings of the verb (the following summary is based on Beck's insightful grammar of UNT, Patla-Chicontla Totonac, 2004). The location of Totonac

> outside the Necaxa Valley is spectacular, featuring high, steep cliffs and deep, narrow river gorges. Some of the peaks in the area rise over 1,500 m., but the Upper Necaxa villages themselves sit on the valley floor at only 260 m. above sea-level. The differences in altitude result in stark contrasts in climate. The lower altitudes have a hot, humid costal climate with average day time temperatures in the high 20s or low 30s, while the higher communities have cooler weather and frequently experience dense fogs and temperatures below 20 degrees. (see: http://www.artsrn.ualberta.ca/totonaco/Landscape.html; last access August 2014).

Beck argues that UNT has a tendency toward VSO word order, but that the sentence structure is highly flexible, that is, that SO or OS are possible as well (Beck 2004: 92). 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 *iʃ*-) and future (marked by the prefix *na*-). Verbs in UNT 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. As Beck points out, the complexity of verbal morphology in Totonac is striking (Beck 2004). In addition to inflection for person and number of syntactic arguments, verbs are marked for a variety of tenses and aspectual categories, as well as for three moods. UNT also has a wide range of valency-altering morphemes, including a variety of causatives and applicatives. As in other Totonacan languages, body parts are frequently incorporated into verb stems as prefixes, performing a wide range of grammatical functions (see table below; also on body parts Levy 1992).

Finally, Totonac has a number of quasi-inflectional affixes expressing a range of adverb-like meanings, and it makes use of deverbalizing morphemes to form participle-like expressions from transitive and intransitive verbs.

Totonac, too, has a wide range of valency-altering affixes including 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 (and posture verbs) are of special interest in this survey 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 effect, that is, they indicate which part of the subject or object is affected by the action.

Body parts referred to here include ear, shin, leg, mouth, back, nose, breast, chest, face, hand, finger, arm, abdomen, vagina, buttocks, anus, foot, knee. See the following Table 12 for examples.

Table 12. Body part partonymic extensions in Upper Necaxa Totonac

	UNT	Gloss	UNT	Metaphoric Extension	Metonymic Extension
a.	*aán*	'ear'	*aʔá-*	'branch' (tree)	'handle' (cup)
b.	*akpún*	'crown of head'	*akpú-*'	'top of object'	'crown of hill'
c.	*tʃa:n*	'shin'	*tʃa:-*	'trunk of tree'	'shaft of object'
d.	*tʃe:én*	'leg'	*tʃeʔe-*	—	—
e.	*ʔéni*	'mouth (interior)'	*ʔé-*	'opening'	'irregular upper surface'
f.	*ʔen*	'back'	*ʔe-*	'back of animal'	'roof of house'
g.	*kíni*	'mouth (exterior)'	*kí-*	'rim' (cup)	'mouth' (bottle), 'edge'
h.	*kíni*	'nose'	*kinka-*	*ʔenʔa-*	'point', 'peak'
i.	*kuʃá:n*	'chest'	*kuʃa-*	—	—
j.	*lakán*	'face'	*laka-*	*laʔa-*	'planar surface'
k.	*lákni*	'leg'	*lak-* '	'lower portion of field'	—
l.	*makán*	'hand, finger'	*maka-, maʔa-*	'paw', 'talons'	'handle' (bucket)
m.	*mákn*	'body'	*mak-, maʔ-*	'bulky part of object'	'area behind or around object'
n.	*pa:n*	'abdomen'	*pa:-*	'wide midriff of object'	—
o.	*peʔén*	'arm'	*peʔe-*	'wing'	'foreleg', 'sleeve'
p.	*pi:n*	'breast, chest'	*pi:-*	'front side of leaf'	—
q.	*pu:n*	'vagina'	*pu-*	'interior'	'container'
r.	*táni*	'buttocks, anus'	*tan-, ta:-*	'hindquarters'	'stem' (corncob)
s.	*tampá:n*	'base'	*tampa:-*	—	—
t.	*tampín*	'bottom'	*tampi-*	—	—
u.	*ta:pá:n*	'side'	*ta:pa:-*	'larger vertical face of object'	—
v.	*tu:xán*	'foot, paw'	*tu:-, tantu:-*	'foot' (furniture)	—
w.	*tsoʔósniʔ*	'knee'	*tsoʔos-*	—	—

Totonac establishes body part metonymic extensions for spatial grounding with the human body as an anchor, e.g., the human ear for a cup handle or the mouth for the rim of a cup. The selected data sets below show the usage of some of the above body part extensions. It will also be apparent that speakers choose different encoding patterns to focus on different spatial alignments and regions.

1.9.3 Eipomek

Subject-object-verb order predominates in the Eipo language (Heeschen 1998: 286). Note that Heeschen also claims that Eipo is a noun-plus-verb language, which implies that another noun is essentially treated as a free unit, that is, associated constituents move freely around this basic unit (Heeschen 1998: 268). The subject role is filled by a human agent (Heeschen 1998: 286). Object-subject-verb structures are also frequently used. Compounding is the main source for denoting or construing word meaning. Nouns are not inflected and not morphologically marked (Heeschen 1998: 197). They are morphologically simple and case marking is pragmatically handled, i.e., the actual discourse marks subject and object of a sentence or situation. In transitive propositions, the noun is profiled as the direct object, things and living beings are acted upon, they undergo actions, manipulation and creation by human beings (Heeschen 1998: 197). Gender is profiled through compounding and derivation, e.g., using *yim* for 'male' or *kil* for 'female' to classify the noun if required (Heeschen 1998: 200); in normal speech gender is not specified in verb conjugation.

Number is expressed either by context or via the verb morphology. Nouns are modified by adjectives (Heeschen 1998: 210). More specifically, adjectives denote dimension, distance and position in geographical and social space (Heeschen 1998: 211). They also denote color, age, value, and properties of human beings, animals, plants and objects. The class of adverbs profiles verbs, adjectives, pronouns, adverbs and sentences (Heeschen 1998: 215).

Eipo differentiate between various adverb types such as temporal ('day', 'time'), local ('down there', 'in the middle', 'in the direction of'; see list of terms for spatial deixis below) and modal adverbs, degree adverbs ('very'), and focus or conjunctional adverbs ('also', 'too'). Verbs denote actions and processes (Heeschen 1998: 223). In contrast with nouns, which prototypically profile landmarks and objects located in space, verbs denote motion events between such landmarks, actions, processes, or conditions (Bußmann 2008: 773). Verbs designate a process unfolding in conceived time (Langacker 1987: 244). Langacker calls a verb a "symbolic expression" whose semantic pole (a symbolic structure consists of a semantic and a phonological pole) profiles a process (Langacker 1987: 244). The quote below summarizes the idea of a process in connection with the verb as a symbolic expression unfolding in time.

> A process is defined as a sequence of configurations (states) conceived as being distributed over a continuous series of points in time. Usually the separate configurations are distinct, i.e. a verb typically designates a change through time; a normal verbal predication is therefore highly complex, for it incorporates as many separate conceptual situations as there are recognizable different states in the designated process. (Langacker 1987: 143–144)

In Eipo, verbs are bound morphemes profiling various processes such as aspect and tense, but also person, number, and mood (Heeschen 1998: 223). The morphemes are suffixed to the verb. Syntactically, verbs profile predicates, and person-number suffixes agree with the subject noun phrase (NP). Note that NPs in Eipo can be constructed based on a noun or a pronoun (Heeschen 1998: 265). This grammatical suffixation represents a parallel to Eipo proper nouns which can take suffixes for human beings indicating gender (Heeschen 1998: 200). Here it is also important to mention that number of nouns is inferred from either the context or profiled by the verb's morphology and its respective suffix.

Just as Dene uses various slots left of the verb stem as seen in the text and template above, so too does Eipo motivate a sequence of bound morphemes: +stem, +/-tense/aspect, +/-object pronouns, +tense/mood /person/number (Heeschen 1998: 223).

The stem without a final consonant is called a "root" (Young and Morgan 1987). Such roots can fill the abovementioned slots such as tense, person, or number suffixes. More interesting is the lexicalization process of compound verbs. This process of the formation of lexical units (as opposed to grammar) is a characteristic typological feature of Mek languages (Heeschen 1998: 231). Heeschen argues that in Eipo most of the (last order) stems are verbs profiling movement in space, such as position('to sit' or 'to stand/stay'), that is, they behave like posture verbs (Heeschen 1998: 231, 234).

The Eipo language consists of six tense-aspect suffixes and six sets of tense-mood-person-number suffixes (Heeschen 1998: 246). With respect to tense-aspect, the Eipo language distinguishes today's past (PAST.I), near past (PAST.II) and remote past (PAST.III). The same tripartite distinction is found in the future aspect, that is, immediate (FUT.I), near (FUT.II), and far future (FUT.III) (Heeschen 1998: 257; see Heeschen's Table 47 for an overview of tense-mood-person-number suffixes).

A typical structure for Papuan languages in general is the classification system, or object-dependent grammatical marking via the verb (Heeschen 1998; Wurm 1982; see also Senft 2000). It is argued that the Eipo language does not feature a classificatory noun/verb system. Heeschen (personal communication) argues that Eipo also has a tendency to classification, but that it is relatively weak and not comparable to the other Papuan languages, or to Dene.

The nominal system not only encodes gender, but also relies heavily on the different verb roots encoding particular features of the object. Foley provides an example taken from Waris, a Papuan language spoken in Sandaun province, Papua New Guinea, in which morphemes are prefixed to the verbs encoding objects found inside a container (*vela*), spherical objects (*put-*), food cooked and distributed in leaf wrappers (*ninge-*), leaf-like objects with soft or non-existent stem (*lè*), leaf-like objects with a hard stem (*pola-*), and so on (Foley 1986: 95). As outlined above, in Dene various verbs encode different characteristics of the relative object, that is, verbs of handling, manipulation, continuing manual contact, including 'give', 'hand', 'take', 'put', 'handle', 'bring', 'carry'. Foley calls these verbs transfer control/position of something (Foley 1986: 115). Dene also has verbs of partially controlled action including an agent, ('toss', 'throw', 'hang up', 'set down', 'drop', 'lose') and verbs of free movement that are independent of an agent ('fall', 'tip over') (Cook 2004; Thiering 2006, 2009b). This system enables the language user to profile exactly the semantic features of the object to be encoded.

This is also interesting with respect to spatial morphemes used in the delimitation of spatial relations. In Eipo, Dene, and Totonac specifically, it is not just important to carefully single out the spatial dimension, but also the aspectual point of view. It should be noted that in Eipo, an independent verb is in the final position and is inflected for person, tense and number of the subject. It has been noted that Papuan languages have a complex morphology, especially in the verb. Moreover, the morphology features agglutinative patterns. The complexity of the verb makes the language an especially interesting comparison with First Nation languages of the Americas, such as Dene (Thiering 2009a), Hopi (Malotki 1979, 1983), Navajo (Young and Morgan 1987), and Slavey (K. Rice 1989). These are all supposedly polysynthetic languages, i.e., words are based on bounded morphemes that have concrete meanings (Boas 1997: 74, 79 and especially with Upper Necaxa Totonac spoken in Mexico (Beck 2004). Indeed, Boas claims that

> a large number of distinct ideas are amalgamated by grammatical processes and form a single word, without any morphological distinction between the formal elements in the sentence and the contents of the sentence. (Boas 1997: 74)

Cook notes that in contrast to noun stems, verb stems alone cannot constitute a word (Cook 2004: 58). He claims that the internal structure of a verb is equivalent to a full sentence in English (Cook 2004: 86).

The next example from Eipo presents the fine-grained structure of aspectual marking (Heeschen 1998: 143). It presents a typical deictic construction using the deictic morpheme *a-* 'here'.

(3)

Aik	*a-bu-lam-se*,	*bai*	*a-ba-lam-se*.
hut	here-sit-HAB-1SG.PAST.III,	outside	from/here-go-HAB-1SG.PAST.III

'I lived in this hut, I was going from here into the forest.'

As mentioned above, Eipo divides the past tense into three stages[49]:

PAST I	=	today's past
PAST II	=	near past
PAST III	=	remote past

The speaker of the quoted phrase, first person singular, explains that s/he lived in a specific house serving also as the point of departure for several trips into the farmed land and the forest. The deictic marker relies on the speaker's intended orientation in which 'here' denotes close proximity.

This might be a good point to consult the grammatical descriptions on Dene, Totonac and Eipo throughout the relevant chapters. The important aspects of the data are the different encoding patterns which rely on a variety of imaging parameters. Consequently a broad understanding of the grammars will suffice for following the relevant points of argumentation.

1.10 Structure of the book

First and foremost, this collection of papers presents qualitative studies on the language-cognition interface based on visual perception processes of figure-ground construals. Although there is some numerical data, the detailed descriptions tend to be cognitive-semantic qualitative descriptions rather than formal-logical accounts. I have used a number of empirical sources, from various elicitation tools to ethnological grammars and ethnological film recordings of real-life practices such as building a house, a

49 See Heeschen (1998: 12).

bridge or a trap in Eipo. These elicitation tools are all visually based. Some were developed by the Max Planck Institute Nijmegen, and one is the property of the author and the Daghida project of the Cold Lake dialect of Dene (University of Alberta, Department of Linguistics).

The selection of former publications was largely based on the very first elicitation tool. Although I have also published on other tools, there is a critical problem with them, or rather access to speakers. As Dene and Totonac are both endangered languages, it is difficult to find fluent speakers. Consequently I ran all tests with the same speakers. This is a drawback simply because of a task effect which taints the results of the follow-up studies (that is, the Caused Position task, the Motion Event task, the Motion Land task and the Spatial Categorization Elicitation task). I have chosen chapters which together represent a unified whole on the interrelation between cognition and culture.

The book is divided into three main parts. Following this introduction a chapter on theoretical issues follows that establish the analytical ground for the chapters to come. The second part presents different case studies, largely based on the two languages Dene and Totonac with additional examples from Germanic and Romance languages as well as a case study on spatial semantic loss in Dene. The third part introduces environmental landmarks as spatial coordinates in Dene and Eipo. Overall, the book starts out with highly detailed analysis of spatial semantics and spatial cognition to later broaden out to the level of environmental landmarks and toponyms or, in other words, from immediate to mediate spatial encodings and visual perception. The chapters are written such that they can be read sequentially or individually, on the understanding that they all relate to a larger framework of spatial semantics and spatial cognition.

Each chapter has been previously published as a peer-reviewed article. However what follows are excerpts from these articles which I have altered extensively so that they better conform to the overall structure of the book. Technical terms used in the book are listed at the beginning. All of this serves to give the book a coherent structure and common thread. Note also that one chapter is from a paper coauthored with Wulf Schiefenhövel. The following provides an outline of the different chapters.

Following the general introduction and theoretical outline, the second chapter, "Cognitive Representation of Knowledge: Spatial Mental Models", serves as an introduction to spatial mental models (formerly entitled "Spatial Mental Models in Common Sense Geography"). It is concerned with implicit or tacit knowledge of spatial orientation as ethnogeographic knowledge based on cognitive maps. It takes visual perception at face value, implementing abstract cognitive mental models as cognitive representation of implicit knowledge systems in orientation, specifically in navigation on land and at sea. Internal representation of implicit knowledge structures is only partially represented in language. I argue that mental models are dynamic systems of representation. As such, I survey different systems of spatial orientation as described in language and culture in different geographic areas. Moreover, physical geographic parameters, or landmarks, are required for anchoring salient geographic concepts in landscape orientation (Duvall 2011: 121; Mark et al. 2011; Golledge and Rushton 1976).

The third chapter, "Figure-Ground Reversals in Language", is concerned with one of the major questions in spatial semantics, namely the place and role of meaning in perception. The chapter addresses that question with respect to the role of meaning in spatial semantics and its figure-ground alignments (see Zlatev 2007 on spatial semantics). The issue is congruent linguistic patterns of figure-ground reversals, that is, cognitive features of salience or reference that can be redistributed from primary to secondary image features. This refers to a participant construed as foregrounded (being canonically the figure or trajector) as opposed to more backgrounded anchorage (the expected ground or landmark) and its reversed patterns. This widely known concept of gestalt psychology is not limited to visual processes, but also applies to linguistic encoding patterns. This is illustrated through a selected sample of languages.

I argue that reversal patterns illustrate the human capacity for constructing and relating objects in space which relies not only on objectively given features, but also (inter)subjective encoding decisions. The hypothesis is that the parallels between language and cognition indicate a bridging element between those levels of human conceptual organization. This element can be found in embodied cognition or situated embodiment, assumed as a crucial mediator between the two information levels (Johnson 1987; Lakoff 1987a, Chapters 12 and 13 in particular; Langacker 2008; Robbins and Aydede 2009; Rohrer 2007; Zlatev 1997, 2003, 2010). The various visually based elicitation tools used in approaching this issue are presented in this chapter. These results indicate figure-ground reversals in spatial semantics and hence some subjective encoding decisions.

This chapter presents data from perceptual elicitation tools used on a variety of languages with non-written traditions. As it happens, so-called figure-ground relations are very often linguistically reversed from their expected alignments and do not follow perceptual or objectively given cues (see Dokic and Pacherie 2006: 268 on the differences between perceptual and linguistic spatial representations). Perception does indeed consist of more than just figural grouping; it also extends to the formation of shapes and linguistic meaning. This is an interesting point when considering the relationship between language, cognition, and perception in general. Where linguistic figure-ground reversals are found one may claim that visual perception is only partially reflected in language (and hence in frames of reference; see Dokic and Pacherie 2006 for an extensive discussion of the relationship between frames of reference involved in non-linguistic spatial representation, with a focus on perception). I will also show that the decision to encode a figure or a ground in a particular scene depends on the speaker's choice of what s/he regards as foregrounded or backgrounded. This leads to a mismatch between the given gestalt and the linguistic encoding pattern.

The fourth chapter on "Degrees of Specificity in Spatial Semantics" presents a cognitive semantic synopsis of spatial topological semantics and, to a lesser degree, frames of reference. The focus is on Dene, and Upper Necaxa Totonac, the agglutinative language spoken in East-Central Mexico. The hypothesis is that differences in semantic detail indicate that speakers of Dene and Totonac encode spatial topological relations at a higher, more detailed degree of specificity than Germanic and Romance languages. This is reflected in a larger inventory of morphosyntactic and semantic choices and spatial devices. Upper Necaxa Totonac encodes spatial relations through adpositions, body parts and posture verb constructions. Here the general focus is on the differing degrees of specificity speakers assign to different figure-ground asymmetries. The results of a visually based elicitation procedure point to differences in the encoding of spatial topological relations between speakers and between languages. This research echoes numerous studies on language variation in spatial semantics familiar from typological and cognitive semantic approaches (Bloom et al. 1996; Levinson 2003; Levinson and Wilkins 2006; Senft 1997). The differing degrees of specificity are the result of different practices chosen by speakers. The data supports the idea that linguistic meaning reflects degrees of specificity in social practices or language games.

The fifth chapter on "Language Loss in Spatial Semantics: Dene" returns to figure-ground asymmetries and degrees of specificity. Again, languages, or rather speakers, carve up the spatial domain depending on individual choice rather than purely objective coordinates. This chapter illustrates intralingual differences, making the point that spatial semantic encodings can differ significantly even within a homogeneous community of speakers . First and foremost, the data points to an ongoing process of language loss in the encoding of spatial relations and spatial cognition in Dene, the highly endangered Northern Athapaskan language covered in earlier chapters. A comparison of older Dene speakers (age 65 to 85; data elicitation from 2002 until 2006 in Cold Lake Alberta) with younger speakers (age 45 to 55) shows significant effects of language loss in the latter, seen in the description of simple spatial situations and consequent loss in spatial mental models.

The findings from younger speakers show that they have a more restricted set of spatial morphemes than older speakers. One crucial difference is that older speakers do not generally use spatial morphemes, such as adpositions. Moreover, the process of language loss in spatial semantics is seen in the fact that younger speakers do not use full classificatory verb paradigms (with the relevant grammatical particles) and that their expressions are generally ungrammatical. On the other hand, older Dene speakers construe and categorize spatial relations by using fine-grained morphosyntactic and semantic encoding patterns, that is, the introduced degree of specificity. These morphosyntactic affordances, i.e., the correlation between the environment and the functional characteristics of objects and the human being, are on the verge of extinction since younger speakers are unable to incorporate these patterns in their descriptions of various spatial scenes. As I argue in this chapter, this limitation is due to ongoing language loss and the influence of English as the dominant means of communication.

The sixth chapter presents an overview of a case study entitled "Spatial Concepts in Non-Literate Societies: Language and Practice in Eipo and Dene Chipewyan"[50] conducted in collaboration with Wulf Schiefenhövel which describes environmental landmarks and cognitive maps. This chapter concerns linguistic representation and actual practices based on environmental landmarks in two unrelated languages. The chapter concerns both Eipomek and Dene. The focus here is on the repercussions of environmental experience and spatial orientation on language and cognition. The point of departure is the anthropological linguistic approach which places language in its social and cultural context, and cultural practices. Spatial knowledge is not only encoded in mental concepts or categories, it is also embodied and embedded in the lived histories of human beings and their cultural and linguistic practices.

It is apparent that some aspects of spatial cognition are culture-specific, being shaped by culture-specific practices of spatial orientation,

50 The author is responsible for the sections on Dene, the linguistic description of Eipo, the main parts of the introduction and the conclusions. The author also gathered and analyzed the Eipo data from the established corpora by Schiefenhövel and Heeschen. The sections on Eipo are all based on Schiefenhövel and Heeschen's 40 years' valuable fieldwork on Eipo.

while others seem to be universal cognitive patterns. As far as its representational function is concerned, language plays a dual role, throwing light on both the structures of cognition and on the constructive process of shaping spatial cognition. Chapters 3–5 present the micro-scale of immediate spatial orientation, while Chapter 6 concerns mediate large-scale spatial orientation. Finally, Chapter 7 offers an overall summary and outlook. It presents an initial glimpse of a theory of cognitive semiotics aligned with cognitive anthropological approaches to form a cultural-cognitive view of spatial semantics.

Chapter 2: Cognitive representation of knowledge: spatial mental models[51]

2.1 Introduction

I would like to begin with some very general comments which refer back to the introduction. Traditionally, a thought is generally interpreted as something expressed in words, and so it is natural to assume that its underlying representation must be in a verbal form (Malt and Wolff 2010). But words and propositions are not the only kinds of things of which individuals are consciously aware when they are thinking. They also experience imagery, they "see" pictures in their mind's eye with varying degrees of intensity. Are words (symbolic representation) and pictures (analogue representation) the sole candidates for thought and cognitive processes?

When addressing the abovementioned phenomenological and gestalt theory issues on visual perception, it should be apparent that the idea of a mental picture is highly idealized. Johnson-Laird and Wason state that Oatley, in his description of Micronesian voyaging, refers not only to embodied cognition theories, but also introduces distributed cognition processes (see also Hutchins 1996; Johnson-Laird and Wason 1977). This process records various means of spatial orientation and navigation between islands without instruments in cultures with non-written traditions. In these cultures, knowledge is transferred by oral and hands-on practices. Their seafarers can undertake voyages with a high degree of navigational accuracy through an elegant system of dead reckoning and more particularly the *etak* system. They conceive of the boat as stationary with islands moving past it, and the stars wheeling overhead. This spatial mental model plays a key role in spatial orientation in their navigational system. For my purposes, the most significant aspect of the system is that it is no mere visual image. It is a dynamic spatial mental model, that is, a representation of the world from which spatial inference or rather mental triangulation can be made (Johnson-Laird and Wason 1977: 523, passim 526–527).

51 This is an extensively revised version of a chapter previously published in: Klaus Geus and Martin Thiering (eds.). 2012. *Common Sense Geography and Mental Modelling*. Max Planck Institute for the History of Science Preprint Series, Vol. 426, 11–44. Note that a further revised version of this chapter was published in Klaus Geus and Martin Thiering. 2014. *Features of Common Sense Geography. Implicit Knowledge Structures in Ancient Geographical Texts*. Berlin/London: LIT, 265–317). The current chapter deviates significantly from the versions in these two publications.

It is generally assumed that humans, if raised in the appropriate environment, can learn to speak any language and to think and operate effectively in the context of any culture. But what about different peoples' traditional bodies of specialized lore? Are they organized in similar ways? Cognitive psychologists are interested in understanding how specialists mentally process and store their knowledge so that they can retrieve it as needed. I am interested in the linguistic, or rather semiotic, encoding processes in different languages which point to different encoding decisions based on culture-specific spatial mental models.

Traditional navigators of the central Caroline Islands provide a case in point. Carolinian navigation techniques include a sizable body of knowledge developed for ocean voyaging for distances of up to several hundred miles among the tiny islands and atolls of Micronesia. With no writing system, local navigators have had to commit to memory their knowledge of the stars, sailing directions, seamarks, and how to read the waves and clouds to determine currents and predict weather.

This chapter is concerned with implicit or tacit knowledge of spatial orientation. This survey in particular takes perception at face value, implementing spatial mental models as cognitive representations of implicit knowledge systems in orientation, specifically navigation on land and at sea.[52] Johnson-Laird and Wason's paraphrased description of navigation techniques and distributed cognition above provides a snapshot of the point of departure: it is held that internal representations of implicit knowledge structures are only partially represented in language. Spatial mental models are dynamic systems of representation. As such, I cover various systems of spatial orientation described in language and culture in different areas. Physical geographic parameters are also required for anchoring salient geographic concepts in landscape orientation (Duvall 2011: 121).

The point of departure is a desire to investigate more fully the subject of mental models, an essential prerequisite for understanding how paradigms of perception and representation have been predefined or pre-

52 Minsky uses the term frame-system theory. He proposes that "[w]hen one encounters a new situation […], one selects from memory a structure called a frame. This is a remembered framework to be adapted to fit reality by changing details as necessary. A frame is a data-structure for representing a stereotyped situation like being in a certain kind of living room or going to a child's birthday party. Attached to each frame are several kinds of information. Some of this information is about how to use the frame. Some is about what one can expect to happen next. Some is about what to do if these expectations are not confirmed. We can think of a frame as a network of nodes and relations" (Minsky 1977: 355). Note that I use spatial mental models and frame-system theory interchangeably (see Knauff 2013 for a logical approach to spatial layout models).

formed by those we are studying. Whether we want to reconstruct their mental models or show how humans move in space, we must identify their a priori notions of space, and the implicit cognitive knowledge or assumed linguistic determinants, i.e., spatial mental models. These are all important features of mental models as cognitive computation mechanisms and processes in particular. The application of mental models needs to be modified since they are usually viewed synchronically[53], whereas a more panchronic approach is called for here.

Orientation processes on land and at sea are based on fundamentals in mental triangulation and gestalt theory conceptions of spatial relations (figure-ground asymmetries). A major example seen in orientation on water is dead reckoning, or navigation without instruments (Hutchins 1996: 65–93; see also Hutchins 1983). More specifically, this method of navigation depends on determining one's position at any given time based on the distance and direction travelled since leaving the last known location (Gladwin 1970: 144). With this method, the navigator monitors the motion of the boat to determine the displacement from a previous position (Hutchins 1996: 56). This mental computing or mental triangulation, i.e., the transformation and propagation of representational states, is arguably also used on land (Hutchins 1996: 49). Along with this method, then, I also investigate travellers' reports, stories, symbols, icons, winds, roads and other kinds of representation to reconstruct spatial mental models of spatial orientation based on implicit knowledge systems.

As I have stated, the overall project assembles various toponyms, landmarks and reference points in various semiotic systems to elucidate ethnogeography. This works on the assumption that ethnogeography underlies cognitive information-processing systems of spatial orientation (Marr 1982). As this book argues, specific encoding patterns vary between orientation reference systems. Moreover, spatial reference frames are shown which construe a dense matrix or gestalt-like representation of knowledge systems. As such, the text also considers course-maintaining systems on land and at sea based on different sorts of semiotic systems.

The rationale is the belief that spatial mental models/cognitive maps, as gestalt-like representations of environmental cues, form dynamic mental models/cognitive maps. This means that different knowledge systems of an implicit (tacit knowledge) and explicit nature interact with each other

53 Johnson-Laird (1983); but see Renn and Damerow 2007 on the historicity of mental models; see also below.

to enable a traveller to find his/her way at sea or through vast terrains.[54] As such they are of particular interest when considering universals of spatial encoding patterns as opposed to those which are truly culture-specific or historical. Cultures differ in this respect. What may be common to all cultures, and thus universal, is the gestalt-like constructive process of spatial mental models (see below). These mental models function as implicit knowledge systems which enable humans to navigate in a specific environment at a given time and space.

Here the focus is more on the theory behind mental models which use toponyms of environmental landmarks and topographical reference frames. Mental models represent, among other things, spatial information at an abstract conceptual level of cognitive representation. They are cognitive layouts of the environment and human experience as represented in long-term memory (Wilson and Keil 1999: 25). Knowledge about both space and time must be integrated to enable human orientation in the environment. Humans are capable of forming sophisticated representations of spatial relations integrated as mental models. Some more central mental representations appear to be closely tied to perceptual systems (Ehrenfels 1890; Jastrow 1899; Müller-Lyer 1889; Pinna 2010; Rubin 1921; Thiering 2011; Wertheimer 1923).

Humans use various forms of imagery based on visual, auditory and other perceptual systems to perform internal mental processes such as mental rotation (Shepard and Metzler 1977). Tolman's results imply that animals and humans go beyond the information given when they go directly to a goal after having learned an indirect path (Tolman 1948). That conclusion is most evident when the spatial cues marking the goal location are not visible from the starting position (Wilson and Keil 1999: 135). Diachronically, a comparison of different semiotic systems is particularly worthwhile, offering as it does insight into the external representation of spatial mental models. Such models may be compared to synchronic representations in terms of universals.

This chapter further presents fundamental theoretical implications of adapting spatial mental models to semiotic systems such as practices. It has been argued elsewhere that maps, people, buildings, objects, historic and fictive events are perceived at a given time and place. Consequently we can establish a link between these cues and cognitive association. The representation of such cues is modeled in cognitive psychology as sche-

54 Renn and Damerow present an adaptation from the Cognitive Science-inspired mental models on the transmission and transformation of knowledge, especially in ancient cultures (Renn and Damerow 2007).

mas, frames, scenarios, scripts, mental models, mental frames and cognitive maps. Mental models can include collections of toponyms, landmarks, frames of reference and other cues that help to mentally triangulate a reference system. Objects as reference cues are defined as follows:

> 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 and Simmons 1991: 7)

I am interested in surveying such systems and their linguistic representation. One very specific spatial mental model of a combination of implicit and explicit knowledge is the above mentioned practice of navigation at sea seen in Micronesian cultures. These practices and cognitive processes are adopted to navigation or piloting techniques on land and at sea. Micronesian cultures are renowned for navigation of the open seas without instruments, but rather with mental gestalt-like constructions based, as I argue, on various implicit and explicit knowledge cues. These implicit cues are based on the construction of a so-called "star compass" and a sort of mental triangulation performed with this compass (Hutchins 1983, 1996). This mental triangulation is apparent in the use of a third, phantom or emergency island (Gladwin 1970; Oatley 1977; Sarfert 1911). This mental triangulation is an inference process. It is neatly summarized in the following description of the Micronesian navigator's techniques, which claims that

> [w]hen the navigator envisions in his mind's eye that the reference island is passing under a particular star he notes that a certain number of segments [*etak*; M.T.] have been completed and a certain proportion of the voyage has therefore been accomplished. (Gladwin 1970: 184)

In addition, navigators need to know a number of islands (50 to 100 on average), reefs (as seamarks), water drifts, winds, wave colors and so on. Navigators are also explicitly trained by older navigators to empirically accommodate, assimilate and finally equilibrate knowledge systems using a bird's-eye perspective (Piaget and Inhelder 1956). They learn a vast number of explicit information cues, as well as skills for mentally representing maps and different routes.

This chapter presents the theoretical framework for exploring the degree to which environmental experience and spatial orientation is reflected in texts, language and practices (as implicit knowledge systems such as spatial mental models). It is an ethnogeographic account of place names, distances between cities and other localities, and coastlines or other features. It is argued that non-linguistic information as cultural practice and implicit knowledge system has an impact on spatial language and categorization in orientation.

Furthermore, I believe that topographical spatial information in particular, but also scale, scope, distance, reference systems of the immediate environment are represented as spatial mental models of topographical coordinates and semiotic practices. The data illustrates the constructive process of environmental landmarks and cultural heritage such as practices, myths and ethnogrammars on the shaping of spatial categorization. Moreover, all manner of landmarks on land and at sea are used as proximate course-maintaining devices for orientation. These landmarks shape and determine a detailed topographical mental model of the environment as represented via language and various practices.

Reference frames are especially important when orienting oneself in different environments. The semiotic systems under review present interesting descriptions of environmental terrains and coordinates. Mental and perceptual course-maintaining in different cultures rely on mental models, that is, the orientation techniques are processes of inference within the structure of cognitive maps. As such, they are structures of spatial reasoning, which is an activity of unconscious inference (Helmholtz 1867). The aim is to employ mental models that draw a correspondence between "real world" cues, such as objects and places, and their symbolic equivalents in the models. As such the models are able to implement knowledge from earlier experiences. They are instruments of deduction processes in the context of given knowledge (Renn and Damerow 2007: 313). They are also context-specific and do not – in contrast with gestalt theory approaches – rely on universal mechanisms. They combine past and present experiences to form a cognitive network. This network also requires cultural, linguistic and historical knowledge. In the case of orientation, mental models are conceived as cognitive maps and these in turn provide mental clues about the traveller's trajectory in his/her environment.

This project explores the degree to which environmental experience and spatial orientation is reflected in spoken and written language, itineraries, texts, maps and practices. This is in line with current anthropological linguistic approaches which place language and other knowledge systems in social and cultural context, and its cultural practices (Foley 1997; Mark et al. 2011). Spatial knowledge is not only encoded in mental concepts and categories, it is also embodied in the lived histories of human beings and their cultural and linguistic practices as encoded in texts or maps (Foley 1997: 177; Johnson 1987; Siegel and White quoted above).

The issue here is the relationship between non-linguistic information and spatial language, that is, environmental landmarks such as rivers, mountains, trees and winds, and the medium (time, distance, measurement data) between landmarks. The argument is that non-linguistic information has an impact on spatial language and categorization, that is, reference to space and its relation to semiotic systems. Data points illustrate the influence and constructive process of environmental landmarks and cultural heritage in shaping spatial categorization.

Burenhult and Levinson ask how landscape features appear as nameable objects and, in particular, whether there are universal categories (Burenhult and Levinson 2008: 136). Moreover, they argue that landmarks or rather environments are interesting features of categorization (see also Mark et al. 2011). That this is indeed the case will be shown in the analysis of the relevant semiotic systems.

One aim of this book is to present some of the most fundamental spatial notions based on environmental or regional landmarks as transmitted and represented in different empirical sources. This approach deviates from the descriptions of landscape features above in the sense that it adopts spatial mental models that are referred to in navigational orientation techniques. This kind of navigation on land and at sea relies heavily on mental models and mental triangulation in ensuring that the navigator has a spatial conception of his position at any given time. These techniques combine implicit and explicit knowledge systems based on geographical coordinates.

2.2 Theoretical basics

This section presents some theoretical fundamentals which are vital for understanding spatial mental models. The first subsection presents cognitive techniques for orientation and navigation, that is, landmarks, and mental models as cognitive maps. It is argued that for orientation, travellers rely on cognitive maps as a mental process of inference. This is followed by a description of ideas of space and degrees of specificity. The section ends with a look at the basics of figure-ground asymmetries and frames of reference. All of these theoretical issues are important when describing one's orientation in an environment, whether one uses instruments or not. Other kinds of orientational devices are governed by implicit knowledge of course maintaining and explicit knowledge of place names, buildings, rivers, coasts lines, etc., serving as reference systems.

In the course of my argumentation I present some fundamental spatial concepts and representations which are based on anthropomorphological spatial knowledge in different semiotic systems. This spatial knowledge is developed by members of any culture on the basis of human phylogenetic adaptations throughout their ontogenesis.

Finally, it is important to stress once more that spatial cognition is externally represented in spoken language, texts, and maps as well as in culture-specific practices (Foley 1997: 169–178). Hence, language and practice are understood as external representations of mental concepts or, as Boas put it about hundred years ago, human language is one of the most important manifestations of mental life (Boas 1997 [1911]: 68).

I begin with the general notion of mental models, followed by general comments on visual perception and cognition.

2.3 Cognitive representation of knowledge: spatial mental models

This paragraph introduces a brief summary on mental models (Johnson-Laird 1983; van der Zee and Nikanne 2000). In general terms, mental models are cognitive ways of representing knowledge.

"Mental models represent entities and persons, events and processes, and the operations of complex systems" (Johnson-Laird 2005: 187). Nöth presents a very clear definition of mental models as seen in the introduction:

> Unter einem (mentalen) Bild versteht auch die kognitive Psychologie die mentale Reproduktion oder Repräsentation einer nicht gegenwärtigen perzeptuellen Erfahrung. (Nöth 2000: 232)

Nöth is essentially summarizing cognitive psychological theories of mental models or mental pictures (*mentales Bild*) as mental reproductions and representations of non-present visual experiences. Moser:

> […] eine zentrale Eigenschaft mentaler Modelle: Die mentalen Modelle ermöglichen nicht nur das Finden von geeigneten Heuristiken zur Problemlösung, sondern sie gewichten auch die verschiedenen Aspekte desselben Sachverhalts je nach gewähltem mentalem Modell unterschiedlich. Dadurch wird die Aufmerksamkeit auf ganz bestimmte Problemlösungen gelenkt, während andere aus dem Blickfeld geraten. (Moser 2003: 188)

Finally, Knauff introduces an adaptation of Johnson-Lairds mental model theory, stating

> [h]owever, my main motivation here is to develop an alternative account that says that the human reasoned construct and inspect qualitative, non-metrical integrated spatial representations, rather than visual images. In the space to reason theory [Knauff's proposed theory; M.T.], I call such integrated spatial representations *spatial layout models*. This is a good place to clarify the difference between

> mental models in Johnson-Laird's sense and spatial layout models in my sense. On the one hand, spatial layout models are mental models, since they are also integrated representations. […] On the other hand, I partly concur with the many cognitive psychologists who criticize the fact that the exact contrast between models and images has changed over time and still remains unclear. (Knauff 2013: 33–34; emphasis original)

The quotation below summarizes the idea of mental models as implicit processes of deduction. Here the example is based on Aristotelian dynamics.

> Das Beispiel dieser aristotelischen Dynamik zeigt, wie ein mentales Modell durch den Wechsel vom Medium des intuitiven Denkens zur schriftlich fixierten Sprache zum Ausgangspunkt und zur Grundfrage einer naturphilosophischen Theorie werden kann. Die aristotelische Dynamik expliziert in der Form von allgemeinen Aussagen die Struktur von intuitiven Schlussfolgerungen [...]. Das Beispiel macht darüber hinaus deutlich, dass die sprachliche Explikation intuitiver Schlussfolgerungen, indem sie Bedeutungsspielräume einengt, eine Transformation des solchen Schlussfolgerungen impliziten Wissens bewirken kann. (Renn and Damerow 2007: 317)

Renn and Damerow argue that the mental model of Aristotelian dynamics, specifically the motion-implies-force model, is based on an explication of intuitive thinking of ancient philosophers. This model is not based on perception and phenomenology of the *Welt-an-sich* (the world as it is), but on a mental construct, i.e., a mental model. The transmission from intuitive thinking to written language and theory shows that a mental model can be the basis for a theory. We see the change from implicit (procedural) to explicit (declarative) knowledge structures. More specifically, and more importantly, verbal manifestation of intuitive deduction profiles a transformation of deduction of implicit knowledge structures.

Moreover, mental models consist of elements and the relations between them (spatial, temporal, causal, force dynamics etc.; see specifically Mulder 2007 and Talmy 2000: 409–470 on force dynamics). Elements are prototypically objects in the world (Bryant et al. 2000: 118). Various qualitative properties can be ascribed to these objects. They enable deductive reasoning on the basis of a priori knowledge. The data sources analyzed throughout this project regard any kind of written source as a form of externalized mental representation. There are also clues which fill in the gaps of memory and knowledge. As such they are not universal but context-specific, depending on a culture, its history and the speaker.

2.4 A simple cognitive network

The Test-Operate-Test-Exit (TOTE) unit is presented as an example of cognitive representation procedures. This unit is a cognitive procedure for calibrating between *as-is* states and *target* states in long-term memory. These units enable mental models to adapt to new forms of knowledge. Hence, they act as TOTE procedures in a logarithmic feedback process. This means that an incoming perceptual input I_n assimilates and accommodates the given mental model R_n, that is, the cognitive knowledge representation (= *R*) system, to eventually equilibrate the input and output systems (as-is vs. target state). This input-output mechanism is not a linear calibration, but a trial-and-error procedure through feedback processes. In simple terms: new, externally triggered information (= assimilation) meets old information or representation (= accommodation) and requires adjustment (= equilibration). Past experience is here connected and combined with present experience as outlined in semantic network theories (Jackendoff 1983: 122–127; Johnson-Laird 1983: 211–242). This new experience is embedded in a cognitive network. The following function illustrates a simple network as a rule system:

$[\text{place}^{x}] \rightarrow [_{\text{place}}\ \text{place-function}\ ([\text{thing}^{y}])]$

This rule system applies for the following propositions:

The mouse ran from under table. = $[_{\text{path}}$ from $([_{\text{place}}$ under $([_{\text{thing}}$ table$])])]$.
The mouse ran into the room. = $[_{\text{path}}$ to $([_{\text{place}}$ in $([_{\text{thing}}$ room$])])]$.

The figure ('the mouse'), the path ('into') and the location and ground ('table/room') are conceptual entities. The proposition involves the verb phrase X 'ran into/ran from under' Y encoding the trajectory ('into' = source(starting point)/goal(endpoint)) of the figure. The transitive motion event 'ran' also encodes the starting point from a source and highlights the goal of the movement 'into'. In English, these entities are linguistically encoded as prepositions, verbs of motion and other participants.

In analyzing different languages with non-written traditions, the goal is to come up with a number of general rule systems which can be implemented in semantic or propositional networks. Semantic networks are representation systems of knowledge in memory. As such they are semantic relationships of conceptual or cognitive entries. Entities of abstract or concrete objects are represented as units in semantic networks (Strube, Becker, Freksa, Hahn, Opwis, and Palm 1996: 422–423). Connections between units represent relations between entities. In English, for example, it can be argued that path is encoded via 'to', 'from', 'towards', 'away from', or via a thing[y] or place[y] (Jackendoff 1983: 166). Hence, the task is to identify various cognitive parameters such as figure, ground, scope, scale, perspective and reference frames to describe spatial mental and cultural models in different conceptions of space.

These networks enable us to deduce, from incomplete knowledge, a coherent gestalt similar to cognitive contours[55]. Moreover, mental models bridge different levels of knowledge representing the same object or event in different knowledge structures.

Again, mental models are specific forms of knowledge representation. The quotations below neatly summarize three different approaches to defining such models. The first two quotes concern the synchronic cognitive knowledge system while the third quotation, from Renn and Damerow, focuses on the historic or diachronic value of mental models.

> Mentale Modelle bezeichnen eine bestimmte Form der Repräsentation von Wissen [...]. Das Konzept des mentalen Models sieht vor, daß Menschen strukturelle und dynamische Aspekte komplexer Problembereiche des Alltags (z.B. technische Geräte, logische Schlußfolgerungen) dadurch repräsentieren, daß sie interne Modelle aufbauen, welche die jeweiligen Sachverhalte (Funktionieren einer Kaffeemaschine, Textverstehen bei Gebrauchsanweisungen, räumliche Inferenzen) anschaulich machen und mental zu simulieren erlauben. (Strube, Becker, Freksa, Hahn, Opwis and Palm 1996: 406)

> Die einzigen Wege zwischen der Welt und dem Gehirn sind Nervenstränge wie jene, die von Augen, Ohren und der Haut her kommen. Auf welche Weise gelingt es den Signalen, die durch diese Nerven gehen, uns das Gefühl zu vermitteln, uns »in« der Welt außerhalb zu befinden? Die Antwort lautet, daß dieses Gefühl eine komplexe Illusion darstellt. Wir haben nie tatsächlich *direkten* Kontakt zu der Welt außerhalb. Statt dessen arbeiten wir mit Modellen der Welt, die wir in unseren Gehirnen fertigen. (Minsky 1994: 110; emphasis added)

> Mentale Modelle verknüpfen gegenwärtige mit vergangenen Erfahrungen, indem sie neue Erfahrungen in ein kognitives Netzwerk aus vorangegangenen Er-

55 "Some notions commonly cited as image schemas fall instead in my third class, conceptual archetypes. These are experientially grounded concepts so frequent and fundamental in our everyday life that the label archetype does not seem inappropriate. Here are some examples: a physical object, an object in a location, an object moving through space, the human body, the human face, a whole and its parts, a physical container and its contents, seeing something, holding something, handing something to someone, exerting force to effect a desired change, a face-to-face social encounter. These notions are fairly schematic, but considerably less so than the configurational concepts. Some are incorporated as components of others. While they can be quite complex and hard to describe explicitly (try explaining what a physical object is!), they are basic in the sense that they are readily apprehended as *coherent conceptual gestalts* [emphasis M.T.] at an early developmental stage" (Langacker 2008: 33–34).

> fahrungen einbetten. Sie ermöglichen so Schlüsse aus unvollständigen Informationen. (Renn and Damerow 2007: 313)

According to Strube et al. (first quotation) mental models are specific forms of knowledge representation. Mental models are problem-solving procedures built on internal models of experiences in daily routine. In other words, in mental models "human beings construct mental models of the world, and [...] they do so by employing tacit mental processes" (Johnson-Laird 1983: X)[56].

The second quotation by Minsky argues much more epistemologically in stating that the only connection between the world and the brain is the nervous system, including the eyes, ears, and the skin. Minsky argues that the idea of direct contact with the world is an illusion. Human beings, like other animals, are never in direct contact with the world. Instead humans cognitively construe models of the world; cognition is the filter between the world and the human being, in other words, autopoietic systems are in effect (Schmidt 1994, 1996, 1998; Varela, Thomson and Rosch 1991).

In a broader and more diachronic sense, the last quotation states that mental models combine past and present experiences, embedding information to form cognitive networks of memory representation. Note that this is not a new idea since Fauconnier defined his mental spaces as "structured, incrementable sets with elements (a, b, c, …) and relations holding between them (R_1ab, R_2a, R_3cbf, …), such that new elements can be added to them and new relations established between their elements" (Fauconnier 1994: 16). He highlights the idea of matching new and old information in a similar way to Renn and Damerow.

Fauconnier is very specific in his modeling of mental spaces and their relations to linguistic cues. He states that

> linguistic expressions will typically establish new spaces, elements within them, and relations holding between the elements. I shall call space-builders expressions that may establish a new space or refer back to one already introduced in the discourse. (Fauconnier 1994: 17)

Common to all these approaches is a cognitive level of mental representation. In line with Nunberg (above), Fauconnier argues that human beings establish links or connections "between objects of a different nature for psychological, cultural, or locally pragmatic reasons and that the links thus established allow reference to one object in terms of another appropriately linked to it" (Fauconnier 1994: 3). The basic argument here is the *Identifica-*

56 Johnson-Laird goes on to state that "the concept is that of *recursive* mental processes that enable human beings to understand discourse, to form mental models of the real and the imaginary and to reason by manipulating such models" (Johnson-Laird 1983: XI; emphasis original). The key issues is tacit, or as I refer to it, implicit knowledge.

tion Principle. This principle holds that two objects, *a* and *b*, are linked by a pragmatic function F $(b = F(a))$, a description of *a*, d_a, may be used to identify its counterpart *b*. The example Fauconnier uses is a function linking authors with the books containing their work: a = Plato, $b = F1(a)$ = "books by Plato". The Identification Principle allows us to deduce from "Plato is on the top shelf" that "the books by Plato are on the top shelf". The first proposition encodes a description or name of a person, d_a (= Plato) that identifies an object *b*, i.e., the collection of books (on the book shelf) (Fauconnier 1994: 4). In a similar situation, this principle also profiles a trigger that identifies the target or source domain. It is not Plato who is on the book shelf, but his work. The decision to profile his work depends on the context. It would be rather strange if Plato *were* sitting on a bookshelf, but this would at least have been a possible world.

As far as implicit knowledge structures are concerned, mental space builders or connectors – the deduction from one piece of information, cue *a* to another one *b* – help model the various data cues and reference points as outlined in various texts and oral descriptions by different authors. These connectors are used to model semantic networks which are interrelated knowledge systems of implicit (procedural) and explicit (declarative) processes. This is even more interesting since Fauconnier argues that geographic spaces, for instance, are linguistic spaces (Fauconnier 1994: 30). This represents a direct link between physical or imagined spaces and their linguistic and cognitive counterparts modeled as semantic networks.

How can this interaction between perception and cognition be conceived? The following outline presents a first glimpse of the intricate procedures involved.

2.5 Cognition, perception, and language

In the field of cognitive linguistics, it is widely agreed that languages reflect conceptual structure and that variation across languages encodes different conceptual systems (Evans and Green 2007; Jackendoff 1983; Langacker 1987; Levinson 2003; Levinson and Wilkins 2006; Talmy 2000; Thiering 2009b). About three decades ago, the cognitive linguist (or cognitive generativist, personal communication) Ray Jackendoff queried the nature of meaning (and I would add spatial memory) in human language, "such that we can talk about what we perceive" and "what does the grammatical structure of natural language reveal about the nature of perception and cognition?" (Jackendoff 1983: 3). He further claims, as I do, that to study language *is* to study cognition. His focus, though, was on the grammatical structure of natural language. In the ensuing three decades, cognitive linguistics has produced many insights into the intricacies of language and cognition from different interdisciplinary perspectives (Evans and Green 2007; Geeraerts and Cuyckens 2007; Langacker 2000, 2008; Levinson 2003; Levinson and Wilkins 2006). As has been outlined above, one common denominator is that language gives insights into the mental world of a speaker and a speaker's community. This is especially true when combing psychological theories on cognition with semantic models, or semantic networks (Johnson-Laird 1983: 211).

Moreover, cognitive linguistics asks, among other questions, whether language actually has a constructive or determining influence on cognition, and what role visual perception has in this process (Marr 1982: 31–38, and Marr's Chapter 2 on Vision; see also Thiering 2011). Talmy and others refer in particular to the gestalt theory framework of figure-ground asymmetries (Langacker 1987, 1991, 2000, 2008; Talmy 1978, 1983, 2000). Figure-ground asymmetries are essential in constructing spatial and geometrical relationships (Ehrenfels 1890; Koffka 1930; Pinna 2011; Rubin 1921; Thiering 2011; Wertheimer 1923, 1925).

In visual perception, we choose a reference object to which to relate a canonically smaller object in a given spatial scene (see below). This process is not only constitutive for cognitive representations of objects, events and so on, but also for linguistic constructions, at least from a cognitive linguistic perspective. These constructions are processes embedded in mental models which involve engrams. These engrams, or memory chunks, are cognitive meaning components, meaning that the knowledge of the experienced world is represented in such mental models. These models are named "gestalts" in reference to the constructive process of the speaker in his/her interaction with the perceptual world – linguistically, phenomenologically and cognitively. This gives rise to the idea of a gestalt as a as a mental model or cognitive map in reference to the phenomenologist approach posited by Merleau-Ponty and the later Wittgenstein (Merleau-Ponty 1974, 1976; Wittgenstein 2006).

A mental model is not a static cognitive representation, but rather a dynamic cognitive model. Changing aspects of the figure or the ground also imply changes of meaning ascription (Thiering 2011; see also the chapter on figure-ground reversals below). As such the gestalt model adapts to changes in perception and various information cues that are non-linguistic and linguistic. Changes in figure-ground asymmetries support the idea that they are only partially universal across cultures, changing in response to culture-specific and individual choices. These changes are online processes adapting to input cues, meaning that mental models are dynamic representation systems. The example of navigation on open seas without instruments supports such gestalt-like mental models. Information cues include the abovementioned aspects such as wind directions, reefs, birds, and the so-called third, phantom or emergency island (Gladwin 1970; Hutchins 1983, 1996; Sarfert 1911). Also reviewed are landmarks, such as rivers and direction of flow, mountains, as well as star constellations which determine direction and thus form frames of reference for orientation. It is assumed that input cues forming a gestalt as a cognitive mental model are multimodal, that is, different information channels influence the cognitive apparatus. These resulting mental models, or abstract mental representations, are conceived as gestalts (Oatley 1977). They combine various implicit and explicit information cues that of which the speaker-hearer is not necessarily conscious.

In terms of cognitive economy, gestalts have the advantage that they gain information in a holographic manner. This sounds more far-fetched than it really is. A holographic visual representation needs only a small number of information cues to construe an image, usually a 3D image (Marr 1982)[57]. This image is based on the speaker-hearer's physiological apparatus and his/her cognitive structures. To form a gestalt, for example to orient oneself in a known or unknown environment, a small number of cues are sufficient for construing a gestalt-like representation. This gestalt is much more than a simple figure-ground asymmetry since it also depends on online computing. It also adds various other imaging parameters that set the stage for a speaker-hearer (see below for some additional imaging parameters). Note that Hutchins explicitly argues in favor of this idea, saying of Micronesian navigation that "a practiced navigator can construct the whole compass mentally from a glimpse of only one or two stars near the horizon" (Hutchins 1996: 70). He goes on to say that this ability is indispensable in construing a mental model for his orientation since the star bearings he needs to triangulate may not be visible at the time of the voyage. Hence, "the star compass is an abstraction which can be oriented as a whole by determining the orientation of any part" (Hutchins 1996: 70).

Johnson further argues that these "are gestalt structures, consisting of parts standing in relations and organized into unified wholes" (Johnson

57 This is also known from navigation without nautical instruments. A number of environmental cues are added to from a gestalt via cognitive contours. This knowledgde is represented as a cognitive map for orienting oneself at sea and arguably also on land.

1987: xix; see Miller and Johnson-Laird 1976: 47–57 on the relationship between parts and wholes in object perception).[58] In other words,

> our experience is embodied, that is, structured by the nature of the bodies we have and by our neurological organization […] the concepts we have access to and the nature of the 'reality' we think and talk about are a function of our embodiment: we can only talk about what we can perceive and conceive, and the things we can perceive and conceive derive from embodied experience. (Evans and Green 2007: 46)

The empirical support comes from different sources such as elicitation tools, corpora, ethnolinguistic texts and different practices. Practices are simply actions of handcraft or construction sites. In the empirical sources under review, these practices encode knowledge systems transferred from one generation to the next via actual hands-on practices.

Ever since gestalt psychologists developed theories of perceptual constraints on visual perception, the extent to which language and hence symbolic function influence the construal of a visual scene has also been questioned (Ehrenfels 1890; Jastrow 1899; Koffka 1935; Köhler 1929; Metzler 1953; Müller-Lyer 1889; Rubin 1921; Wertheimer 1923, 1925; see Merleau-Ponty 1974, 1976 on a phenomenological approach based on gestalt theory approaches). Minsky points out that we humans always construe mental models of the world based on the structure of our brains (as well as the body; Minsky 1977; but see Gallagher 2005 on the body and mind interaction and Hutchins 1996 on distributed cognition). This means that perception is a mediator or a process between cognition and the external world. Specifically, mental models are the actual construing devices or rather abstract mental representations of "the real world" (Johnson-Laird 1983; Krumnack et al. 2011; Minsky 1994).

The cognitive-semantic approach in accordance with Langacker (1987) and Talmy (1978, 1983, 2000) adopts the figure-ground asymmetry (or Langacker's technical term trajector-landmark) and uses it for cognitive linguistic and cognitive anthropologist analysis. Broadly speaking, the distinction generally (but not always) follows the syntactic division of a sentence into subject and object (Langacker 1987: 231; Thiering 2011). Below I will describe this asymmetry in more detail.

Along with these mental models, this project presents various ideas of space, or *Raumbilder,* as introduced above (Malotki 1979). Such ideas of

58 It should be noted that Johnson explicitly attacks objectivist theories of meaning, claiming, for example, that "meaning is an abstract relation between symbolic representations (either words or mental representations) and objective (i.e., mind-independent) reality. These symbols get their meaning solely by virtue of their capacity to correspond to things, properties, and relations existing objectively in the world" (Johnson 1987: xxii).

space, i.e., the speaker's basic delimination of his/her world of experience, are important in any language and culture. These ideas of space include the deictic parsing of space into 'here', 'there' and 'over there', or simply 'celestial space' as opposed to the 'earth' as encoded via 'above' and 'down'. Ideas of space are also seen in the projectives 'left' and 'right', 'in front of' and 'behind', 'up' and 'down', 'near' and 'far away', 'inside' and 'outside', 'in' and 'on', the cardinal directions 'north', 'south', 'east', and 'west', 'back' and 'forward', manmade places such as 'houses' and 'geographic places' or 'surfaces' (Malotki 1979: 294–297).[59] These are certainly based on cognitive frames of reference, that is, cognitive descriptions of spatial arrays as reference systems serving as a shared spatial anchor (Haun et al. 2011).

The following section presents the idea of frames of reference as coordinate systems for orientation.

2.6 Frames of reference

Frames of reference are crucial in the linguistic encoding of spatial orientation and spatial cognition in particular (Eilan, McCarthy and Brewer 1993; Levinson 1996: 126; but for a critical discussion see Dokic and Pacherie 2006). The actual use of the concept refers back to gestalt theories of perception, which state that an organization of units serves to identify a coordinate system with certain properties of objects resulting in a gestalt. Thus, human beings instantiate relations between objects relying on various frames of reference which, as the name implies, serve as reference points.

According to Malotki (1979), the term "linguistic coordinate" means the division of a spatial configuration into a speaker, a hearer, and a third part (a person or a thing the speaker-hearer refers to; see Bühler 1999[1934]; Ogden and Richards 1923). Hence, a linguistic coordinate system is not just a geographical or mathematical abstract concept, but also a means of spatial configuration in linguistic encoding. The encoding

59 Note that in contrast to Hopi (the language in which Malotki specialises), some languages do not have real terms for cardinal directions. Yet it is believed that expressions such as 'downstream' and 'upstream' have a similar semantic function. So we can say that selected languages also evoke a three-way system of deictic reference. This three-way separation is similar to the German *hier* 'here', *da* 'there' and *dort* 'over there', which differentiate between proximal and distal distances taking the speaker as the anchor of his/her perspective (note the lack of a medial marker as we have seen for Hopi above).

of spatial relations depends on certain spatial (and temporal) parameters that set the linguistic coordinate reference system for the speaker-hearer.

A reference point anchors a specific orientation between objects and the viewer (Carlson 1999, 2000, 2003; Carlson, Logan 2001; Carlson-Radvansky and Irwin 1993; Carlson-Radvansky, Carlson-Radvansky 1996; Levinson 2003). These construals are encoded in different languages in different ways, and thus differently grammaticalized or lexicalized, i.e., different grammatical or morphosyntactic components encode the various reference points (see Verhagen 2007 on construals and perspective). In considering frames of reference, Dokic and Pacherie argue that "perception may be perspective-free, in the sense that it need not involve any frames of reference" (Dokic and Pacherie 2006: 259). I shall determine whether this is also true of the languages and cultures reviewed here.

The meanings of verbal expressions are based on conceptualizations of figure-ground asymmetries (Thiering 2011; see below). In addition, all facets of our general knowledge of a conceived entity contribute to the meaning of an expression which designates this entity, and so we see again that any rigid distinction between semantics and pragmatics is superfluous (Nunberg 1978; Sweetser 1990). The encoding of spatial relations depends on certain spatial (and temporal) parameters that set the linguistic coordinate reference system for the speaker/hearer. In general, spatial marking is based on one of three different reference frames. These are assigned to the objects profiled in the situation (Carlson-Radvansky 1993; Carlson 1999, 2000, 2003; Carlson and Gordon 2001; Coventry and Garrod 2004; Levinson 2003).

The three frames of reference are (a) a viewer/ego-centered or relative frame, as in the English example "he's to the left of the house" (assuming that from the perspective of the viewer, a person is situated to the left side of the house), (b) an object-centered or intrinsic frame, as in "he's in front of the house" (assuming that the front is where the main door is located; the object has an inherent front and back side), and (c) an environment-centered or absolute frame, as in "he's north of the house/city".

In (a), the viewpoint depends on the location of the perceiver's vantage point and his/her relation to the figure and ground. The intrinsic frame in (b) is an object-centered reference system determined by culture-specific inherent features of the object. Finally, the absolute frame (c) is a fixed direction provided by, for example, a cardinal direction (for an extensive overview, see Levinson 2003; Levinson and Wilkins 2006).

This study will primarily focus on the semantic features of location, direction, path and manner of the figure and ground. It is argued that these ascriptions are determined by cultural, environmental and language-specific affordances (Whorf 1956; Wygotski 1964; Watzlawick 1981; Hunt and Agnoli 1991; Lucy 1992a, 1992b). These in turn depend on speaker-imposed figure-ground asymmetries which are attributed to the respective objects (Talmy 1978, 1983, 2000).

So far we have seen that spatial marking is based on the instantiation of one of three different reference frames. These are assigned to the objects profiled in the situation (Carlson 1999, 2000, 2003; Carlson and Logan 2001; Carlson-Radvansky and Irwin 1993; Coventry and Garrod 2004; Levinson 2003, but see Jackendoff 1996, who introduces eight different and more specific frames of reference). Dokic and Pacherie point out that the use of frames of reference "involves different cognitive abilities" (Dokic and Pacherie 2006: 264). The distinctions between these frames of reference are not absolute or clear-cut, rather they are highly idealized classifications which can intersect with each other. Nevertheless, frames of reference do have an advantage in that they can spell out the specific semantic functions and imaging parameters of language and the construer in particular to highlight the often highly subjectivized construction mechanisms.

Grabowski proposes the following situation: a person drives a car, with a passenger, along a road and sees another car at a certain distance, parking in the direction of traffic (in this example the car is a yellow "Beetle") (Grabowski 1999: 14–15). The passenger asks whether she (the driver) could park "in front of" the Beetle (the German example is: "*Halte doch bitte vor dem gelben Käfer an*!"). Now, where is "in front of the Beetle"? Grabowski claims that we usually use 'in front of', and 'behind' as follows: If we move towards and pass by an object, then the place which appears first is called "in front of X (any object)". The object itself (the yellow Beetle) would appear first and then the location behind the object. Hence, 'in front of' means that it is located between the object (the Beetle) and our perspective. 'Behind the object' is the location which is beyond the actual object (away from it). But cars have their own front-end and thus an intrinsic orientation. "In front of the Beetle" could therefore also mean the location of the car's front which is actually 'behind' the Beetle from the driver's perspective. We see that the choice of reference has to be specified to maintain location. Two frames of reference interfere: the intrinsic and the relative.

Frames of reference are linguistically based on semantic structures. These are predications characterized relative to cognitive domains such as time, space and color. Any cognitive structure can function as a domain for a predication (Langacker 1987: 56). Moreover, meaning is conceived as cognitive processing[60]. Expressions used to describe an ostensibly objective situation may differ in meaning, depending on how the situation is construed. This is seen in figure-ground reversals (Thiering 2011). An expression imposes a particular image on its domain. Imagery is used as a technical term for the cognitive capacity to construe a cognitive domain in alternate ways.

The following examples in (4) give an idea of this variation in different languages (1a–g elicited by the author).[61]

(4)

a.

FIG	LOC	GND	CLV:POST=STAT[FIG]	Dene
k'es	*gáh*	*yaltikóe*	*ho-ʔa.*	
poplar	close/near/beside	church	IMPF.3SG.S-SO.stand(exist; to have extension)[62]	

'The poplar stands beside the church.'

b.

FIG	LOC	GND	CLV:[?]POST=STAT[FIG]	Dene
k'es	*ʔuzi*	*yaltikóe*	*ná-ghí-ʔa.*	
poplar	on.the.other. side.of	church	in.place.of[?]-IMPF.3SG.S-SO.stand(exist; to have extension)	

'The poplar stands on the other side of the church.'

60 Langacker argues more specifically that verbs are symbolic processes, i.e., "a verb is a symbolic expression whose semantic pole designates a **process**" (1997: 244; highlight original). Different states are profiled in such a process consisting of a figure (trajector) and a ground (landmark) in a spatial domain. The key processes are summary and sequential scanning as contrasting modes of cognitive processing. The former is an additive process, a set of events contributing to a single configuration (coexistent and simultaneously available) whereas the latter involves the transformation of one configuration or blending into another (Langacker 1987: 145; see also Fauconnier 1994 on conceptual blending).

61 The first line presents the concepts in small capitals (as are all technical terms). The second line in italics is the actual elicited response from one or more speakers while the third line parses the response into grammatical meaning. The last line is an English translation. Note that an additional line is added for Totonac data, which parses grammatical information in more detail.

62 The prefix *ho-* also encodes an area or a place (Cook 2004: 174). As Cook points out, the exact meaning of this prefix is ambivalent.

c.

GND	LOC	FIG	CLV:POST=STAT[FIG]	Dene
laméskóe	*k'edhe*	*k'es*	*ná-ghí-ʔa.*	
church	alongside	poplar	in.place.of[?]:IMPF.3SG.S-SO.stand(exist; to have extension)	

'The poplar stands alongside the church.'

d.

GND	LOC	FIG		CLV:POST=STAT[FIG]	Dene
yaltikóe	*ghá*	*k'edhe*	*k'es*	*ná-ghí-ʔa.*	
church	close/near /beside (physically)	alongside	poplar	in.place.of[?].IMPF.3SG. S-SO.stand(exist; to have extension)	

'The tree stands close to/near/beside/alongside the church.'

e.

FIG	POST	LOC	GND	German
Der Baum	*steht*	*vor*	*der Kirche.*	
the tree	3SG.S.IMPF.stand	in.front.of	the church	

'The tree stands in front of the church.'

f.

FIG	POST	LOC	GND	Norwegian
Tre-et	*står*	*foran*	*kirk-en.*	
tree-the	3SG.S.IMPF.stand	in.front.of	church-the	

'The tree stands in front of the church.'

g.

FIG	EXIST	LOC	GND	English
The tree	*is*	*in front of*	*the church.*	
the tree	3SG.S.IMPF.be	in front of	the church	

'The tree is in front of the church.'

h.

LOC+BP	GND	POST	CLS	FIG	Totonac
ixcha:hé:n	*nakpu:sikwalán*	*ya:lh*	*a'hatín*	*kí'wi'.*	
ix-cha:hé:-n	nak=pu:sikwalán	ya:lh	a'ha-tín	kí'wi'	
3PO-back-NM	LOC=church	stand	CLS-one	tree	

'There is a tree behind the church.' (Beck, personal communication) i.

POST+ LOC[CARDINAL]	LOC[ADP]	LOC[PROJECTIVE]	GND	FIG	Tzeltal
tekel-Ø	*ta*	*s-tz'eel*	*eskwela*	*te'.*	
standing-3absolute.suffix	at	3ergative-side	school	tree	

'The tree is standing at the side of the school.' (Brown 2006: 244)

j.

FIG	POST	LOC[PROJECTIVE]		GND	Dutch
De hond	*zit*	*rechts naast*	*zijn*	*hok.*	
the dog	sits	right next to	his	cage	

'The dog is sitting to the right of its kennel.' (Staden, Bowerman and Verhelst 2006: 507)

The results in (at least 4a–c, and possibly also 4d) indicate the speaker's use of a particular kind of contextualized, intrinsic frame of reference (Levinson 2003; Levinson and Wilkins 2006). It does not encode an 'in front of' (*nádaghe* in Dene) relation of the primary to the secondary object. This is different to English, Norwegian, German, and Dutch (4e–g, 1,j) which use a relative frame of reference (the human body or viewer's location being the anchor for orientation). Dene speakers encode a rather figure-dependent construal in which the entrance of the church is profiled as the intrinsic focal point in the encoding of the relation of the figure to the ground.

An intrinsic frame of reference expresses the figure's orientation more specifically. Such expressions are generally called non-biased geometry, as opposed to biased geometry (Talmy 1983: 240). In expressions based on biased geometry, a relative frame of reference is instantiated that depends on the speaker's perspective of the scene. In other words, the speaker profiles the figure as being in a frontal axis to the ground, depending on the speaker's perspective and scope. This scope is important in Langacker's stage model introduced above (Langacker 1987). It implies that the scope of the figure to be localized depends on various qualities of the ground. Langacker argues that speakers set a stage in which various imaging parameters are at work, e.g., figure, ground, scale, scope and distance. This stage enables the speaker to set a coordinate system which helps to construe different asymmetries.

I argue that the different frames conceptually construe different gestalts based on language-dependent features. An interesting example considering variation of frames is the navigational system of some Micronesian seafarers. They use cognitive maps based on gestalt principles (Gladwin 1970; Hutchins 1983; Oatley 1977; Sarfert 1911). Micronesian navigation techniques combine different frames of reference to construe a cognitive map for orientation. As is argued, this cognitive map is a schematization as a gestalt. This gestalt serves as a coordinate system for the seafarer. With no nautical instruments, the seafarer construes a cognitive map for travel between islands from just a few anchor or reference points. Beside practical knowledge, they use orally transmitted knowledge of the various characteristics of the sea, such as riffs, currents, winds, and between 50 to 100 islands which all determine the journey. We can only understand these techniques if we assume cognitive maps to be mental models based on gestalt principles. This means that just one information input is required for construing a complete gestalt, again based on the process of cognitive contours.

2.7 Figure-ground constructions

As outlined above, this survey addresses the question of spatial mental models, specifically the role of meaning in the form of mental models in spatial semantics and its various figure-ground alignments. Consequently the focus is on participants that are construed as foregrounded (being canonically the figure or trajector) or backgrounded (the expected ground or landmark) and reversed patterns. This widely-known aspect of gestalt psychology is not limited to visual processes, but also applies to linguistic and verbal encoding patterns (Langacker 1987; Talmy 1978, 1983, 2000; Thiering 2011).

In considering the figure-ground asymmetry, the cognitive semanticist Talmy adopts a somewhat simplified gestalt psychology dichotomy. I concur with Talmy's definition, arguing that certain cognitive categories play an important role in attributing the primary and secondary objects of a scene or stage (Talmy 1983: 230). These functions are encoded by the figure and ground of a scene – the variable element or positive space versus the reference element or negative space (Hofstadter 1980; Talmy 1978: 627; 1983: 232; 2000). The former is the smaller, moveable object whereas the latter is usually the larger, permanently located object (see Talmy's 20 parameters for the domain of spatial configurations of figure-ground asymmetries; Talmy 1983: 277–78).

Three basic factors determine the contrast between figure and ground: the size, movement, and position of the figure in relation to the ground in the shared knowledge of the discourse participants. Talmy states that adpositional phrases profile relationships such as the location of the figure in relation to the ground, the time of the unfolding event, the manner in which the event unfolds, and the transition, motion and path of the figure (Talmy 2000).

Talmy adopts and simplifies the gestalt theorists' figure-ground asymmetry, stating that a physical object is located or moves with respect to another object which serves as a reference point (Talmy 1978: 627). This asymmetry is embedded in schematization. Schematization is the process whereby specific aspects of a reference point of a scene are profiled to represent the whole gestalt (Talmy 2000; Sinha and Kuteva 1995). Talmy defines the basic asymmetry in a schematization process as follows:

> The Figure object is a moving or conceptually movable point whose paths or site is conceived as a variable [...]. The Ground object is a reference-point, having a stationary setting within a reference-frame, with respect to which the figure's path or site receives characterization. (Talmy 1978: 627, 2000: 315)

In a similar vein, the cognitive grammarian Ron Langacker defines this asymmetry as "a trajector as the figure in a relational profile; other salient entities are identified as landmarks" (Langacker 1987: 231). He further argues that

> […] relational predications display an inherent asymmetry in the presentation of their participants. This asymmetry is not reducible to semantic roles, i.e. the nature of participant involvement in the profiled relationship. [...] it is observable even for predications that designate symmetrical relationships: X equals Y is not precisely equivalent semantically to Y equals X, nor is X resembles Y equivalent to Y resembles X. [...] In the expression X equals Y [...], X is referred to as a trajector, and Y as a landmark. This terminology reflects the intuitive judgment that Y provides a reference point with respect to which X is evaluated or situated [...]. (Langacker 1987: 231)

This semantic distinction between the two conceptual categories reflects the fundamental notion of figure and ground in gestalt psychology (Ehrenfels 1890; Jastrow 1899; Köhler 1920, 1929; Koffka 1935: 177–210; Müller-Lyer 1889; Rubin 1921; Wertheimer 1923, 1925). It should be noted though that the gestalt psychologist's definition is much more complex and broader than the notions adopted in cognitive semantics. This is why I introduced various imaging parameters above (Table 2). Nevertheless the basic idea of a reference object and an object that needs an anchor in a phenomenology of perception is somewhat similar.

Conceptually, the cognitive semantic notion is very specific in the distribution of meaning components in a sentence. Talmy shows that ostensibly similar sentences such as (a) "The bike is near the house" and (b) "The house is near the bike" are not the same semantically. They present two different (inverse) forms of a symmetric relation (Talmy 2000: 314).

In (a) the house is the reference object, and in (b) it is the bike, which seems unlikely in actuality. Depending on the real world situation, a speaker might refer to the bike as the reference object for various reasons.

Zlatev presents a similar example in support of construed situations. In the expressions (a) "“The tree is by the car” and (b) “The car is by the tree”, different situations are encoded. These differences indicate different worlds of human experience, that is, a non-objectivist approach is favored (Zlatev 2003: 332; see also Zlatev 2007). The semantic function chosen by the speaker does not correspond to the world of part-whole partitioning, but rather language-specific information. This might be due to pragmatics or culture-specific decisions or biases. This example already reveals that language, or rather writers/speakers, choose to reverse ostensibly natural figure-ground asymmetries. The empirical evidence presented here also supports this observation.

In the list of characteristics above, Talmy presents various characteristics of the figure-ground asymmetry (Table 1) specifying the relationship, such as the figure being of greater concern or relevance (more salient) where the ground is of lesser concern or relevance (more backgrounded) (Talmy 2000: 316). This semantic distribution is different from the gestalt notion which is more perceptual, based on geometric coordinates (Lewin 1936: 87–92, 118–154).

Some of the these notions and technical terms are used to analyze cultural assumptions, traditional habits and behaviors, patterns and aims of action, and elementary measurement procedures in spaces. Indeed I claim that the application of cognitive psychological and cognitive semantic models onto different semiotic systems enhances the implicit presupposition of knowledge of spatial mental models. Moreover, the cognitive semantic approach outlined here is important in analyzing the selected data sources.

Cognitive and linguistic structures are intertwined in the construction of a cognitive world in the form of mental models. Subjective decisions to relate (for example, objects) depend not only on the cognitive apparatus, but also on language and cultural affordances as represented by the different semiotic systems and practices. It is argued that reversal patterns of figure-ground asymmetries and the various degrees of specificity (see below) indicate a human capacity for constructing and relating objects in space independent of phenomenological cues in the objective world, but rather based on implicit knowledge structures, i.e., mental models (Thiering 2011, 2013). Therefore, this process of ascribing meaning to a visual situation depends not only on objectively given features such as buildings, walls, cities, rivers and mountains, but subjective and pragmatic encoding decisions as well.

In cognitive semantics this shift of aspects of semantic foci is seen in the different ascriptions of phenomenological figure-ground relations. Visual aspects can shift depending on the speaker/hearer's focus and his/her construction of a spatial situation. Rubin states that

> dazu ist der Nachweis erforderlich, daß wirklich ein ansehnlicher Unterschied zwischen dem besteht, was bei ein und derselben objektiven Figur erlebt wird, wenn ein Feld, das bei einer Gelegenheit als Figur bezw. Grund, bei einer anderen Gelegenheit als Grund bezw. Figur erlebt wird. (Rubin 1921: § 4, 31)

Rubin basically seeks to prove the difference between figure-ground asymmetries and their reversals. Why does a figure becomes a figure at a certain point, while at another point the same figure functions as a ground or reference point? This shift in meaning was also examined by the later Wittgenstein, among others. Wittgenstein differentiates between *Aspektsehen* and *Aspektblindheit* (Wittgenstein 2006: Part II: 213). He claims that *Aspektsehen* and *Aufleuchten eines Aspekts* are different processes (Wittgenstein 2006: Part II). I would also add that these are indeed different perceptual cognitive processes which intersect.

Gestalt theory processes and universal laws of perception are still employed in phenomenological approaches, but are now complemented by background information on the speaker and attention span. Wittgenstein already points to the fact that universal laws do not suffice in encoding spatial relations. He also adds certain criteria of experience with the perceived object. His duck-rabbit head example taken from the gestalt psychologist Jastrow, originally published in 1899, highlights this fact perfectly. We perceive either a duck or a rabbit, but never both aspects at once. We can say that the phenomenological aspect is a *dazwischen*, an "inbetween" the aspects, an oscillating of aspects. In fact, we might perceive neither of the aspects unless we are prompted, "what (else) do you see?". So context and cultural expectations trigger different aspects and consequently different figure-ground settings. This is an extension of classic gestalt theory approaches that is important to implicit knowledge structures and spatial mental models in my approach.

There is one additional component to this survey which is crucial in deciding between figure or ground: embodied cognition. Rohrer states that the most general definition of embodiment is that "the human physical, cognitive, and social embodiment ground our conceptual and linguistic systems" (Rohrer 2007: 27). Furthermore, Johnson argues

> that human bodily movement, manipulation of objects, and perceptual interactions involve recurring patterns without which our experience would be chaotic and incomprehensible […]. (Johnson 1987: xix)

As stated in the introduction, these recurring patterns are known as "image schemas", and they function as abstract structures of mental images.[63] Mental models, as defined by Renn and Damerow (2007), have the advantage that they present knowledge structures, and changes thereto, as diachronic processes. They are therefore dynamic systems and, as Johnson-Laird argues, not reduced to propositional or syllogistic knowledge (Johnson-Laird 1983).

In addressing the linguistic parsing of spatial relations, the next section introduces the concept of degree of specificity, or the morphosyntactic and semantic detail used in encoding spatial relations. This question of degree is here particularly applied to measurement of distances.

2.8 Degree of specificity

Human beings are embedded in shared cultural practices in a specific culture (Zlatev 1997, 2010; see also Johnson 1987). Naturally, this is echoed by situated embodiment and distributed cognition. Linguistically such situated embodiment constructions are represented morphosyntactically. As such, one phenomenon explored in more detail is the abovementioned degree of specificity regarding the figure's location with respect to the ground (Svorou 1993; Thiering 2013a; see below). This degree of specificity, or semantic granularity, relates to the amount of detailed expressive morphosyntactic content with which figure-ground asymmetries describe spatial relations in various languages and texts. As an example, Svorou argues 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; see also Langacker 2008: 19, 43, 55–57; Ameka 2006: 371 for an example in Ewe). The latter specification encodes further partitions of the door into smaller regions (Thiering 2011, 2013).

Through their language, or rather language affordances, speakers are required to depict a visual scene in a highly specific and often highly contextualized way. These affordances are the semantic content encoded via specific morphosyntactic devices (Gibson 1986: 127–143). This is even

63 As we have seen, cognitive psychology invokes other concepts, such as cognitive maps, idealized cognitive models, frames, mental models, slots and scripts, each with a different focus of knowledge representation (Anderson 1990; Knauff 2013; Neisser 1976; Schanks and Abelson 1977;).

more relevant when considering the impact of different semiotic systems in a culture. The ability to preserve knowledge via such symbols (texts, itineraries, instruments, travellers reports, maps, practices, etc.) enables us to construct different mental models for instance, for orientation.

With a more synchronic point of view, Malotki presents various facets of the Hopi language, encoding spatial relations and demonstrating various degrees of specificity (Malotki 1979; Svorou 1993; Thiering 2013a).[64] As we have seen, this linguistic phenomenon of the figure's location with respect to the ground is related to the amount of detailed expressive content with which spatial relations are described in various languages (Svorou 1993). Malotki states that Hopi uses a fine-grained linguistic system to encode spatial relations and that its spatial concepts also differ, to a certain degree, from most other languages (Malotki 1979: 293). The study of these fine-grained structures in different sources is my point of departure for analyzing spatial mental models.

It should come as no surprise that different languages and cultures offer language-specific affordances, that is, the semantic content hard-wired into specific morphosyntactic devices or patterns. These patterns are a verbal manifestation of mental models. As such, spatial concepts are linguistically represented in different forms, which are rooted in the respective language system.

Different semiotic encoding systems and oral presentations present crucial environment-dependent encoding patterns mirrored in implicit knowledge structures. Lakes, mountains, rivers, walls, buildings, bridges and cities are significant limitations in various cultures. Note the difference between small-scale (buildings, walls) and large-scale orientation (between cities). These limitations have repercussions for language patterns and the carving-up of spatial concepts at the language level.

2.9 Mental models as cognitive maps: orientation as implicit spatial reasoning

It is believed that travellers, and navigators for that matter, locate their current position on the Earth's surface symbolically within spatial mental models, or more specifically, cognitive maps.

Orientation in the environment which relies on toponyms or landmarks, for example, requires the traveller to mentally compare the direc-

64 Malotki does not use the concept of degree of specificity, but certainly presents data along the lines of semantic granularity.

tion of travel toward the destination with a reference orientation in the respective cognitive map. The process of dead reckoning is of particular interest here since I believe that orientation, and certain techniques of navigation and pilotage, are similar to spatial mental models found in other spatial domains. Navigating without instruments requires recording distance and maintaining course based on wind directions, reefs, tides, birds, visible islands, but particularly *etak* systems (the following webpage from the University of Pennsylvania (UPenn) provides an excellent overview: http://www.penn.museum/sites/navigation/intro.html).

According to Hutchins, *etak* systems are not distance measures, but rather temporal measurements (spatial duration; Hutchins 1996: 87–88; see also Gladwin 1970). The *etak* is based on the sidereal compass, an abstract construction of star positions. A specific mental model for the required journey is adapted to actual conditions (winds, visibility, etc.). The sidereal compass provides directional frames of reference, but also enables the traveller to envision a third island as a reference point. The star compass divides the great circle of the horizon into 32 points named for the stars (with the exception of Polaris) which rise and set at those points. These 32 points form a sidereal star compass which provides the system of reference for organizing all directional information about winds, currents, ocean swells, and the relative positions of islands, shoals, reefs and other seamarks (Gladwin 1970; Goodenough 1953; Hutchins 1996; Riesenberg 1972; Sarfert 1911). The diametrically opposite points of this compass are seen as connecting in straight lines through a central point. A navigator thinks of himself, or of any location from which he is determining directions, as this central point. So whenever he faces a compass point, there is a reciprocal point at his back.

The third island (or emergency island, or phantom island depending on the researcher) is a reference point used to determined distance travelled. It is over the horizon and out of sight of the first two islands that serve as reference points. As Hutchins points out, this system of encoding distance travelled "in terms of the changing bearing of a reference island is called *etak*" (Hutchins 1996: 70; emphasis original). The navigator knows the star bearings for the different inter-island routes in the relevant area. He also knows the star bearings of the reference island from his point of origin and the bearing of the reference island from his destination. So the navigator conceptualizes the reference island with reference to a particular star (keeping in mind the sidereal compass)

> and moves back abeam of the canoe during the voyage through a succession of star bearings until the canoe reaches its destination, at which time the reference

> island is under the point that defines the course from the destination island to the reference island. (Hutchins 1996: 70–71)

Gladwin points out that

> the etak system does not add anything to the input of concrete information upon which the navigator bases his judgment of position and course. It is a way of organizing and synthesizing information obtained through a variety of discrete observations and nothing more. In sum, the contribution of etak is not to generate new primary information, but to provide a framework (spatial mental model; M.Th.) into which the navigator's knowledge of rate, time, geography, and astronomy can be integrated to provide a conveniently expressed and comprehended statement of distance traveled. (Gladwin 1970: 184, 186)

This quotation is particularly interesting since it is believed that the *etak* system functions according to gestalt principles based on mental models for orientation. Parameters such as distance, scope, scale, frames of reference, the star compass, currents, reefs, and other spatial and non-spatial information is amalgamated to form a spatial mental model for the respective journey. The same is true of pre-modern navigation. Hutchins offers a neat example, claiming that "navigation in European waters looked a good deal like a rather unsophisticated version of Micronesian navigation" (Hutchins 1996: 93). He goes on to point out that before the discovery of the magnetic compass needle, the sun and the stars were the guides in Western navigation. An interesting example is the reference to Homer's *Odyssey* where Homer comes home from the west

> […] by keeping the bear (the Big Dipper) on the left and sailing toward the rising of the Pleiades and Arcturus. The Pleiades and Arcturus have similar declensions (they rise out of the same point in the eastern horizon) and are 11 hours different in right ascension (they are on opposite sides of the night sky), so one or the other would be in the sky of any night regardless of season. (Hutchins 1996: 93)

At first sight it appears we are dealing with practical knowledge applied in navigation, but the implicit knowledge employed is much more sophisticated than it seems. A linear constellation is not sufficient for orientation. In addition, the distances, *etak*, stadia, or kenning need to be conceptualized. The implicit knowledge for longer distance is a day's sailing, the distance a "normal vessel would accomplish during a twenty-four-hour run with a fresh following wind" (Hutchins citing Taylor; 1996: 94). The interesting aspect here is that the navigator requires knowledge of the relevant weather and water conditions to determine a day's sail.

Hutchins states that "[m]aking this judgment is probably the sort of skill that no practitioner can describe in detail" (Hutchins 1996: 94). And he further argues that the practitioner would never need to do so since this is implicit knowledge applied as needed. At any given time the navigator can estimate distance and direction to known points, such as the point of departure. The difficulty here is in retaining a sense of direction, especially when there are no landmarks in sight, as is the case with dead reckoning navigation (Gladwin 1970; Hutchins 1983; Oatley 1977; Sarfert 1911). This continuous application of change of location with respect to changing surroundings is embedded in implicit knowledge structures which evolve from practices.

That same UPenn webpage examines more explicit knowledge structures which influence spatial mental models as semiotic externalization:

> "Island Looking" is the name of the most important exercise. With it, navigators and their pupils endlessly rehearse their knowledge of where islands are located in relation to one another. One takes an island and then goes around the compass naming the places that lie in each direction from that island. Then one takes another island and does the same. As they sit around the boathouse in the evening, older men quiz the younger men and one another. In reciting "Island Looking", a beginner gives the name of the nearest island that lies in a given compass direction from the hub island. As he goes around the compass, if no island lies in a particular direction, he so indicates. Later, the student learns to include reefs and shoals and, finally, living seamarks, thus filling most of the compass directions from each focal island. The sidereal compass here shows the places named on the compass directions as one looks out from Woleai Atoll.
>
> Another exercise, "Sea Knowing", involves learning the names of all the sealanes, called "roads", between the various islands and reefs. To speak of sailing on the "Sea of Beads" is to indicate travel between Woleai and Eauripik on the star course between "Rising of Fishtail" (in Cassiopeia) and "Setting of Two Eyes" (Shaula in Scorpio). Referring only to the names of sealanes, those in the know can tell one another where they have been traveling and leave the untutored in the dark.
>
> The exercise called "Sea Brothers" groups sealanes that lie on the same star compass coordinates. Thus on the course from "Rising of Fishtail" to "Setting of Two Eyes" lie the several sealanes that connect the islands of Pisaras and Pulusuk, Pikelot and Satawal, West Fayu and Lamotrek, Gaferut and Woleai, and Woleai and Eauripik. A navigator may forget the sailing directions from Woleai to Eauripik but remember that the Woleai-Eauripik sealane is "brother" to the West Fayu-Lamotrek sealane. His remembering the star coordinates for the latter allows him to retrieve the forgotten coordinates for the former. (http://www.penn.museum/sites/navigation/intro.html; last retrieval July 17, 2013

It is apparent that navigators learn different information cues and symbolic systems which provide vital coordinates when leaving the point of departure, as seen in the "island looking" procedure. "Sea knowing" is another procedure in which the various islands and reefs serve as frames of reference. This amalgam of absolute and relative frames of reference is apparent in the "sea brothers" exercise, in which the sidereal compass is projected onto sea routes. From this it is already clear that different spatial mental models can interact. Some spatial mental models are explicitly named and thus less mental in nature, others are implicitly referred to as knowledge structures. Both fulfill joint action processes between the navigator and his environment. Different frames of reference are applied, and they are interwoven with each other.

The more metaphorical patterns described in the following passage from the same source present a vivid picture of a navigation procedure that seems rather at odds with Western navigation techniques.

> "Coral Hole Stirring" imagines a parrot fish hiding in its hole in the reef at a given island. A fisherman probes the hole with a stick to drive the fish out into a dipnet, and it darts off to a hole in the reef at a neighboring island. Again the fisherman tries to catch the fish, and again it darts away to another island, and so on through a series of islands back to the one from which the exercise began. Each such hole has a special name, known only to navigators, that serves as a synonym for the island name. In this exercise the star courses are from hole name to hole name. To learn all of these star courses is to learn a parallel and redundant set of sailing directions. "Coral Hole Stirring" provides another arena within which to rehearse these directions and, importantly, a way for navigators to discuss voyages within the hearing of others without being understood. Another exercise very similar to this one is called "Sea Bass Groping".

This more anecdotal means of navigation results in a spatial mental model in which the parrot fish serves as a frame of reference for the navigator's motion process. The result of such living frames of reference is shown in the next passage from the same webpage.

Having no maps or charts, navigators must devise mental equivalents.

> "Trigger Fish" is the name for one such way of conceiving of the geography of the navigator's world. It envisions five places. Four of them form a diamond to represent the head, tail, and dorsal and ventral fins of the trigger fish. The head is always the eastern point and the tail the western one; but the dorsal and ventral fins can serve either as northern and southern or as southern and northern points respectively. The fifth place, at the center of the diamond, represents the fish's backbone.
>
> Any set of islands, real or imaginary, reefs, shoals, or living seamarks whose relative locations are suitable can be construed as a trigger fish. On a course between the dorsal and ventral fins, the head or tail can serve as reference island and the backbone marks midcourse.

Again, at first sight this seems at odds with Western ideas of navigation, but the spatial mental model behind the navigation process should be rather obvious. The fish is analogous to a map. A map is also used as a reference point for amalgamating spatial and orientational knowledge. The navigator places himself outside the map in order to visualize his voyage. The frame of reference of the stage thus introduced can either be dynamic in character (fish) or static (map); the difference is purely a matter of usage.

What is presupposed as implicit knowledge and what is construed *en passant* or in online processing in the sense of Slobin's "thinking-for-speaking" or Levinson's "experience-for-speaking"? I argue that human beings, like any other animal from desert ants, pigeons to bees, construe mental models or cognitive maps to orient themselves and to navigate both familiar and unfamiliar terrain. Underlying these models are proximal input cues gained from visual perception (and other input systems as outlined above), from external reference points, for instance. The advantage of these models is that one cannot just orient oneself, but also anticipate movements ahead: we see that they fit the definition of spatial mental models above. These movements depend on changes in position in relation to objects or landmarks. As such they are manifested in linguistic systems in different degrees of specificity. These degrees also indicate the importance of the different reference frames. Cognitive maps entail not only representations of distal objects and coordinates, but also representation of spatial relations in general, including unknown objects and those yet to be perceived. The focus here is on distal as opposed to proximal perceptions of objects. The ability to mentally triangulate different distances for orientation based on the body and landmark cues is complemented by the ability to mentally represent spatial environments and coordinates[65]. These representations are evidently necessary for orienting and navigating in known and unknown terrain. These cognitive maps are arguably based on universal cognitive processes which are biologically and evolutionarily wired in the cognitive apparatus. This means that there is not just an ontogenetic development of the individual orienting and navigating depending on different cultural practices, but also a phylogenetic need for specific mental models (or cognitive maps).

As argued above, it is believed that spatial mental models of spatial orientation are based on mental triangulation processes which implement a cognitive compass based on various frames of reference. This cognitive compass is a conceptual representational system which computes informa-

65 As such I argue, in line with Hutchins, that "[i]n the Western tradition of pilotage, virtually all computations involving position are carried out on nautical charts. While there are many other ways to represent the date and carry out the computations of navigation, the chart is the key representational artifact. The most obvious property of maps or a chart are correspondences with positions in a depicted large scale space. That is always true. But charts designed for navigation are something more than this. A navigation chart is essentially a carefully crafted computational device" (Hutchins 1996: 61). The proposed spatial mental models of implicit knowledge structures are similar to Hutchins' navigation charts as computational devices.

tion cues to form gestalt-like structures based on different input patterns. As such I believe that different perspectives, distances (proximal, medial, distal), perspectives, frames of reference, scopes, scales, toponyms, landmarks, and other features all go into mental triangulation. In short, different intermodal processes apply. These processes can be inferred from the stories that Micronesian navigators tell, but also from other oral practices in which authors describe different landmarks and toponyms that are based on implicit knowledge structures. The next section deals specifically with landmarks as reference points. I argue that they form part of the respective spatial mental models of orientation, keeping track of distances and frames of reference to navigate.

2.10 Landmarks as coordinates of orientation

Landmarks are defined as any kind of culture-specific environmental reference points (see Mark et al. 2011 on a collection of chapters on the influence of landscape on language; landmarks are synonymous with topographic markers). This could be any of the previously cited elements used to measure distance: mountains, rivers, houses, reefs, winds, birds, water conditions or even trees, but also islands and cities. Landmarks are point references external to the person. In a city, landmarks may be distant buildings or geographical features that can be seen from many angles and distances, or they may be primarily local elements such as buildings, signs, trees, storefronts, doorknobs and other urban details (Miller and Johnson 1976: 378). Siegel and White argue that

> landmarks are unique configurations of perceptual events (patterns). They identify a specific geographical location. A person's account of his spatial representation generally begins with landmarks, and these landmarks are the strategic foci to and from which the person moves or travels. Landmarks are used as proximate course-maintaining devices. Not only do they identify beginnings and endings, but also serve to maintain course. (Siegel and White 1975: 23)

Landmarks arguably shape and determine a detailed topographical map of the environment as represented via written or spoken language and practices (Thiering 2014). The following quotation by Fowler and Turner summarizes the function of landmarks and geographic features in particular. This quotation also summarizes the point of departure with respect to the function of environmental knowledge and its reflection in language (see also Miller and Johnson 1976: 377).

> The naming of geographic features as part of territorial marking and orientation is a common occurrence in all cultures […] topographical names reflect specific

> cultural interests and historical developments within the possibilities given by the morphology of the language. (Fowler and Turner 1999: 424)

Fowler and Turner point out that the process of naming geographic and territorial landmarks is crucial in every culture. I will return to this point in the chapter on Eipo and Dene. What is particularly important here is that the authors conclude that topographical names indicate particular cultural interests as represented by the language repertoire, or the language-specific affordances. This is echoed by the data in this book, which represents a relatively dense linguistic system of topographical reference frames, seen in place names and itineraries which serve as mental maps for orientation. As is argued above, human beings instantiate relations between objects relying on various frames of reference that, as the name implies, serve as reference points for locating participants. These reference points anchor a specific orientation between objects and an imposed viewer (Carlson-Radvansky 1993, 1996; Carlson 2001, 2003; Levinson 2003; Levinson and Wilkins 2006). These linguistic coordinates are significant in the description of topographical spatial relations and the description of projective relations in general (Malotki 1983: 16; Thiering 2011, 2012).

According to Malotki, the term 'linguistic coordinate' implies the division of a spatial configuration into a speaker, a hearer and a third part (a person or a thing to which the speaker-hearer refers). This means that a linguistic reference system is not an abstract geographical or mathematical concept, but a means of spatial or semiotic configuration in linguistic encoding. I adapt this semiotic idea in my survey of different practices in language and other encoding patterns.

Throughout this book, some fundamental spatial concepts and representations are assumed based on anthropomorphological spatial knowledge in different cultures. It examines culture-specific structures and behaviors which reflect experiences with local environmental conditions, such as rivers and mountains, rivers and lakes, or roads and coastlines as natural or manmade boundaries or significant delimiting features. Fowler and Turner summarize this concept as follows:

> If peoples choose to orient themselves to coasts or seas, rivers or mountains, the sun's path, or some other feature, some aspect of this will usually show up in their place-names. (Fowler and Turner 1999: 424)

Some of those aspects described by Fowler and Turner are presented here. I will return to their approach in the penultimate chapter. People in different cultures do indeed use place names and coastal lines in their specific environments to construct a linguistically dense topographical reference system for orientation. Environmental experience is represented via language and more specific practices (written or spoken), and language in turn constructs spatial concepts or spatial mental models. I am keen to describe some of the implicit underlying cognitive structures which I call spatial mental models.

2.11 Intermediate conclusion

This chapter argues that certain fundamental aspects of spatial cognition and topographical coordinates apply to geographic descriptions of ethnogeography as implicit knowledge structures. Some aspects of spatial cognition are culture-specific, being shaped, for instance, by culture-specific practices of spatial orientation and organization. In this approach, language, texts, pictures, symbols, icons and practices perform a dual role as external representation. These sources shed light on structures of cognition while also pointing to fundamental structures of knowledge, such as spatial mental models and frame-system theory, in shaping spatial cognition and influencing its structure. It is assumed that using different data points from a broad range of sources will result in an ethnogeographical and enthnolinguistically diverse picture of culture-specific encoding patterns. This theoretical point of departure attempts to distinguish some basic aspects of spatial cognition in ethnogeography. Some might potentially be universals although they may find different expression in different languages. Spatial topography will reveal itself as truly culture-specific in the sense that different cultures develop different cognitive structures based on different environmental coordinates, or culture-specific mental models.

People of the different cultures under review lived in complex environments, travelled long distances into dangerous terrain and usually made their way back safely (as do Micronesian seafarers using dead reckoning systems). To survive in their habitats they depend on evolved capacities which human beings typically use to efficiently orient themselves in space via mental models. They also rely on ontogenetic learning about the geography and its many specific features and on culturally transmitted, linguistically encoded spatial reference systems sufficiently precise that they can form cognitive maps of the land and sea in their habitats.[66] These concepts are based on topography and related to environmental landmarks. These landmarks include mountains, rivers and lakes, as well as the indi-

66 See on geographical categories Smith and Mark (2001).

vidual's own experience of travelling to and returning from various distant places.

In addressing the notion of space, ethnolinguist Volker Heeschen cites Konrad Lorenz, who states that "human thinking is nothing but movement in space, that is, moving on probation in imagined spaces" (Heeschen 1998: 198). Spatial classification therefore implies the location of objects; in other words, to defining a place is basically to deliminate or categorize based on the environment and the available mental models. Humans in general, and navigators in particular, parse up their environment into a specific, necessary topography or spatial matrix which is represented in the language and practices seen in the described dead reckoning procedures outlined above. In this process they employ a vast matrix of mountain, river and place names; the parsing up into degrees of specificity will illustrate this process. The examples in question are deictic and other references to, and conceptualizations of, space. Moreover, culture- and language-specific semiotics as ideas of space are presented in the cultures under survey with respect to the conception of spatial mental models. Such spatial concepts are shown to be vital in describing spatial mental models as cognitive representational systems that entail different forms of implicit and explicit knowledge. The example of dead reckoning practices shows us that these systems can be very powerful.

Traditional stories, myths, and other semiotic forms such as landmarks, toponyms, wind direction, measurements, and other spatial data of reference systems serve as crucial data points. I argue that these semiotic practices function as chronological topologies of places and spaces. The description of such components, as Malotki rightfully points out, should incorporate the anthropological and cultural aspects of the language (Malotki 1979: 301). These aspects do indeed find their way into culture-specific spatial mental models.

The interrelation of different cultures, environments, and oral and hands-on practice are the focus here. As a working hypothesis, it is assumed that the environment and culture acts upon spatial mental concepts which proven to function in the long term. These aspects consequently shape language actions which in turn influence the mental construction of space. This should come as no surprise since every language presents language-specific affordances, that is, the semantic content hard-wired into specific morphosyntactic devices or morphosyntactic patterns. As such, spatial concepts are linguistically represented and rooted differently in the respective language system. Malotki points out that ideas of space might be culture- and language-specific. Such ideas of space are also crucial for spatial mental models of geographic knowledge of the environment.

This research also shows the rich linguistic and non-linguistic inventory of detailed spatial concepts encoded in different semiotic practices. Finally, one can conceive the (linguistic and cognitive) meaning, and the understanding of an utterance as the "concrete manifestation of a semantic horizon which generally already exists prior to the heard utterance".

> […] it is certainly space, which forms such a 'Sinn-Horizont' or, in other words, a principle which has a determining influence upon the semantic layer of language. (Heeschen's translation of the German original: Konkretisierung eines allgemein schon vor der gehörten Äußerung vorhandenen Sinn-Horizontes. (Hörmann 1978: 394; cited and translated by Heeschen 1998: 29)

The goal is to show the influence of culture on language (and vice versa), as well as cognition. Questions such as "what is cultural or language-specific?" and "what might potentially be regarded as universals?" frame the scope of the different empirical sources under review. Certain practices, habits, and environmental landmarks have repercussions for language (as will be shown in the selected linguistic examples). My insights mirror Humboldt's idea of *Weltansichten* 'world perspectives', that is, the idea that the structure of language might influence the thought process (Humboldt 1963b; Miller 1968; Thiering 2013b; Trabant 2012; Underhill 2013). In North America, this concept is known as the Linguistic Relativity Principle or Sapir-Whorf theory (see Deutscher 2010; Everett 2013; Lucy 1992a,b, 2014; Levinson 2003; Levinson and Wilkins 2006; Thiering 2013b). They support the idea that languages differ in the way they shape our world perspectives. I also believe that non-linguistic information, that is, implicit knowledge structures, has an impact on spatial language and categorization. The current research therefore aims to show the idea of space as dependent on a web of interaction of language, culture, and cognition. This interaction is represented in different semiotic systems based on the authors' interpretation and presentation of actual or fictive events. The following quote by Heeschen summarizes the function of non-linguistic information, e.g., environmental and cultural information, upon language.

> The importance of reference to space, the social context of giving and taking, and references to non-verbal communication shape the content of the vocabulary. The characteristics and peculiarities of everyday interaction and speech follow from the fact that speech is complemented by, and related to, other semiotic systems. (Heeschen 1998: 381)

I subscribe to Heeschen's view of the reference of space and its relation to semiotic systems. Hopefully, it will be apparent that spatially implicit knowledge and orientation is embedded in cultural and linguistic practices of implicit and explicit knowledge systems. This is outlined above as a guiding principle, i.e., that spatial knowledge is not only encoded in mental models, but also embodied in the lived histories of human beings, such as the use of instruments for measurement. These histories are represented by cultural and linguistic practices of spatial mental modes. Therefore, the notion above which presupposes the influence of non-linguistic information on spatial language and categorization is of central significance to this project.

The next chapters present some initial insights into language-specific patterns based on visual gestalt conceptions known as figure-ground asymmetries. These chapters argue that we must include a third aspect between language and cognition, that is, embodiment theories based on phenomenological aspects. Here I argue in favor of intersecting aspects of spatial semantics and visual perception[67]. This section also argues in favor of the constructive approach to the instantiation of stage-like settings between different perceptual anchors as known from gestalt theory.

67 "What does it mean to see? The plain man's answer […] would be, to know what is where by looking. In other words, vision is the *process* of discovering from images what is present in the world, and where it is. Vision is therefore […] an information processing task, but we cannot think of it just as a process. For if we are capable of knowing what is where in the world, our brains must somehow be capable of *representing* this information–in all its profusion of color and form, beauty, motion, and detail. The study of vision must therefore include not only the study of how to extract from images the various aspects of the world that are useful to us, but also in inquiry into the nature of the internal representations by which we capture this information and thus make it available as a basis for decisions about thoughts and actions" (Marr 1982: 3; emphasis original).

Part II: Linguistic encodings of spatial mental models: the case studies

Chapter 3: Figure-ground reversals in language

3.1 Introduction

This chapter questions the role of meaning in perception in spatial semantics and its figure-ground alignments. At focus are congruent linguistic patterns of figure-ground reversals. This widely-known aspect of gestalt psychology is not limited to visual processes. It also applies to linguistic encoding patterns as will be shown in the languages selected for analysis. It is argued that reversal patterns show that the human capacity for constructing and relating objects in space depends not only on objectively given features, but subjective encoding decisions as well. The hypothesis is that the parallels between language and cognition indicate a bridging element between those levels of human organization. This element can be found in embodied cognition, arguably a crucial mediator between the two information levels.

I present data from a perceptual-driven elicitation tool used on a small number of languages, some with a non-written tradition. One puzzling result is that figure-ground relations are sometimes linguistically reversed and do not follow perceptual or objectively given cues alone. Perception, it seems, is more than figural grouping, extending to the formation of shapes and linguistic meaning. This is of interest when considering the relationship between language, cognition, and perception in general. Where we find linguistic figure-ground reversals, we may then argue that visual perception is only partially reflected in language. It will also be shown that the decision to encode a figure or a ground in a particular scene depends on the speaker's choice of what s/he regards as being foregrounded or more backgrounded. This results in a mismatch between the given gestalt and the linguistic encoding pattern. These patterns tend to support the idea of more subjective encoding patterns.

One of the main questions concerns the place and role of meaning in perception. This chapter addresses this question directly with reference to the role of meaning in spatial semantics and its figure-ground alignments (see Zlatev 2007 on spatial semantics). The focus here is on congruent linguistic patterns of figure-ground reversals, that is, cognitive features of salience or reference which can be redistributed from primary to secondary image features. This applies to participants that are construed as foregrounded (being canonically the figure or trajector) as opposed to backgrounded anchorage (the expected ground or landmark), and their reversed patterns. This widely-known aspect in gestalt psychology is not limited to visual processes, but also applies to linguistic encoding patterns. This language samples in this chapter will illustrate this point (for an application from cognitive mechanisms to verbal reasoning see Krumnack, Bucher, Nejasmic, Nebel, and Knauff 2011).

It is argued that reversal patterns show that the human capacity for constructing and relating objects in space as depending not only on objectively given features, but subjective encoding decisions as well. Note again that this phenomenon is known as the degree of specificity of the figure's location with respect to the ground, as discussed previously (Svorou 1993).[68]

The hypothesis is that the parallels between language and cognition indicate a bridging element between those levels of human conceptual organization. This element can be found in embodied cognition or situated embodiment, assumed to be the crucial mediator between the two information levels (Johnson 1987; Lakoff 1987a, Chapters 12 and 13 in particular; Langacker 2008; Rohrer 2007; Zlatev 1997, 2003). Rohrer states that the most general definition of embodiment is that "the human physical, cognitive, and social embodiment ground our conceptual and linguistic systems" (Rohrer 2007: 27). Furthermore, Johnson argues "that human bodily movement, manipulation of objects, and perceptual interactions involve recurring patterns without which our experience would be chaotic and incomprehensible […]" (Johnson 1987: xix). These recurring patterns are called image schemas and function as abstract structures of images. Johnson further argues that these "are gestalt structures, consisting of parts standing in relations and organized into unified wholes" (Johnson 1987: xix; see Miller and Johnson-Laird 1976: 47–57 on the relationship between parts and wholes in object perception).[69] In other words,

68 This degree of specificity is related to the morphosyntactic and, as I argue above, the semantic amount of detailed expressive content with which spatial relations are described in various languages. We have seen that the English prepositional phrase 'on the door' has a lower degree of specificity than 'on the left side of the door' (Svorou 1993: 6–8). The latter specification encodes further partitions of the door into smaller regions. Speakers of the two languages at focus in this chapter are required by their languages, or rather language affordances, to depict a scene in a highly specified and often highly contextualized way. These affordances are the semantic content encoded via specific morphosyntactic devices. Boas already argues that different languages are guided by their specific grammatical encoding patterns to parse up and categorize the environment.

69 It should be noted that Johnson explicitly attacks objectivist theories of meaning, claiming, for instance, that "meaning is an abstract relation between symbolic representations (either words or mental representations) and objective (i.e., mind-independent) reality. These symbols get their meaning solely by virtue of their capacity to correspond to things, properties, and relations existing objectively "in the world" (Johnson 1987: xxii).

> our experience is embodied, that is, structured by the nature of the bodies we have and by our neurological organization […] the concepts we have access to and the nature of the 'reality' we think and talk about are a function of our embodiment: we can only talk about what we can perceive and conceive, and the things we can perceive and conceive derive from embodied experience. (Evans and Green 2007: 46)

In approaching this issue, I present various visually based elicitation tools and selection of the results generated by them. These results indicate figure-ground reversals in spatial semantics and hence some subjective encoding decisions. This is in line with typological approaches seen in Croft's work, but differs since Croft primarily addresses syntactic issues (Croft 2001). Moreover, the present work only examines two languages at length, hence it is not strictly speaking a typological approach.

Ever since gestalt psychologists developed theories of perceptual constraints on visual perception, the extent to which language and thus symbolic function impacts the construal of a visual scene has also been at issue (Ehrenfels 1890; Koffka 1935; Köhler 1929; Rubin 1921; Wertheimer 1923, 1925). Minsky points out that human beings always have mental models of the world construed on the basis of our brains (and, as he further points out, the body). So, as stated above, perception is a mediator and mental models are the actual constructing devices or rather abstract mental representation of "the real world", that is, they represent a projected world (Jackendoff 1983, 1996; Johnson-Laird 1983; Krumnack et al. 2011; Minsky 1994).[70]

This chapter presents data from perceptual elicitation tools; although applied to a variety of languages, only data from languages with a non-written tradition is presented here. It is apparent that so-called figure-ground relations are very often linguistically reversed and do not follow perceptual or objectively given cues (see Dokic and Pacherie 2006: 268 on the differences between perceptual and linguistic spatial representations). This means that perception is more than figural grouping, extending as well to the formation of shapes and linguistic meaning. This is interesting when considering the relationship between language, cognition, and perception in general. Where we find linguistic figure-ground reversals, we may then claim that visual perception is only partially reflected in lan-

70 The cognitive semantic approach in accordance with Langacker (1987), and Talmy (1978, 1983, 2000) adopts the figure-ground asymmetry (or Langacker's technical term 'trajector-landmark') and uses it for cognitive linguistic analysis. Broadly speaking, this distinction echoes the syntactic division of a sentence into subject and object of a sentence, but not always (Langacker 1987: 231).

guage.[71] It will also be shown that the decision to encode a figure or a ground in a particular scene depends on the speaker's choice of what s/he regards as foregrounded or backgrounded. Hence, there is a mismatch between the given gestalt and the linguistic encoding pattern. These patterns tend to support the idea of more subjective encoding patterns.

This chapter first introduces the different elicitation tools before offering selected examples and finishing with some concluding remarks.

3.2 Elicitation tools[72]

The following section presents three of the elicitation tools. While data from only one of the tools is presented, summarizing the rationale of the tools gives an idea of the reasoning behind the protocols. All of the tools are visually based in order to elicit the most basic notions of spatial relations such as topological, deictic, or reference frame information. It should be noted that the offline tools have some major problems with respect to gaining natural language data. Often, the tools are not only very idealized and abstract, they also impose certain relationships especially with respect to motion events. Hence, they might not evoke natural data. Speakers erver so often construe literally scenes that are not natural in their daily language use. It is therefore necessary for future research to complement the tests with a) different corpora and empirical sources based on b) for example interviews, and other sources like film ethnographic recordings, and c) online test designs to diminish the different task effects. Still, the tests are a good start to elicit very basic spatial relationships and notions especially in environments where highly elaborated laboraty designs do not apply just because of the remote areas. A picture book, like the one described below, is easy to carry around.

71 See Dokic and Pacherie 2006 for an extensive discussion of the relationship between frames of reference involved in non-linguistic spatial representation, with a focus on perception.

72 A comprehensive overview of the different test results can be found in Thiering (2006, 2007, 2009b).

3.2.1 The Topological Relational Markers Picture Series

The 'Topological Relational Markers Picture Series' (hereafter TRM) by Pederson, Wilkins and Bowerman (1998) consists of 71 simple black-and-white line drawings. They aim to identify how various languages encode systems of spatial topological relations, and to determine the semantics of these spatial relations. This test is used as a controlled means of eliciting language data without resorting to translation equivalents, giving field linguists an initial impression of a language's resources for describing topological spatial relations. The larger purpose is to capture, if not exhaust, the various markers and the sense extensions associated with them for encoding topological relations cross-linguistically for detailed typological comparison. For elicitation purposes, Pederson et al. (1998) call for a minimum of three speakers, and suggest 10 for valid cross-linguistic comparison. In my study, 14 speakers of Dene and four Upper Necaxa Totonac speakers were interviewed. For cross-linguistic comparison, I also ran this test on speakers of Indo-European languages, including English (10), German (10), and Norwegian (10).[73] In addition, I occasionally involved speakers of other languages, including French, Spanish, Danish and Swedish (three from each language) (Thiering 2009b). Speakers were asked to individually relate to the displayed objects by answering the question "Where is object X?". The tool thus allows us to explore how different languages use their linguistic resources to carve up the domain of topological spatial relations. The line drawings are intended to prompt discussion on how the depicted relationships between objects are linguistically represented. The elicitation tool enables us to extract information on gestalt restrictions in various languages as they affect topological spatial relations and specific frames of reference.

3.2.2 The Caused Position Test

The Caused Position Test developed by Hellwig and Lüpke (2001) is a follows on from the TRM test. It, too, is designed to elicit locative descriptions. It primarily aims to exhaust the verbal elements used to express location, such as 'sit', 'stand' and 'lie', and the causation of object displacement. This places the focus on the role of external agents and dynamism in the different usages of positional verbs in locative constructions

[73] The total number of elicited utterances are approximately 5000 answers. Especially Dene and Totonac speakers added per stimulus at least one or two alternative descriptions.

(Hellwig and Lüpke 2001: 126). It was designed to reveal the inception of positions between figures and grounds in 46 short video clips. The interviewee is asked to describe the scene (e.g., a person putting an object such as a ball, a rope, or a bottle of wine on a table, on the ground, or in a tree). These video clips are contrasted with static images in which objects simply appear without a causer - an object independent of an event. Following the initial description, the researcher may prompt the interviewee for further possibilities.

3.2.3 The Spatial Categorization Elicitation Test

The Spatial Categorization Elicitation Test was developed by the author and uses 95 short video clips (each of approximately 10 seconds' duration) presented in random order (Thiering 2009b). As a set, they exploit and exhaust only some of the imaging parameters for a given scene and include various manipulations of a wider range of "natural" objects in different situations involving varying surfaces, e.g., water, table, ground. The parameters are figures of various shapes, sizes, and material construction. Here the perceiver or conceptualizer, the scope, scale and distances of the figure-ground asymmetries are all important coordinates. Deictic, vectorial and general spatial information is also addressed (based on the theory chapter above).

The test uses various visual situations to elicit different constructions. These include different animate and inanimate objects in relation to a static reference point (e.g., stone(s) on the ground or in a vessel, stick(s) on the ground, bottle(s) on a table/the ground or moving surface, and (birds, leaves and boats on water). It employs three different viewing distances to draw out the semantics of different deictic perspectives: (a) proximal, (b) medial, and (c) distal. Varying numbers of objects are manipulated with one or more objects placed on or put into a vessel or at a point above or below (stone(s) on table, bottle(s) standing/lying on table or ground, keys on table, cloth folded/spread out on table/ground). Different orientations are employed to reveal insights into the frames of reference used by speakers.

3.3 Figure-ground asymmetries

The following section presents some empirical evidence of figure-ground reversals. It should be noted at the outset that all stimulus triggers, again, are perceptually driven, but the task itself is a linguistic one, i.e., the prompt "where is object X?" requires an appropriate response. An initial glimpse at the intricacies of various gestalts as linguistically constructed should hopefully allow general interpretations of the categorization processes involved in the encoding of figure-ground relationships. For the purpose of this chapter, I have only presented data from the Pederson, Wilkins and Bowerman (1998) elicitation tool. Canonical asymmetries illustrate the general structure of spatial semantics in a variety of languages, and are followed by some rather unusual examples of figure-ground reversals.

3.3.1 Canonical figure-ground relationships

As the alignment of various objects in the TRM study shows, spatial topological relations are defined as static locations between objects specifying an objective space. One special case, as previously outlined, are topological spatial relations that rely on geometrical properties which are ostensibly speaker-neutral in their perspective. As the theory-based chapter indicates, topological relations are generally described using certain universal rule systems.

The languages surveyed differ from the idealization of geometric and topological concepts as shown above, simply because of the scattered semantic distribution of spatial content across a construction and the various degrees of specificity (as introduced above). Therefore the spatial information cannot be pinpointed to a single morpheme, but rather a cohort of semantic information. These can be body part expressions and spatial affixes, classificatory verb systems, case markers (although not in Totonac), posture verbs, and so on. This implies that the tables in Chapter 2 only illustrate the case for English and German or Germanic and Romance languages in general. A more canonical data set of various languages using some of the above features is presented below.

The following example (5) illustrates a static spatial topological relation between a figure and a horizontal ground.

(5)

a.

FIG	POST	LOC	GND	German
Die Tasse	*steht*	*auf*	*dem Tisch.*	
the cup	3SG.S.be/stand	on	the table	

'The cup is/stands on the table.'

b.

FIG	EXIST/POST	LOC	GND	Norwegian
Kopp-en	*er/står*	*på*	*bord-et.*	
cup-the	3SG.S.be/stand	on	table-the	

'The cup is/stands on the table.'

c.

FIG	POST	LOC	GND	Dutch
Het kopje	*staat*	*op*	*de tafel.*	
the cup	3SG.S.stand	on	the table	

'The cup is/stands on the table.' (Staden, Bowerman and Verhelst 2006: 487)

d.

FIG	EXIST	LOC	GND	French
La tasse	*est*	*sur*	*la table.*	
the cup	is	on	the table	

'The cup is on the table.'

e.

FIG	EXIST	LOC	GND	Spanish
La taza	*está*	*en/sobre*	*la mesa.*	
the cup	is	on(top.of)	the table	

'The cup is on/on top of the table.'

f.

FIG	GND+LOC	EXIST	Hungarian
A csésze	*az asztalon*	*van.*	
DET cup	DET table-sup	3SG.S.be	

'The cup is on the table.'

g.

LOC+ BP	GND	POST	FIG	Totonac
naixa'kpú:n	*mesa*	*wi:lh*	*ta:sá.*	
nak=ix-a'kpú:-n	mesa	wi:lh	ta:sá	
LOC=3PO-crown-NM	table	sit	cup	

'The cup is on top of the table.'

h.

GND	LOC	FIG	CLV:LOC+EXIST+FIG	Dene
lidi tth'ai	*ke*	*bek'esh'ich'elyi*	*da-the-ta̧.*	
cup	on	table	up-IMPF.3SG.S-RO.be.situated	

'The cup is up on the table.'

All of the speakers in examples (5a–f) encode the figure (here the cup, the third person singular subject) as being located on the horizontal ground (the table). In all of these examples, a posture or existential verb and a preposition mark the location of the figure as being situated on the ground. From a linguistics point of view, it is interesting that the verb itself does not give any additional semantic information about the material or shape of the object, remaining relatively neutral with regard to perspective.

The difference in the way that speakers of Dene and Totonac describe the static scene of a cup on a table is subtle yet significant. In Dene (example (5h)), a physical object or figure cannot be specified without reference to its inherent qualities, such as shape, size, scale and configuration (e.g., round, stick-like or flat object), its material (e.g., flexible, non-flexible), its animacy and any functional values associated with it. A classificatory verb stem system provides this detailed qualitative information and hence profiles the degree of specificity (Davidson, Elford and Hoijer 1963; Li 1946; S. Rice 1997; Thiering 2006, 2009b; see also above). In Totonac, spatial alignment is encoded by the body part system (e.g., 'crown') and posture verbs (e.g., 'sit') in particular.

Example (5g) indicates a static topological 'on' relation between the figure (the cup) and the ground (the table). As well as the all-purpose oblique locative marker *nak*, the figure is located with reference to a metaphorical body part extension. The morphosyntactic construction profiles the upper-part of the figure with *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'; this means that three semantic components profile the specific spatial location taking the human body as the perceptual reference point.

However, (5g–h) also show that the Totonac body part structure and the Dene verb stem in themselves express more than just the encoding of a static locative relation. Both encoding patterns profile a higher degree of specificity than the examples in (5a–f). For a Totonac or Dene speaker the figure in this situation is a compact round object in a perspectivized 'up' relation to the ground (here meaning the earth as reference point) as opposed to the unspecified perspective in examples (5a–f). So we see that topological parameters are only one aspect in the encoding process. In each case the figure-ground asymmetry is as expected, namely, a reference is established (the table), serving as an anchor for the figure, the potentially movable object. Functional and deictic information is also encoded. This can be seen in the usage of the postposition which expresses a very generic spatial relation. A spatial relation or rather deictic relation is not just marked by a postposition, but also the classificatory verb stem and its directional prefixes . Semantic information about the figure is conflated into the verb stem in Dene, a contrast to the way the European languages generically encode the figure samples.

This short introduction, and the handful of linguistic examples, shows that Dene requires postpositions, directional prefixes and often figure-based classificatory verbs, while Totonac requires body parts and posture verbs to express spatial relations as locational relationships between objects (Thiering 2006, 2009a, b). In addition, some of these systems encode somewhat perspectivized constructions, i.e., deixis, and dynamic motion and manner events rather than just static topological relations. Moreover, a certain degree of specificity (e.g., being situated 'up' and 'on'), can be drawn from the spatial encoding, which again is different from the Germanic and Romance examples.

Note again that this degree of specificity relates to the amount of semantic detail with which spatial relations are described in various languages. Language-specific affordances require Totonac and Dene speakers to depict a scene in a highly specified and often perspectivized and contextualized fashion. Therefore, many of the presumed static and idealized situations used in the elicitation tool are encoded as dynamic and therefore in a non-idealized manner. Moreover, many of the natural relationships are reversed for pragmatic reasons, or arguably due to the speaker's specification of foregrounded versus backgrounded information.

3.4 Figure-ground reversals

The previous section presented canonical and expected language patterns across a small sample of languages. This section presents some interesting empirical evidence of figure-ground reversals. These reversals indicate that perception does not prevail over language, or rather, that different languages and speakers deploy situation-dependent encoding patterns in which they arbitrarily choose an anchor – not necessarily the natural ground – as a reference point.

An important technical term here is the concept of 'region'. A spatial region profiles the place of the figure and ground. Miller and Johnson-Laird provide a formal description: *reg(x,y)* profiles that *y* is the region *(reg)* within which characteristic interactions with *x* are possible (Miller and Johnson-Laird 1976: 60). In cognitive grammar, a region is defined as a set of mutually interconnected entities in which a noun profiles a region (Langacker 1987: 492). This definition adheres to the idea that subjects and objects are usually encoded by nouns, which in turn parallel figure and ground, as stated above. Regions are specified as delimiting a spatial configuration that constrains the boundary or scope of the figure. This means that the ground bears the primary responsibility for denoting the space for the figure.[74]

Note again that the syntactic pattern of Dene and Totonac is subject-object-verb. In all of the examples below, the expected object and ground reference point assignment is reversed. Note, too, that only the more unusual examples are shown. In many cases speakers also use an expected figure-ground asymmetry. But figure-ground reversal patterns are not exceptions and they do point to interesting consequences when considering gestalt strategies in the encoding of spatial relations. Which raises the question: How universal are gestalt principles, and what is culturally or linguistically interfering with the stage construal?

The first set (6) shows a response to the question "where is the hose?" (which is located, coiled, on a tree stump). Speakers of the selected Germanic and Romance languages all encode this scene as expected, i.e., the hose (figure) is on top of the stump (ground). In Dene and Totonac this relationship is reversed. In addition, the speaker in (6a) uses the word

74 Pinna argues with respect to figure-ground segregation that the figure allows for grouping. He also highlights that "an exception to the rule is only to be observed in ambiguous patterns in which figure and ground reverse" (Pinna 2010: 17). This is the case for the examples given in this chapter, i.e., some of these exceptions are shown. Indeed, Sinha and Kuteva argue that it is the ground or landmark which allows for grouping, and not the figure (Sinha and Kuteva 1995: 170). This chapter argues for both possibilities.

'rope' instead of 'hose' (for which there is no word in Dene). This does not, however, change the selection of the plural object (PO) classificatory verb.

(6)

a. Dene

GND	LOC	FIG	MAN	LOC+FIG[CLV]
tl'ule	*k'e*	*echichené*	*dethe*	*da-the-la.*
rope	on	stump/tree/wood	twisted	up-IMPF-3SG.S.PO.laying

'On the stump the rope lays in a twisted way (up).'

b. Totonac

	GND	BP+POST	FIG
pulaktín	*helhán*	*helhwí:lh*	*manguera.*
pulak+tín	helhán	helh+wí:lh	manguera
CLS+one	stump	mouth+sit	hose

'On the stump the hose sits.'

In both examples speakers decide to highlight the larger background (the stump) as being the figure (the canonically smaller element). In the spatial scene focuses on the stump, the ground being canonically the reference point, but is profiled as the figure. Speakers choose the stump as the subject but not the figure in this situation. This is also at odds with the encoding of the classificatory verb system *dathela* in Dene which also profiles the rope, a plural object (plural (PO) because it is coiled many times). We suspect that this is because a hose coiled on top of a tree stump is a highly unusual scenario for the speakers. While speakers can provide the expected response in which the hose/rope is the figure, this is not the natural or spontaneously occurring pattern. The same pattern is observed with the Totonac set. As the expected subject, the hose should appear first in this construction, but does not.

The next scenario is that of a tree standing on top of a hill. The expected figure should be the tree, but again, every speaker chooses to reverse this idea (14/14 Dene; 4/4 Totonac).

(7)

a. Dene

GND+LOC	FIG	POST+LOC+FIG [CLV]
shethlae	*el*	*ná-ghi-ʔa.*
hill.on.top.of	spruce.tree	in.place/in.front.of-3SG.SO.IMPF.stand.upright

'On top of the hill the tree stands.'

b. Dene

GND	LOC	FIG	FIG[CLV]
sheth	*k'e*	*el*	*nesha.*
hill	on	spruce.tree	3SG.SO.PERF.grow

'On the hill the tree grew.'

c. Dene

LOC+GND	FIG	FIG+POST+LOC+CLV
hotaghe	*elʔaze*	*ná-ghi-ʔa.*
on.the.side.of.hill/mountain	little.spruce.tree	in.place/in.front.of-3SG.SO.IMPF.stand.upright

'On the side of the hill the tree stands.'

d. Totonac

GND+LOC	BP+POST		CL	FIG
he:stín	*a'kpu:yá:lh*	*tzamá:*	*pu:laktín*	*kí'wi'.*
he:stín	a'kpu:+yá:lh	tzamá:	pu:lak+tín	kí'wi'
Ridge	crown+stand	that	CLS+one	tree

'On the crown of the ridge one tree stands.'

e. Totonac

LOC+ BP	GND	POST	CL	FIG
naxa'kpú:n	*sipéj*	*ya:lh*	*pu:laktín*	*kí'wi'.*
nak=ix+a'kpú:+n	sipéj	ya:lh	pu:lak+tín	kí'wi'
LOC=3PO+crown+nk	hill	stand	CLS+one	tree

'On top of /crown of the hill a tree stands.'

The first and most interesting point is the amount of spatial information that is encoded, especially in Totonac, but also in Dene. This spatial information profiles the degree of specificity as outlined above, that is, the amount of spatial semantics. Not only is a figure-ground asymmetry encoded, but also various spatial parsing mechanisms of this asymmetry via posture verbs such as 'stand upright', body part constructions such as 'crown', and locatives. This fine-grained parsing differs from that in the

Germanic and Romance data sets, in which the figure usually 'is' or simply 'stands' 'on' or 'on top of a hill'. There is no encoding of detailed spatial semantics.

The next set shows an interesting scenario of a boat on water. Every speaker of Germanic and Romance languages encodes the boat on water in a static relationship (see Thiering 2009b). Dene speakers profile a dynamic relationship in which the boat, or rather the boat's sail, moves by the wind, thus specifying the causation of movement.

(8)

a. Dene

FIG	CLV[FIG]
ts'i	*ghe-shuł.*
boat	PERF.3SG.S-SO.float(no control)

'The boat floated.'

b. Dene

FIG	LOC+GND	NEUT[FIG]
ts'i	*túsi*	*the-ta.*
boat	into.water	IMPF:3SG.S-SO.situated

'The boat is in the water.'

c. Dene

GND	FIG		GND	CLV[FIG]
ts'i	*nibáli*	*t'a*	*ts'i*	*ghe-shił.*
boat	canvas	because	boat	IMPF:3SG.S-motion. because.of.air/ blown.along(causation)[75]

'The boat canvas (sail) moves because of the wind.'

d. Dene

GND	FIG	LOC	CLV[FIG]
ts'i	*nibáli*	*k'e*	*ghe-shił.*
boat	canvas	on	IMPF:3SG.S-motion.because.of.air/blown.along(causation)

'The canvas (sail) moves because of the wind.'

75 The stem encodes a flexible object which is moved by the wind as confirmed by the following elicited example: *holąnįbale ghe-shel* [flag IMPF:3SG.S.movement.caused.by.air] 'The flag is moving/fluttering (caused by the wind)' (see also: *heshi* 'wave' (in the wind): 'It waves in the wind.').

e. Totonac

LOC+BP	GND	LOC	FIG
naixhélhni'	*xká:n*	*tojomá:lh*	*barco.*
nak=ix+hélh+ni'	xka:n	tojo+má:lh	barco
LOC=3PO+mouth+NM	water	be.inside+PRG	boat

'The boat is on top of the water.'

f. Totonac

LOC+BP	GND	DYN	FIG
naxhélhni'	*xka:n*	*a'ma:lh*	*pu:takítni'.*
nak=ix+hélh+ni'	xka:n	a'+má:lh	pu:takítni'
LOC=3PO+mouth+NM	water	GO+PRG	boat

'The boat goes on the water.'

g. Totonac

POST	BP	GND	FIG
wi:lh	*hélhni'*	*xká:n*	*pu:takítni'.*
wi:lh	hélh+ni'	xka:n	pu:takítni'
sit	mouth+NM	water	boat

'A boat is on the water.'

The Dene example in (8a) is interesting for the causation of a possible motion and manner of the figure. The spatial configuration of a figure-ground asymmetry is secondary to the dynamic event. Dene speakers are reluctant to encode the figure in a static 'on' position to the ground. Real-world knowledge of boats moving in water interferes with the idealized situation shown in the black-and-white drawings. Consequently, a topological relation encoded via 'on' is insufficient, and the causation of the motion is profiled. A motion event is also encoded in one of the Totonac examples(8f). Moreover, the location is specified using body parts (e.g. 'mouth') and posture verbs. This indicates a high degree of specificity in partitioning the region. In each case, a figure-ground reversal can be obtained. It seems that in Totonac the focus is on the spatial relation rather than the figure-ground asymmetry. In all three cases it is the more specific spatial encoding which is profiled, followed by the ground and figure.

The next set shows butter on a knife; the prompt here is "Where is the butter"? Again, a very simple relationship, but one which is reversed in Dene and Totonac.

(9)

a. Dene

GND	FIG	LOC	FIG[CLV]
bes	*tles*	*yaghe*	*heltther.*
knife	greasy.substance/lard	under	3SG.SO.PERF.covered.in.grease.it

'The knife is covered/under (by) the butter.'

b. Dene

GND	FIG	LOC	FIG+LOC[CLV]
beschok	*tles*	*yaghe*	*heltther.*
sword/knife	greasy.substance/lard	under	3SG.SO.IMPF.fall.into

'The knife falls in the butter.'

c. Totonac

BP + LOC[DOS]	GND		FIG
lakapi:xwaká'lh	*kuchílu*	*tzamá:*	*mantequilla.*
laka+pi:x+waká'lh	kuchílu	tzamá:	mantequilla
face+neck+be.high	knife	that	butter

'The butter is up on the flat edge of the knife.'

d. Totonac

GND	BP+LOC[DOS]	FIG
kuchilu	*kilhwaká'lh*	*mantequilla.*
kuchílu	kilh+waká'lh	mantequilla
knife	lips+be.high	butter

'The butter is up on the knife.'

In Dene a reversal relationship is encoded. The actual manner in which the knife falls into the butter is encoded, an unusual response to the prompt "Where is the butter?". Speakers actually perform a gesture using a virtual knife smearing butter onto something. The act itself is the focus, not the actual spatial relationship. Although this might be a task effect, a task that is idealized and does not entail certain cultural specificities, the pattern is coherent for all Dene elder speakers (7/14). Pointing to a task effect does not suffice for this coherent pattern, nor is the explanation that the grammar governs these patterns. Speakers simply profile the manner or causation and not primarily the spatial relationship which goes *en passant*.

The Totonac examples encode a spatial relation, but again reversing figure and ground. The knife is the subject which is at odds with the scenario. The amount of spatial information is specified and shows two different patterns. One is more specific ('up on the flat edge' as opposed to 'up on high'). This degree of specificity is interesting when compared with the Germanic and Romance examples where the butter is simply 'on' the knife in a static relationship (Thiering 2009b). Totonac speakers partition the region into smaller and more detailed parts. The next set is similar to the boat example above in that the causation of the figure's motion is profiled.

(10)

a. Dene

GND	LOC	FIG	FIG+DYN[CLV]
ttheshéth	*daghe*	*yak'odhaz*	*ghe-sheł.*
hill	above/ over	cloud	IMPF:3SG.S-motion. because.of.air/ blown.along(causation)

'The cloud (located above the mountain) moves as caused by the air.'

b. Totonac

LOC+BP	BP	LOC[DOS]	FIG
naxa'kpú:n	*sipéj*	*waká'lh*	*po'hlhnú'.*
nak=ix+a'kpú:+n	sipéj	waká'lh	po'hlhnú'
LOC=3POSS+crown+NM	back	be:high	cloud

'The cloud is high (above the hill)'

c. Totonac

LOC	FIG	LOC
talhmá:n	*po'hlhnú'*	*waká'lh.*
ta:lhmá:n	po'hlhnú'	waká'lh
high.above	cloud	be:high

'The cloud is up high above.'

d. Totonac

LOC+BP	BP	LOC	FIG
naxa'kpú:n	*sipéj*	*waká'lh*	*po'hlhnú'.*
nak=ix+a'kpú:+n	sipéj	waká'lh	po'hlhnú'
LOC=3PO+crown+NM	back	be:high	cloud

'The cloud is over the hill'.

e. Totonac

FIG	BP+LOC	BP
po'hlhnú'	*a'kpu:waká'lh*	*sipéj.*
po'hlhnú'	a'kpu:+waká'lh	sipéj
cloud	crown+be.high	back

'The cloud is over the hill.'

f. Totonac

FIG	LOC	LOC+BP	LOC+GND
po'hlhnú'	*waká'lh*	*ixpu:hélhni'*	*naksipéj.*
po'hlhnú'	waká'lh	ix+pu:+hélh+ni'	nak=sipéj
cloud	be:high	3PO+CTD+mouth+NM	LOC=hill

'A cloud is over the mountain.'

g. Totonac

BP	LOC	BP	GND
lakatzunajtzá	*waka'lhi*	*ixpu:hélhni'*	*naksipéj.*
laka+tzunaj=tzá	waká'lh	ix+pu:+hélh+ni	nak=sipéj
face+close=now	be:high	3PO+CTD+mouth+NM	LOC=hill

'The cloud is closely over the mountain.'

h. Totonac

FIG	LOC+BP	BP	LOC
po'hlhnú'	*naixa'kpú:n*	*sipéj*	*la:waká'lh.*
po'hlhnú'	nak=ix+a'kpú:+n	sipéj	la:+waká'lh
cloud	LOC=3PO+crown+NM	back	do+be.high

'The cloud is above the hill.'

i. Totonac

LOC+BP	BP	LOC	FIG
naixa'kpú:n	*sipéj*	*la:waká'lh*	*po'hlhnú'.*
nak=ix+a'kpú:+n	sipéj	la:+waká 'lh	po'hlhnú'
LOC=3PO+crown+NM	back	do+be.high	cloud

'The cloud is above the hill.'

j. Totonac

FIG	BP+LOC	BP
po'hlhnú'	*a'kpu:waká'lh*	*sipéj.*
po'hlhnú'	a'kpu:+waká'lh	sipéj
cloud	crown+be.high	back

'The cloud is around the top of a hill.'

k. Totonac

FIG	LOC	LOC
po'hlhnú'	*waká'lh*	*naka'kpú:n.*
po'hlhnú'	waká'lh	nak=a'kpú:+n
cloud	be:high	LOC=crown+NM

'The cloud is up in the sky.'

l. Totonac

FIG	BP+LOC	GND
po'hlhnú	*a'kpu:+waká'lh*	*nak=sipéj.*
po'hlhnú	a'kpu:+waká'lh	nak=sipéj
cloud	crown+be.high	LOC=hill

'The cloud is above the hill.'

Dene speakers encode the cloud's motion, or rather the motion's causation. The spatial encoding is essentially secondary. The actual ground, the mountain, is only inferred by the locative. In Totonac the cloud is in a static relation to an inferred mountain or hill. The specification is the figure's spatial alignment in particular. The different examples (10b–l) show the degree of specificity in Totonac. Speakers encode the particular location of the figure as being close to, or above, the mountain.

The final example is a simple relationship between a ball and chair. The prompt is "where is the ball?".

(11)

a. Dene

GND	LOC	FIG	FIG[CLV]
edachene	*yaghe*	*dzol*	*the-ʔa.*
chair	under	ball	IMPF-3SG.RO.IMPF.situated

'Under the chair the ball is (located).'

b. Totonac

GND	POST	CL	FIG
silla	*tampiwi:lh*	*a'htín*	*pelota.*
silla	tampi+wí:lh	a'htín	pelota
chair	base+sit	CLS+one	ball

'The ball sits under the chair.'

c Totonac

CL	GND	POST	FIG
a'htín	*silla*	*tampiwí:lh*	*pelota.*
a'htín	silla	tampi+wí:lh	pelota
CLS+one	chair	base+sit	ball

'The ball is underneath the table.'

d. Totonac

CL	GND	LOC	FIG
a'htín	*silla*	*tampi:tanu:má:lh*	*pelota.*
a'htín	silla	tampi:+ta+nu:+má:lh	pelota
CLS+one	chair	base+inch+inside+PRG	ball

'The ball is inside/underneath the chair.'

e. Totonac

	GND	POST	FIG
naixtampín	*silla*	*wi:lh*	*wi:lh.*
na+ix+tampín	silla	wi:lh	pelota
FUT+3POSS+base	chair	sit	ball

'The ball sits under the chair.'

In each case the expected figure is not the actual figure. The chair, the actual expected reference point, serves as the figure. In Dene the classificatory verb system does encode a round object (i.e., the figure). In terms of language structure, the ball should be at first position followed by a locative and then the ground. This relationship is reversed. This inconsistency could simply be a mistake, a lapse in concentration on the part of the speaker; other factors could include the influence of the lingua franca (Spanish for Totonac, English for Dene) or simply a lack of language knowledge. But given that these patterns recur frequently, and with different speakers, this seems unlikely. It is also too early to make a definitive statement about the relationship between visual perception, language and meaning, but it seems apparent that universal perceptual patterns in the figure-ground grouping are only partially in effect. In fact, more subjective construction patterns might add semantic detail to the given spatial relation. This semantic detail as shown in the degree of specificity is the interesting factor in the various linguistic encoding patterns. It shows the variability of language and language users' encoding patterns, and the potential for focal points independent of physical properties.

3.5 Concluding remarks

This chapter opened with a broad question concerning the place of meaning in visual perception. The focus has been on spatial relations and their semantics, with various figure-ground asymmetries and degrees of specificity (see below for detailed descriptions on the specific parsing and categorization known as degree of specificity). The central concern, then, has been on spatial semantics and visual perception. As it happens, some encodings consistently reverse the figure-ground patterns known from gestalt psychology.

The hypothesis was that the different figure-ground reversals are not purely coincidental or ungrammatical, but might point to language-specific patterns that only partially relate to universal gestalt conceptions. This means that other components (inter)subjective constructions, are operating.

The introduction posited a bridging element between visual perception, or rather spatial cognition, and language. Embodied cognition, or the bodily basis of meaning, might be a crucial mediator between the two information levels or modalities (Johnson 1987; Gallagher 2005; Zlatev 2010). This bodily basis lends support to the gestalt psychology approach which argues for perceptual constraints in visual perception. These constraints are culturally influenced, that is, speakers construe subjectively staged visual scenes depending on a number of semiotic systems.

The figure-ground dichotomy in visual perception helps to categorize the world at large, an a priori, given, external world that is differently marked, both culturally and linguistically[76]. In addition, these categories are reflected in language as subject and object markers. The perceptual elicitation tools were applied to a variety of languages. For the purposes of this chapter the focus was limited to two unrelated languages, both with non-written traditions. Figure-ground relations are very often linguistically reversed. It seems that they do not just follow perceptual cues (i.e., a larger entity serving as a reference for a smaller entity; Koffka 1935: 178).

There are also claims that visual perception is more than objective figural grouping based, for example, on geometrical properties. The decision to encode a figure or a ground in a particular scene depends on the speaker's choice of what s/he regards as foregrounded or backgrounded;

76 Note that the conception of an external vs. internal world is an idealization that has been highly questioned in phenomenological approaches following Husserl, Merleau-Ponty and the later Wittgenstein, as well as some post-structuralists who argue against a subject-object or external-internal dualism.

it is a somewhat subjective, staged construction. Interestingly, the examples examined in this chapter point to the use of more subjective (or pragmatic) decision patterns in construing figure-ground relations. This should come as no surprise since the literature claims that speakers ascribe subjective and functional properties to objects (Labov 1973; Rosch 1973, 1978; Rosch and Lloyd 1978). An a priori external world is given as physical relative space, itself encoded and profiled differently by different speakers and referenced differently by different cultures as seen in the various degrees of specificity and the portioning of regions. These differences are seen in the variations in gestalt configurations (i.e., perceptual relationships or, as shown, linguistic ones). This indicates an interplay of universal perceptual mechanisms and linguistic specifications that might differ from canonical figure-ground relations. Again, this interplay may be represented on the intermediate level, embodied cognition.

The next chapter also examines figure-ground asymmetries, focusing on grammatical constructions encoding specific details of visual scenes.

Chapter 4: Degrees of specificity in spatial semantics[77]

4.1 Introduction

This chapter presents a cognitive semantic synopsis of spatial topological semantics and, to a lesser degree, frames of reference. Once again the focus is the Northern Athapaskan polysynthetic language, Dene, and Upper Necaxa Totonac, an agglutinative language spoken in East Central Mexico. The hypothesis is that differences in semantic detail indicate that speakers of Dene and Totonac encode spatial topological relations to a higher degree of specificity or semantic granularity than Germanic or Romance languages. This is reflected in their larger inventories of morphosyntactic and semantic choices.

The issue here is the various degrees of specificity speakers assign to different figure-ground asymmetries. Results from a visually based elicitation procedure indicate differences in the encoding of spatial topological relations between speakers and between languages. As such, this research echoes numerous studies on language variation in spatial semantics as known from typological and cognitive semantic approaches. The different degrees of specificity result from different practices chosen by speakers. The data supports the idea that linguistic meaning reflects degrees of specificity of social practices or language games.

The linguistic phenomenon known as degree of specificity of the figure's location in relation to the ground refers to the amount of detailed expressive content with which spatial relations are described in various languages (Svorou 1993). This chapter subscribes to the idea that "linguistic meaning is inextricable from the social practices (language games) in which language is used" (Zlatev 1997: 5; "language games" is adapted from the later Wittgenstein and highlights the pragmatic function of language and meaning; see Wittgenstein 2006). It is interesting that speakers choose to encode the same situation in very different ways (i.e., use differ-

77 This chapter is an extensively revised version based on two papers previously published. One in 2010 as Intralingual variation of spatial concepts in an Athapaskan language. *Cognitive Sociolinguistics: Language Variation in its Structural, Conceptual and Cultural Dimensions*. Preceedings of the 34th International LAUD Symposium. University of Koblenz-Landau: LAUD, 92–123 and :the other as Degree of specificity in spatial semantics. Monika Reif, Justyna A. Robinson and Martin Pütz (eds.). 2013. *Variation in Language and Language Use. Linguistic, Socio–Cultural and Cognitive Perspectives*. Duisburger Arbeiten zur Sprach- und Kulturwissenschaft, 96. Frankfurt: Lang, 367–420.

ent degrees of specificity). This is not only the case between languages (interlingual), but also within a single language (intralingual).

Results from the visually based elicitation tool offer insights into the spatial topological semantics of the two languages . As outlined above, the Topological Relations Markers series of 71 simple black and white drawings was used to elicit the usage of spatial language (Pederson, Wilkins and Bowerman 1998).[78] Comparing linguistic data from 13 Dene and four Totonac speakers reveals significant effects of linguistic variation (see Thiering 2009b for cross-linguistic comparison). While only a few speakers were interviewed, the process of spatial semantic variation is already indicated by the speakers' choosing to encode the various scenes in a highly incongruent fashion (see Thiering and Schiefenhövel 2013). This variation is seen in differences in degree of specificity. It is fair to say that no two speakers agree with one another in their answers. This is especially true of Totonac speakers. This highly scattered distribution of semantic choices is not accidental, but rather systematic in nature. The data offers an interesting case of degree of specificity, as well as variation of spatial semantics (see Thiering 2007, 2009b).

Note that this is a more qualitative study and data presentation. While I am aware of the shortcomings of such an approach, I believe that the empirical evidence points to interesting spatial semantic differences (i.e., variation as shown by the various degrees of specificity). I believe that the encoding differences are symptomatic, offering striking evidence of spatial semantic variation. Moreover, this study presents a detailed review of semantic variations between speakers and age differences, but also between the two languages in question. Given that the elicitation task is fairly simple and limited in its range of spatial scenes, the variety of speakers' choices is remarkable. These are not incidental results, but inherent language choices, or rather speaker-dependent choices for setting the coordinates of the spatial scope in the displayed scene.

Comparing results from older (age 65 to 85) and younger (age 45 to 55) Dene speakers highlights significant effects not only of linguistic variation, but also of language loss in the description of simple spatial situa-

78 As well as the Topological Relations Markers (Pederson, Wilkins and Bowerman 1998), the Caused Position (Hellwig and Lüpke 2001), the Motion Event Study (Levinson) and the Spatial Categorization Elicitation (Thiering 2005), qualitative elicitation tools were used to delimit the semantic scope of topological spatial relations in Dene and other languages (see Thiering 2009b). The data presented here is solely from the TRM test, for the reason that there only a few fluent speakers left for these endangered languages. Clearly there is a priming effect, making the data and results of the other elicitation tools highly biased.

tions (Thiering 2004, 2009a).[79] The results from younger speakers offer a more limited set of spatial morphemes, while older speakers generally do not use spatial morphemes at all. The process of degree of specificity is seen in the younger speakers, who do not use full verb paradigms (including the relevant grammatical particles), most of their expressions being somewhat ungrammatical.

However, older speakers of Dene do construe and categorize spatial topological relations using fine-grained morphosyntactic and semantic encoding patterns. These morphosyntactic affordances (i.e., the correlation between the environment and the functional characteristics of objects and the human being), are on the verge of extinction with younger speakers unable to use these patterns in their descriptions of various spatial scenes. Finally, it should be noted that while the scope of this chapter only allows an initial glimpse into the intricacies of semantic variation in Dene and Totonac, it does support speaker-dependent variation of spatial semantics of such perspectively neutral topological spatial relations.

The chapter opens with theoretical issues regarding topological spatial relations (section 4.2). Section 4.3–4.3.2 presents a general summary of the results; Section 4.4 examines projective relations while 4.5 considers dynamic events with empirical evidence for various degrees of specificity. Finally, section 4.6 offers a conclusion of these findings.

4.2 Spatial semantics: topological spatial relations

This chapter presents two fields of spatial semantics research also touched on in the last chapter. The more geometrically driven topological spatial relations are followed by a brief look at an interesting aspect of language and its constructive function as presented in the discussion of frames of reference.

As established above, spatial topological relations are static locations between objects specifying an objective space relying on geometrical properties. As such, the encoding of topological relations is deemed to be speaker-neutral and neutral to perspective.

This chapter references Lewin's above definition of linguistic topology. This chapter deviates from this general definition, since other encoding mechanisms indicate complexity in spatial encoding processes. Differences in size and scale of figure-ground objects are as significant to Dene and Totonac as they are to other languages. Some of my students recently

79 The four Totonac speakers range in age from 44 to 67.

conducted a pilot study with 30 German native speakers which revealed differences in the encoding of geometric objects such as cubes and spheres depending on how the size was manipulated.[80] In German, at least, posture verbs change according to the size of the object. A small sphere "lays" on the table, but the larger sphere is "sitting" on the table. Figure and ground encodings remain approximate until the figure (the sphere) has a certain extension with respect to the ground (the table). I am certain that other qualitative features of the object also affect speakers' spatial encoding decisions.

The languages under review differ from the idealizations seen before purely because of the scattered semantic distribution of spatial content across a construction and the various degrees of specificity (as noted above). The spatial information therefore cannot be pinpointed to a single morpheme, but rather to a cohort of semantic information. These could be body part expressions and spatial affixes, classificatory verb systems or posture verbs examined earlier.

In addition to these features, the data below indicates that speakers construe spatialized events by focusing on the shape, size and material of primary and secondary objects. This means that the degree of specificity is partitioned into smaller regions.[81] Morphological devices include classificatory verbs, body parts, posture verbs, and locatives. As outlined above, classificatory verbs are present in Athapaskan languages such as Beaver, Dogrib, Navajo and Slavey. Dene, in particular, encodes functional features of the figure, that is, the primary object, as opposed to the secondary object, the ground. As we will see, additional components are encoded that are not topological in the strict sense.

To illustrate a relatively canonical spatial topological relation, examples (12a–g) offer descriptions from the TRM elicitation tool. Speakers generally encode a static topological relation between the figure (a cup) and the ground (a table), expressed by a copular or posture verb, and a

80 The seminar *Language and Cognition* was held at the Department of Linguistics at the Technical University Berlin, summer term 2014. My thanks to all participants who provided thought-provoking data sets and new test designs.

81 Note again that a spatial region profiles the place of the figure and ground. A formal description has been given above by Miller and Johnson-Laird: REG (x,y) profiles that y is the region (REG) within which characteristic interactions with x are possible (Miller and Johnson-Laird 1976: 60). In cognitive grammar a region is defined as a set of mutually interconnected entities in which a noun profiles a region (Langacker 1987: 492). Regions are specified as delimiting a spatial configuration that constrains the boundary or scope of the figure. This definition is consistent with the idea that subjects and objects are usually encoded by nouns which in turn parallel figure and ground (Langacker 1987: 231). Hence, the ground is primarily responsible for denoting the space for the figure.

preposition. Note that Dene and Totonac speakers use more detailed descriptions and thus higher degrees of specificity or semantic detail than the European languages.

(12)

a.

FIG	EXIST/POST	LOC	GND	
Die Tasse	*ist/steht*	*auf*	*dem Tisch.*	German
the cup	3SG.S.be/stand	on	the table.	

'The cup is/stands on the table.'

b.

FIG	EXIST/POST	LOC	GND	
Kopp-en	*er/står*	*på*	*bord-et.*	Norwegian
cup-the	3SG.S.be/stand	on	table-the	

'The cup is/stands on the table.'

c.

FIG	EXIST	LOC	GND	
La tasse	*est*	*sur*	*la table.*	French
The cup	3SG.S.be	on	the table	

'The cup is on the table.'

d.

FIG	EXIST	LOC	GND	
La taza	*está*	*en/sobre*	*la mesa.*	Spanish
the cup	is	on(top.of)	the table	

'The cup is on/on top of the table.'

e.

FIG		GND	EXIST	
A csésze	*az*	*asztalon*	*van.*	Hungarian
DET cup	DET	table-sup	3SG.S.be	

'The cup is on the table.'

f.

GND	LOC	FIG	LOC+CLV	
bek'esh'ich'elyi	*k'e*	*tsaili*	*da-the-ta.*	Dene
table	on	cup	up-IMPF.3SG.S-RO.be.situated	

'The cup is up on the table.'

g.

BP	GND	POST	FIG	
naixa'kpú:n	*mesa*	*wi:lh*	*ta:sá.*	Totonac
LOC=3PO-crown-NM	table	sit	cup	

'The cup is on top of the table.'[82]

The examples in (12a–e) encode the cup – the figure – as being located on the table – the ground.[83] In the different examples, a posture or existential verb and a preposition mark the location of the cup as being situated on the table, but the verb itself does not give any additional semantic information about the material or shape of the object.[84]

By contrast, speakers of Dene and Totonac describe the scene of a cup on a table in different terms (12f–g). In Dene, the figure is profiled with reference to its inherent qualities, i.e., its shape (round object). Example (12f) indicates that the scene is indeed encoded as a static topological 'on' relation between the figure (the cup) and the ground (the table). However, (12f) also indicates that the Dene verb stem in itself expresses more than just the encoding of a static locative relation. It specifies that the figure is a compact round object in a perspectivized 'up' relation to the ground (here meaning the earth as reference point) as opposed to the non-specified perspective in examples (12a–e).

This means that topological parameters are only one aspect of the encoding process: functional and spatial information is also encoded. This can be seen in the usage of the postposition, which expresses a very generic spatial relation, or, as in example (12g) posture verbs and body parts (e.g., crown). Semantic information about the figure is conflated into the verb stem in Dene, in contrast to the European languages which encode the figure samples more generically.

In general, Dene requires postpositions, directional prefixes and figure-based classificatory verbs to express spatial relations as locational relationships between objects. Some of these systems additionally encode

82 See Beck for an analysis of the locative clitic *nak*. He claims that this clitic is closest to a preposition in Totonac (Beck 2004: 13).

83 Again, languages construe different concepts in invoking a reference point and a referent. Two main cognitive operations based on physiological properties are established above: the figure as the variable element or positive space and the ground as the reference element or negative space (Hofstadter 1980; Talmy 1978, 1983, 2000).

84 Posture verbs imply certain orientations such as *steht* or *står* in (a and b), i.e., only long objects with full contact with the ground can 'lie', while objects with a degree of vertical extension can 'stand'. The quality of the figure determines the choice of verb. I have presented the following exmple from German above. Germans say *Der/das Kaugummi ist unterm Tisch* (a piece of chewing gum is under the table), implying a direct contact relationship between the figure (the chewing gum) and the ground (the table). If I say the shoes are under the table then a certain distance is implied between the figure and the ground.

tionships between objects. Some of these systems additionally encode more perspectivized constructions (i.e., deixis) and dynamic motion events as opposed to static topological relations. As noted above, the degree of specificity differs from that seen in the Germanic and Romance languages.[85] Again, this degree of specificity relates to the amount of semantic detail different languages use to describe spatial relations. One result of this study is that Dene and Totonac speakers depict scenes in a more specified fashion (i.e., the degree of specificity is higher). The ostensibly speaker-neutral topological spatial relations are also sometimes perspectivized and contextualized. It can therefore be argued that many of the ostensibly static, idealized situations used in the elicitation tool are actually encoded as dynamic or perspectivized.

Topological relations are only one aspect of spatial semantics. Another important aspect is the idea of frames of reference, mentioned above. Frames of reference are crucial in the linguistic encoding of spatial orientation and spatial cognition in particular. The actual use of the concept refers back to gestalt theories of perception which hold that an organization of units serves to identify a coordinate system, with certain properties of objects resulting in a gestalt.

4.2.2 Subjects, equipment, and materials

Native speakers of Dene, primarily resident in the Cold Lake First Nations Reserve, served as paid language consultants for this project. Two groups of Dene-English bilingual speakers (13 speakers in total) were interviewed in Dene (with some additional English instructions). Note that ongoing language loss, or attrition, made it essential to divide the group into younger and older speakers (see Thiering 2009a). This language loss is seen in the more restricted and often ungrammatical encoding patterns offered by younger speakers. Only the older speakers were able to offer full paradigms.

This chapter, like the last, employs the Topological Relational Markers series (TRM). Four Totonac speakers were also interviewed for this study. They were each asked, either in Spanish or Totonac, to relate the objects shown by answering the question "Where is object X?"86 The TRM enables a comparison of the grammatical marking of spatial topological rela-

85 See Svorou 1993 for a comprehensive and cross-linguistic overview of the degree of specificity.

86 Thanks go to David Beck and Ryan Klint for running the test on site in Mexico. David, Ryan and me have also asked visiting speakers at the University of Alberta.

tions in a wide array of languages (see Levinson and Wilkins 2006; Thiering 2009b).87 It also enables an open-ended exploration of how speakers of different languages use their linguistic resources to carve up the domain of spatial topological relations. The line drawings are intended to prompt discussion on how the depicted relationships between objects are linguistically encoded.

As Pederson, Wilkins, and Bowerman (1998) suggest, spatial descriptions can be used to locate grammatical distinctions that are not strictly spatial in nature. This, it turns out, is indeed the case for the languages in question.

The first Dene group (A) consists of five females and one male, ranging in age from 45 to 55 years. The second group (B) consists of seven speakers, four female and three male, with an age range of around 65 to 85. Four Totonac speakers were also interviewed (age 44–67). Each speaker was presented with the TRM drawings. The Dene results were recorded using a laptop computer and transcribed by hand by a Dene-speaking consultant and by the author, using a score sheet. A free audio editor and recorder such as Audacity is useful for this type of exercise (as is Sound Studio, albeit not free of charge). These transcriptions were verified by the consultant with reference to an electronic Dene-to-English dictionary (Department of Linguistics, University of Alberta). The Totonac data was transcribed by hand only.

4.3 Degrees of specificity in spatial semantics: Dene and Totonac

The following sections offer examples of presumed topological spatial relations. The predominant role of non-linguistic influences on spatial cognition, and especially spatial semantics, is in question here, as well as the various degrees of specificity. Such information is encoded more frequently by elder speakers of Dene and Totonac. The different sections are subdivided into various functional, topological, and projective notions and relations.

87 Note that the 'Where'-question proposed by Pederson et al. (1998) implies or even forces a topological spatial relation which does not necessarily make for a natural description of a scene for a Dene or Totonac speaker, hence the above mentioned task effect or response bias tends to occur.

4.3.1 Figure located on horizontal ground

This section primarily focuses on similar encoding patterns between speakers expressing the general location of a figure to the ground as encoded by postpositions in addition to classificatory verbs, posture verbs or body parts. The data in (13) presents the topological relation of contiguity and support in which the ground supports the figure from below.

(13)

a. Dene group A

GND	LOC	FIG	CLV:LOC+EXIST[FIG]
bek'eshelyi	*k'e*	*erihtl'ischene*	*da-the-ta.*
table	on	pencil	up-IMPF.3SG.S-SO.situated

'The pencil is up on the table.'

b. Dene group B

FIG	GND	LOC	CLV:LOC+POST[FIG]
erihtl'ischene	*halzuzi*	*k'e*	*da-the-ta.*
pencil	office.desk	on	up-IMPF.3SG.S-SO.situated

'The pencil is up on the desk'.

c. Totonac

LOC	LOC+GND	FIG
waká'lh	*nakmesa*	*lápiz.*
Waká'lh	nak=mesa	lápiz
be:high	LOC=table	pencil

'The pencil is on the table.'

d. Totonac

FIG	BP+LOC[DOS]	GND
lapis	*a'kpu:waká'lh*	*mesa.*
lapis	a'kpu:+waká'lh	mésa
pencil	crown+be.high	table

'The pencil is on the table.'

e. Totonac

LOC+GND	BP+LOC[DOS]	FIG
naxpu:tzó'hnu'	*a'kpu:+waká'lh*	*ix+li:+tzó'hnu'.*
nak+ix+pu:tzó'hnu'	a'kpu:+waká'lh	ix+li:+tzó'hnu'
LOC=3PO+CTD+write	crown+be.high	3PO+INST+write

'The pen is on the table.'

f. Totonac

LOC+BP[DOS]	GND	POST	FIG
naixa'kpú:n	*pu:tzó'hnu'*	*wi:lh*	*lapis.*
nak=ix+a'kpú:+n	pu:tzó'hnu'	*wi:lh*	lápis
LOC=3PO+crown+NM	desk	sit	pencil

'The pencil is on top of the desk.'

In (13a–b), the locative encodes the general location of the figure as being in contact with, and in an attachment relation to, the ground. Every older speaker uses the construction presented in (13b), whereas only three (50%) of the younger speakers use this construction in (13a). The other three use constructions that are morphosyntactically and semantically ungrammatical. In both examples (13a–b), the horizontal ground – the 'table' – supports the figure – the 'pencil'. The directional prefix *da-* profiles a deictic location of the inanimate figure in addition to the postposition. The salient reference point is similar to an expected English or German description (i.e., the desk or table). The two Dene age groups are consistent in their encoding of a static topological spatial 'on' relation. In Totonac, there is an evident variation in spatial semantics. The first example (13c) is a generic location which does not use a body part or posture verb construction, rather the *nak* locative construction alone. The figure is located on the horizontal surface. In (13d–f) the figure's degree of specificity is encoded using a body part plus locative construction (13d–e), and finally locative plus body part, and posture verb construction (13f). So the last example offers the most specific profiling of the region (i.e., the figure sits on top of the horizontal ground).

The following set presents the inanimate figure coincident and attached to the ground in a vertical position.

(14)

a. Dene groups A and B

GND	FIG	CLV:POST[FIG]
shéth-lae	*el*	*na-ghel/naghiʔa.*
hill-at.the.summit.of	spruce.tree	upright-IMPF.3SG.S.SO.stand

'The tree stands upright on top of the mountain.'

b. Totonac

FIG	BP	GND	POST
kí'wi'	*a'kpú:n*	*sipéj*	*ya:lh.*
kí'wi'	a'kpú:+n	sipéj	ya:lh
tree	crown+NM	hill	stand

'The tree is on the hill.'

c. Totonac

	FIG	BP+POST	GND
a'hatín	*kí'wi'*	*a'hpu:yá:lh*	*sipéj.*
a'ha+tín	kí'wi'	a'hpu:+yá:lh	sipéj
CLS+one	tree	crown+stand	hill

'The tree stands/is on top of the hill.'

d. Totonac

	FIG	BP+POST	GND
pulaktín	*kí'wi'*	*a'hpu: yá:lh*	*sipéj.*
pulak+tín	kí'wi'	a'hpu:+yá:lh	sipéj
CLS+one	tree	crown+stand	hill

'The tree stands/is on top of the hill.'

e. Totonac

	FIG	POST	LOC+BP	GND
pulaktín	*kí'wi'*	*ya:lh*	*naxa'kpú:n*	*sipej.*
pulak+tín	kí'wi'	ya:lh	nak=ix+a'kpú:+n	sipéj
CLS+one	tree	stand	LOC=3PO+crown+NM	hill

'The tree stands/is on top of the hill.'

f. Totonac

FIG	BP+POST	GND
kí'wi'	*a'kpu:yá:lh*	*sipéj.*
kí'wi'	a'kpu:+yá:lh	sipéj
tree	crown+stand	hill

'The tree stands/is on the hill.'

g. Totonac

LOC+BP	GND	POST	FIG
naixa'kpú:n	*sipéj*	*ya:lh*	*kí'wi'.*
nak=ix+a'kpú:+n	sipéj	ya:lh	kí'wi'
LOC=3PO+crown+NM	hill	stand	tree

'The tree stands/is on top of the hill.'

h. Totonac

BP+POST	GND	FIG
a'kpu:yá:lh	*sipéj*	*kí'wi'.*
a'kpu:+yá:lh	sipéj	kí'wi'
crown+stand	hill	tree

'The tree stands/is on top of the hill.'

i. Totonac

LOC	BP+POST			FIG
he:stín	*a'kpu:yá:lh*	*tzamá:*	*pu:laktín*	*kí'wi'.*
he:stín	a'kpu:+yá:lh	tzamá:	pu:lak+tín	kí'wi'
ridge	crown+stand	that	CLS+one	tree

'The tree stands/is on the ridge.'

j. Totonac

LOC+BP	GND	POST		FIG
naxa'kpú:n	*sipéj*	*ya:lh*	*pu:laktín*	*kí'wi'.*
nak=ix+a'kpú:+n	sipéj	ya:lh	pu:lak+tín	kí'wi'
LOC=3PO+crown+NK	hill	stand	CLS+one	tree

'The tree stands/is on top of the hill.'

Speakers in both Dene groups express physical contact between figure and ground using the classificatory verb expression *naghe* (100%). Here, a ground-based vertical dimension serves as the spatial coordinate or frame of reference for profiling the region. The topological location is specified by a locative static verb and the postposition expressing the figure's general vertical position in relation to the ground. The different Totonac examples show various degrees of specificity ranging from the generic 'on the hill' to 'stands on top of the hill' and 'at the ridge'. The figure is not only located on the hill, but it stands on top of it. Both posture verb and body part constructions are used to specify the spatial region. In (14c–j) the figure is profiled in a standing position relative to the ground. The location is specified as 'on top of' the reference point. Several constituents profile the spatial relationship, such as the body part 'crown', posture verb 'stand', and *nak*. The combination of these constituents construes the degree of specificity of the figure-ground alignment, and hence the partitioning of the region.

The following examples indicate that the inanimate figure relates to the ground in an attachment relation. Topological relations of contiguity and support are encoded. All situations are point-to-point attachments (Bowerman and Choi 2001).

(15)

a. Dene group A

GND	LOC	FIG	CLV:POST[FIG]
**jiedechene*	*k'e*	*jie*	*the-ha.*
fruit.tree	on	fruit	IMPF.3SG.S-RO.situated

'The fruit is (situated) on the tree.'

b. Dene group B

FIG	CLV:POST[FIG]
jiechok	*da-the-ha.*
fruit.big	up-IMPF.3SG.S-RO.situated

'The big fruit is situated (up there).'

c. Dene group B

FIG	MAN	CLV:POST[FIG]
jiechok	*nesha*	*da-ni-s-há.*
fruit.big	they.are.growing	up-move.up-PERF.3SG.PL-RO.grow

'The big fruit are growing up (there).'

d. Totonac

	GND	FIG				FIG
pu:laktín	*xakí'wi'*	*mansa:nás*	*tzaj*	*a'htín*	*halhí:*	*xamansa:nás.*
pu:lak+tín	xa+kí'wi'	mansa:nás	tzaj	a'htín	halhí:	xa+mansa:nás
CLS+one	DET+tree	apple	only	CLS+one	have	DET+apple

'The apple tree just has apples.'

e. Totonac

	LOC[DOS]	BP	LOC+GND
a'htín	*waká'lh*	*xpe'hen*	*nakí'wi'.*
a'htín	waká'lh	x+pe'he+n	na+kí'wi'
CLS+one	be:high	3PO+arm+NM	LOC+wood

'One hangs on branch in tree.'

f. Totonac

GND		FIG
xakí'wi'	*halhí:*	*mansa:nás.*
xa+kí'wi'	halhí:	mansa:nás
DET+tree	have	apple

'The tree has apples.'

g. Totonac

	FIG	LOC[DOS]	LOC+BP	GND
pulaktín	*mansa:nás*	*waká'lh*	*naxa'hán*	*xakí'wi'.*
pulak+tín	mansa:nás	waká'lh	nak=ix+a'há+n	xa+kí'wi'
CLS+one	apple	be:high	LOC=3PO+ear+NM	DET+tree

'The apple is on the branch of the tree.'

h. Totonac

	FIG	BP+LOC[DOS]	LOC+BP[DOS]	GND
pulaktín	*mansa:nás*	*a'hawaká'lh*	*naxa'han*	*xakí'wi'.*
pulak+tín	mansa:nás	a'ha+waká'lh	nak=ix+a'há+n	xa+kí'wi'
CLS+one	apple	ear+be.high	LOC=3PO+ear+NM	DET+tree

'The apple is up on the branch of the tree.'

i. Totonac

FIG	LOC[DOS]	GND
mansa:nás	*waká'lh*	*xakí'wi'.*
mansa:nás	waká'lh	xa+kí'wi'
apple	be:high	DET+tree

'The apple is up on the tree.'

j. Totonac

FIG	LOC+GND	LOC[DOS]
mansa:nás	*naxpé'hni'*	*waká'lh.*
mansa:nás	nak=ix+pé'hni'	waká'lh
apple	LOC=3PO+leaves	be:high

'The apples are up in the leaves.'

k. Totonac

FIG	LOC+BP[DOS]	LOC[DOS]
mansa:nás	*naxa'hán*	*waká'lh.*
mansa:nás	nak=ix+a'há+n	waká'lh
apple	LOC=3PO+ear+NM	be:high

'The apples are up on the branches.'

l. Totonac

FIG	LOC+BP[DOS]	LOC[DOS]	GND
mansa:nás	*naixa'hán*	*waká'lh*	*xakí'wi'.*
mansa:nás	nak=ix+a'há+n	waká'lh	xa+kí'wi'
apple	LOC=3PO+ear+NM	be:high	DET+tree

'The apple is on the branch of the tree.'

The inanimate figure in (15a) (100% of the younger speakers use these expressions) is profiled by a locative marker determining the figure. The figure is situated in a topological relation to the ground by means of the postposition *k'e*. In (15a) the verb stem is missing the locational prefix *da-* indicating a general 'up there' location as shown in (15b) (three older speakers offer (15b)). This morpheme correlates with a neuter verb expressing and conflating the figure and its general location. The figure's semantic specification, its location in a growing upright position, is conflated into the verb stem. The younger speakers fail to name the twig and instead use the general word for tree. They also reverse figure and ground and fail to use the verb stem in (15b) with the expected prefix *da-*.

In a further session, older speakers looked at different data sets and were asked to translate. In contrast with group (15a), the results of group B (15b, b–c) indicate an event, that is, a dynamic process of growing. Note that the prefix *da-* in (15c) (used by three of the elder speakers) encodes the figure as plural. The salient feature is not just the location of the figure in an attached point-to-point relation to the ground, expressed by the supported-by-hanging relation in (15a), but also the motion event. This is indicated by the lack of a postposition. Expressing a static, contact and attached/contiguity relation of the figure to the ground is not enough. A dynamic perspective is adopted to support the idea of the figure's motion, as implied by the expression of a 'growing-out-of' movement. Totonac speakers again vary between generic encoding ('the tree has apples', (15g)) to more specific encodings ('is up on the tree'). In Totonac, the encoding patterns, with the exception of (15d–f), are specific in relation to the spatial alignment of the figure. Examples (15d–f) are highly generic and non-specific figure-ground alignments.

In example (16), the substance of the figure determines its relation to the ground, leading to a reverse relation of the figure-ground asymmetry in older speakers (see Thiering 2011). In addition, the only postposition gives a general location.

(16)

a. Dene group A

FIG	LOC	GND	CLV:VOM[FIG]
**bes*	*k'e*	*łes*	*the-tthete.*
knife	on	greasy.substance	IMPF.3SG.S-SO.fall.into

'The knife falls into the butter.'

b. Dene group B

FIG	GND	LOC	CLV:POST+VOH[FIG]
**bes*	*ɬes*	*yaghe*	*he-(h)?a.*
knife	greasy.substance	under/cover	IMPF.3SG.S-SO.situated

'The knife is covered by the butter (somebody greased in the knife).'

c. Dene group B

FIG	GND	LOC	CLV:VOM[FIG]
beschok	*ɬes*	*yaghe*	*he-he-tth'er.*
knife.big	greasy.substance	under/cover	PERF.3SG.S-[?]-SO.fall.into

'The big knife fell into the butter (it is under and covered by the butter; it got greased in).'

d. Totonac

GND	BP+LOC[DOS]	FIG
kuchilu	*kilh:waká'lh*	*mantequilla.*
kuchílu	*kilh*+waká'lh	mantequilla
knife	lips+be.high	butter

'The butter is up on the knife.'

e. Totonac

GND	BP+LOC[DOS]	FIG
li:lakchukún	*kilh:waká'lh*	*mantequilla.*
li:+lak+chukú+n	kilh+waká'lh	mantequilla
INST+DIST+cut+NM	lips+be.high	butter

'The butter is on the knife.'

f. Totonac

BP+BP+LOC[DOS]	GND		FIG
lakapi:x:waká'lh	*kuchílu*	*tzamá:*	*mantequilla.*
laka+pi:x+waká'lh	kuchílu	tzamá:	mantequilla
face+neck+be.high	knife	that	butter

'The butter is up on the flat edge of the knife.'

g. Totonac

	GND		FIG
hentín	*kuchílu*	*halhí:*	*há'lhni'.*
hen+tín	kuchílu	halhí:	há'lhni'
CLS+one	knife	have	blood

'One knife has blood.'

h. Totonac

	LOC+MAN+FIG
tu:	*li:lakchukununkán.*
tu:	li:+lak+chuku+nun+kán
NREL	INST+DIST+cut+DTV+as

‘Knife for cutting.’

i. Totonac

BP	FIG	GND
kilhhalhí:	*há'lhni'*	*kuchí:lu.*
kilh+halhí:	há'lhni'	kuchí:lu
lips+have	blood	knife

‘The knife has blood on its edge.’

j. Totonac

BP+LOC[DOS]	GND		FIG
lakapi:xwaká'lh	*kuchílu*	*tzamá:*	*mantequilla.*
laka+pi:x+waká'lh	kuchílu	tzamá:	mantequilla
face+neck+be.high	knife	that	butter

‘The butter is up on the flat edge of the knife.’

Examples (16a–c) profile the fact that the knife is a stick-like object and the butter a wet or smeary substance. Four of the younger speakers use the construction (16a); three speakers fail to use the right classificatory verb. In (16a), the butter is the figure, which is supported by the horizontal ground (i.e., the knife). In addition, however, the result of a dynamic event – the knife ‘falling into’ the butter – is also expressed. In (16b–c), the three older speakers use the classificatory verb profiling the general location of the knife, and four elder speakers express the action of the knife falling into the butter. This is a reversed figure-ground asymmetry where the larger object—the knife—is in an occlusion relation with respect to the butter. The locative plus the classificatory verb encode the figure as being inseparably related to the ground. The general location of the figure is expressed as a containment-by-encircling-ground relation (Pederson’s et al. 1998). The verb of handling expressed by ‘greasing it in’ encodes an aspectual and therefore dynamic usage event, and the particular manner as well.

In profiling a ‘falling into’-process, this set indicates a dynamic figure-ground relation. We can therefore claim that the material of which the objects are made, and the way they are usually handled, are significant. This should come as no surprise since classificatory verbs encode qualitative features of the figure. This has an impact on the encoding process, because Dene requires additional semantic information of the participant. This is in clear contrast to a purely topological and static relation between a small entity and its natural larger reference point. Additionally, fulfilling the various morphosyntactic affordances requires a profound knowledge of the language. In summary, one can see that older speakers often seem to profile the actual dynamic event while more or less ignoring the prompt. Younger speakers seem to focus more on the actual topological relation; dynamicity, if encoded at all, is secondary. Totonac speakers encode a maximum degree of specificity, as in ‘up on the flat edge’. The spatial semantic range extends from ‘figure is up on ground’ to the ‘figure is on the flat edge of ground’. There are also highly generic encodings which reference the function of the figure (i.e., cutting).

4.3.2 Superior and interior spatial relations

The example in (17) describes the figure as being superior to the ground. In general, the spatial predications expressed by the preposition ‘over’ or ‘above’ indicate that the location of the primary object is ‘in the sphere of’ the reference object (Talmy 1983: 248).

(17)

a. Dene group A

GND	LOC	FIG	CLV:POST[FIG]
**tthesheth*	*tethe*	*yak’odh*	*hu-tł’i.*
rock.hill	over	cloud	IMPF.3SG.S-AM.liquid.moving.by(lots.of.clouds)

‘The cloud(s) above the mountain moves.’

b. Dene group B

GND	LOC	FIG	CLV:POST[FIG]
tthesheth	*daghe*	*yak’odhaz*	*ghe-sheł.*
rock.hill	above	cloud-small	IMPF.3SG.S.uncontrolled.motion/blown.by. the.wind[88]

‘The small cloud above the mountain moves because of the wind.’

88 The verb plus prefix *heʔe* means ‘to move’ (various things differently) such as ‘clouds’, ‘ice’, ‘sticks floating’.

c. Totonac

FIG	LOC[DOS]	LOC+BP[DOS]
po'hlhnú'	*waká'lh*	*naka'kpú:n.*
po'hlhnú'	waká'lh	nak=a'kpú:+n
cloud	be:high	LOC=crown+NM

'The cloud is up in the sky.'

d. Totonac

FIG	BP+LOC[DOS]	LOC+GND
po'hlhnú'	*a'kpu:waká'lh*	*naksipéj.*
po'hlhnú'	a'kpu:+waká'lh	nak=sipéj
cloud	crown+be.high	LOC=hill

'The cloud is above the hill.'

e. Totonac

LOC[DOS]	FIG	LOC[DOS]
talhmá:n	*po'hlhnú'*	*waká'lh.*
ta:lhmá:n	po'hlhnú'	waká'lh
high.above	cloud	be:high

'The cloud is up high above.'

f. Totonac

LOC+BP+GND[DOS]	BP	LOC[DOS]	FIG
naxa'kpú: n	*sipéj*	*waká'lh*	*po'hlhnú'.*
nak=ix+a'kpú:+n	sipéj	waká'lh	po'hlhnú'
LOC=3PO+crown+NM	back	be:high	cloud

'The cloud is over the hill.'

g. Totonac

FIG	BP+LOC[DOS]	BP
po'hlhnú'	*a'kpu:waká'lh*	*sipéj.*
po'hlhnú'	a'kpu:+ waká'lh	sipéj
cloud	crown+be.high	back

'The cloud is over the hill.'

h. Totonac

FIG	LOC+BP[DOS]	BP	LOC[DOS]	FIG
po'hlhnú'	*naixa'kpú:n*	*sipéj*	*la:waká'lh.*	*po'hlhnú'.*
po'hlhnú'	nak=ix+a'kpú:+n	sipéj	la:+waká'lh	po'hlhnú'
cloud	LOC=3PO+crown+NM	back	do+be.high	cloud

'The cloud is above the hill.'

i. Totonac

BP[DOS]	BP	LOC[DOS]	FIG
naixa'kpú:n	*sipéj*	*la:waká'lh*	*po'hlhnú'.*
nak=ix+a'kpú:+n	sipéj	la:+waká'lh	po'hlhnú'
LOC=3PO+crown+NM	back	do+be.high	cloud

'The cloud is above the hill.'

j. Totonac

FIG	BP+LOC[DOS]	BP
po'hlhnú'	*a'kpu:waká'lh*	*sipéj.*
po'hlhnú'	a'kpu:+ waká'lh	sipéj
cloud	crown+be.high	back

'The cloud is around the top of a hill.'

k. Totonac

FIG	LOC[DOS]	BP[DOS]	LOC+GND
po'hlhnú'	*waká'lh*	*ix pu:hélhni'*	*nak:sipéj.*
po'hlhnú'	waká'lh	ix+pu:+hélh+ni'	nak=sipéj
cloud	be:high	3PO+CTD+mouth+NM	LOC=hill

'A cloud is over the mountain.'

l. Totonac

BP+LOC[DOS]	LOC[DOS]	BP	GND
lakatzunajtzá	*waka'lh*	*ix pu:hélhni'*	*naksipéj.*
laka+tzunaj=tzá	waká'lh	ix+pu:+hélh+ni'	nak=sipéj
face+close=now	be:high	3PO+CTD+mouth+NM	LOC=hill

'The cloud is closely over the mountain.'

Both Dene cases (17a and 17b) encode a "partially controlled action" (S. Rice 1997: 103). In example (17a), the figure is described as moving or floating over the ground, and thus does not express a purely static topological location of the figure above the ground. Two of the younger speakers do not know the appropriate classificatory verb stem, although they know that the cloud should be encoded as a moving entity. The other four younger speakers offer the ungrammatical utterance shown in (17a). In addition, the verb stem cannot be used with objects such as clouds, which are amorphous masses moving in an uncontrolled fashion. Younger speakers use a verb stem that is reserved for liquid objects, not for clouds. In other words, they do not use the appropriate verb. Still, the encoding of the spatial relation is basically a motion event implying, but not expressing, the cause of the movement. The cause is the wind driving the motion of the cloud. This, again, is not the right form. The younger speakers understand the concept and how it should ideally be encoded, but do not seem to have the necessary verbal inventory at their disposal.

In contrast with the ungrammatical sentence in (17a), the expression in (17b), used by every older speaker, profiles the wind as the cause of the figure's motion. When asked, older speakers argue that the figure simply cannot be in a non-moving static position above the ground. Both objects are not just vertically aligned or 'in the sphere of' each other, as they would be in an idealized static situation. Instead, the encoding of this scene relies primarily on the description of the floating event as a dynamic situation in contrast to the static situation captured by the idealized picture. The corresponding locative is used to indicate that the general location of the cloud is above the mountain. The diminutive suffix *–az* specifies that the cloud is small.

In the elicitation session, speakers were specifically asked whether they could describe the relation between figure and ground in the scene as static (i.e., 'the cloud above the mountain'). They maintain that the inherent motion characteristic of the figure can only be negated by an artificial or decontextualized answer, stating that the cloud is over or above the mountain in an English-to-Dene translation. Again, this expression is relatively unlikely in Dene, with speakers refusing to express a static location of the cloud above the mountain. Any form of idealization of the scene locating the figure above the ground fails to reflect the speakers' knowledge of their experiential world, where clouds are continually in motion. This extralinguistic information is relevant to the Dene speakers and therefore the ostensibly static scene is encoded as a dynamic event.[89] Totonac speakers profile different degrees of specificity, such as 'above', 'up in', 'up high', 'over', and 'closely over'. Different body part constructions, such as mouth and crown, specify the figure-ground alignment. The figure is at a certain distance to the ground ('above' or 'high above') or even related in a very specific manner ('closely over'). The responses from the four Totonac speakers in (17c–l) offer an interesting range of spatial semantic variations.

The next section addresses projective figure-ground alignment and, consequently, different frames of reference.

89 Note that English or German speakers can of course respond with dynamic expressions, but they encode the scene as static when prompted with the question "Where is the cloud?". They are able to easily decontextualize the scene.

4.4 Projective figure-ground spatial relations

This section looks at several encoding patterns defined as projective relations. These examples are of particular interest since they challenge a general projective orientation, such as a right-left asymmetry of a figure in relation to a ground. The examples below present four cases where the orientation is contextualized in terms of perspective. This depends on the focal point of the speaker and/or intrinsic features in the figure-ground asymmetry.

The examples in (18) illustrate an anterior location as indicated by the tree standing 'in front of' the church.

(18)

a. Dene group A

FIG	LOC	GND	CLV:POST[FIG]
k'es	*gáh*	*yaltikoé*	*ho-(h)a.*
poplar(s)	near	church	3SG.S.IMPF-SO.exist/location(consuming space)

'The tree is (located) near the church.'

b. Dene group B

FIG	LOC	GND	CLV:POST[FIG]
k'es	*ʔuzi*	*yaltikoé*	*ho-(h)a.*
poplar(s)	out.of.sight	church	3SG.S.IMPF-SO.exist/location(consuming space)

'The poplar blocks the church which is out of sight (on the other side of the church).'

c. Dene group B

GND	LOC	FIG	CLV:POST[FIG]
yaltikoé	*hogáh*	*k'escho*	*nághi-a(h).*
church	space.beside/vicinity.of	tree.big	in.place/in.front.of-3SG.S.IMPF.SO.location(upright)

'The tree stands close to and in front of the church.'

d. Dene group B

GND	LOC	FIG	CLV:POST[FIG]
laeskoé	*tsu-k'edhe*	*k'es*	*ná-ghi-a(h)*
church	[?]-alongside	poplar	in.place/in.front.of-3SG.S.IMPF-SO.location(upright)

'The tree stands in front of/alongside of the church.'

e. Totonac

BP	LOC+GND[DOS]	POST		FIG
ixcha:hé:n	*nakpu:sik walán*	*ya:lh*	*a'hatín*	*kí'wi'.*
ix+cha:hé:+n	nak=pu:sik walán	ya:lh	a'ha+tín	kí'wi'
3PO+back+NM	LOC=church	stand	CLS+one	tree

'There is a tree beside the church.'

f. Totonac

BP	LOC+FIG[DOS]	POST	GND
ixcha:hé:n	*na kí'wi'*	*ya: lh*	*pu: sikwalán.*
ix+cha:hé:+n	nak=kí'wi'	ya:lh	pu:sikwalán
3PO+back+NM	LOC=wood	stand	church

'The church is beside the tree.'

g. Totonac

FIG	BP+LOC+POST[DOS]	LOC+GND[DOS]
kí'wi	*'lakanu:yá:lh*	*nakpu:sikwalán.*
kí'wi	'laka+nu:+yá:lh	nak=pu:sikwalán
tree	face+inside+stand	LOC=church

'The tree stands beside the house.'

h. Totonac

FIG	POST	LOC+BP[DOS]	GND
kí'wi	*ya:lh*	*naxmákni'*	*pu:sikwalán.*
kí'wi	'ya:lh	nak=ix+mák+ni'	pu:sikwalán
tree	stand	LOC=3PO+body+PF	church

'The tree stands beside the house.'

i. Totonac

LOC+BP[DOS]	GND	POST	FIG
naixmákni'	*pu:sikwalán*	*ya:lh*	*kí'wi'.*
na+ix+mákni'	pu:sikwalán	ya:lh	kí'wi'
LOC+3PO+body	church	stand	tree

'The tree stands by the church.'

j. Totonac

LOC+BP[DOS]	GND	BP+FIG	FIG
naixmákni'	*pu:sikwalán*	*makcha'nkaní:*	*'kí'wi'.*
na+ix+mákni'	pu:sik walán	mak+cha'n+kan+ní:	'kí'wi'
LOC+3PO+body	church	body+plant+as+PF	tree

'The tree has been planted by the church.'

k. Totonac

LOC+BP[DOS]	FIG	POST	GND
naixcha:hé:n	*kí'wi'*	*ya:lh*	*pu:sik walán.*
nak=ix+cha:hé:+n	kí'wi'	ya:lh	pu:sik walán
LOC=3PO+back+NM	tree	stand	church

'The tree stands on the side of the church.'

l. Totonac

	GND	BP+POST [DOS]	FIG	BP+ LOC+POST[DOS]		FIG
wamá:	*pu:sik walán*	*a'kpu:yálh*	*cruz*	*he:lakanu: yá:lh*	*pulaktín*	*kí'wi'.*
wamá:	pu:sik walán	a'kpu:+ yálh	cruz	he:laka+nu:+ yá:lh	pulak+tín	kí'wi'
this	church	crown+ stand	cross	and:face+inside +stand	CLS+one	tree

'The cross stands on the church and a tree stands beside this church.'

m. Totonac

LOC+BP[DOS]	GND	POST		FIG
naxmákni'	*pu:sikwalán*	*ya: lh*	*wamá:*	*kí'wi'.*
nak=ix+mák+ni'	pu:sikwalán	ya: lh	wamá:	kí'wi'
LOC=3PO+body+PF	church	stand	this	tree

'This tree is beside the church.'

n. Totonac

LOC	GND	POST		FIG
naxpe'hka:ná	*pu:sikwalán*	*ya:lh*	*pulak tín*	*kí'wi'.*
nak=ix+pe'hka:ná	pu:sikwalán	ya:lh	pulak+tín	kí'wi'
LOC=3PO+[?]	church	stand	CLS+one	kí'wi'

'Right by the church is a tree.'

The responses in (18c–d) consistently indicate the speakers' use of a particular kind of contextualized orientation or frame of reference (Levinson 2003). Examples (18a–b) are intrinsic frames of reference constructions, whereas (18c–d) are more relative constructions. This it is not simply an 'in front of' relation between the primary and secondary object. Elder Dene speakers ascribe certain intrinsic features to the church, that is, the church serves as the reference point. In contrast to (18b), the younger speakers' response in (18a) is an ungrammatical form, syntactically and semantically.[90] Four speakers use the ungrammatical form, and one fails to use the appropriate classificatory verb for a solid object. Only one (older) speaker uses (18b). Example (18c) (two older speakers opt for this description) encodes the tree as blocking the view of the church.[91] In other words, the tree is described as being located between the viewer and the church. This example indicates that the secondary reference point serves as a geometric focal point that singles out a certain portion of the figure located nearest to the reference point (Talmy 1983: 150).

The older speakers encode a more specific classification of the figure as being in an upright position in relation to the geocentric reference point (two older speakers use the form in (18c); three use (18d)). In (18c), speakers encode the relation between figure and ground from the perspective of the viewer ('in front of') and also specify the proximity between figure and ground. In (18d), the 'in front of' relation as well as the fact that the tree is situated 'alongside' or parallel to the church is encoded. The perspective of the viewer, as well as the church's intrinsic characteristic of having a side, are taken into account here.

To sum up, not only do some of the younger speakers encode the scene in an ungrammatical way, they include less information in their descriptions than older speakers. Totonac speakers, on the other hand, profile the figure-ground alignment in a highly specified manner. Spatial encodings such as 'right by', 'on the side of', 'beside', and simply 'by' profile an intrinsic frame of reference. The last entry (n) is the most generic (as opposed to 'on the side of'), and it is also the exception since it evokes a relative frame of reference. Posture verbs and body parts encode the different spatial relations. Again, the reference frames are more intrinsic than some of the relative Dene examples.

In example (19), the figure is in a lateral position in relation to the ground. In both data sets, the figure is encoded via the verb stem, which profiles a general orientation of the figure as being in a 'sitting' position towards the earth as ground. In (19a), the lateral specification is encoded by the postposition *gáh*. All six of the younger speakers use this expression with one reference point to anchor the figure in a proximity relation to the ground.

90 I asked older speakers about this sentence and they indicated that the right form is *k'es naghi gáh yaltikoe ho(h)a.* Hence, 'the tree is near the church' (*gáh* = 'near'), i.e., a non-specified degree of specificity.

91 Such an expression is called *non-biased geometry* as opposed to a *biased geometry* (Talmy 1983: 240).

(19)

a. Dene group A

GND	LOC	CLV:NEUT[FIG]
kon	*gáh*	*the-da.*
fire	near/at	IMPF:3SG.S-AO.sit

'An animate object sits near/at the fire.'

b. Dene group B

FIG	GND_2	GND_1	CLV:NEUT[FIG]
chilikwi	*kon*	*nih*	*the-da.*
young.man	fire	ground	IMPF:3SG.S-AO.sit

'The young man sits by the fire.'

c. Totonac

FIG	BP+LOC[DOS]	POST	GND	
cha:tín	*hawacha*	*pa:xtú*	*wi:lh*	*lama:ná'.*
cha:+tín	hawácha	'pa:+xtú	wi:lh	lama:ná'
CLS+one	boy	belly+out	sit	

'The boy is beside the fire.'

d. Totonac

	FIG	BP+LOC[DOS]	POST	GND
cha:tín	*hawacha*	*pa:xtu*	*la:wi:lh*	*lama:ná'.*
cha:+tín	hawácha	'pa:+xtú	la:wílh	lama:ná'
CLS+one	boy	belly+out	be:sit	flame

'The boy is beside the fire.'

e. Totonac

FIG	BP+POST[DOS]		GND
hawách'	*la'hawí:lh*	*a'htín*	*makskút.*
hawácha'	la'ha+wí:lh	a 'htín	makskút
boy	face+sit	CLS+one	fire

'The boy is by the fire.'

f. Totonac

LOC+POST[DOS]	LOC+GND[DOS]		FIG
lakapu:wí:lh	*nakmakskút*	*tzamá:*	*hawácha.*
lakapu:+wí:lh	nak=makskút	tzamá:	hawácha'
flat.vertical.surface+sit	LOC=flame	that	boy

'The boy is by the fire.'

g. Totonac

LOC[DOS]	GND	POST	FIG
naixlakapú:n	*hawácha*	*la:wí:lh*	*makskút.*
nak=ix+lakapú:+n	hawácha'	la:wí:lh	makskút
LOC=3PO+flat.vertical.surface+NM	boy	do+sit	fire

'The fire is by the boy.'

h. Totonac

LOC+BP[DOS]	LOC+GND[DOS]	POST	FIG
naixlakatzunaj	*nakmakskút*	*la:wílh*	*hawácha.*
nak=ix+laka+tzunáj	nak=makskút	la:wílh	hawácha'
LOC=3PO+face+little	LOC=flame	sit	boy

'The boy is near the fire.'

i. Totonac

	FIG	BP+POST[DOS]	LOC+GND[DOS]
wamá:	*hawácha*	*laka mi:wí:lh*	*nakmakskút.*
wamá:	hawácha'	laka+min+wí:lh	nak=makskút
this	boy	face+come+sit	LOC=flame

'The boy is watching the fire.'

The boy is situated in a lateral or proximity locational relation, expressed in the basic orientational positional verb plus prefix. In (19a), the postposition expresses a specific proximal relation of the distance between the fire and the boy. The older speakers emphasize a less specific location of the reference points. Here, for once, the younger speakers are actually more specific. Interestingly, older speakers are reluctant to give an English 'beside' or 'next to' translation. Instead, *nih* in (19b) encodes the fact that the boy is sitting 'in the vicinity of' or even 'in the light/heat of' the fire. It is essential to point out that the English morphemes do not capture the ambiguous connotations of *gáh* and *nih*. However, as we can see, the younger speakers use a different pattern in which the relation of the figure to the ground is only expressed by the classificatory verb.

Totonac and Dene speakers encode the figure in an intrinsic spatial relationship (i.e., 'by' or 'near'). Totonac also exhibits a range of usage patterns, such as body part, locative and posture verb constructions. The distance between figure and ground is unspecified meaning that the region is relatively unprofiled. This is different in example (19h) where the figure is 'near' the ground, and not just 'by' it as in (19e–g). The most unbiased asymmetry is given in (19i) where the figure is simply not spatially related to the ground.

4.5 Dynamic figure-ground spatial relations

This final section provides an example of various construction type patterns which show several different spatial relations between figure and ground. The data again provides evidence that certain spatial relations in Dene and Totonac are not based purely on topological coordinates. The figure is not only situated or supported by the ground, but it is profiled as a moving event as well. With the exception of (20b), the ground and thus the topological relation between figure and ground are inferred, meaning that the description of the scene merely implies a physical contact between figure and ground.

(20)

a. Dene group A

FIG	CLV:MAN[FIG]
**ts'i*	*ghe-shuł.*
boat	PERF.3SG.S-SO.float(no control)

'The boat floated.'

b. Dene group A

FIG	LOC+GND	CLV:NEUT[FIG]
**ts'i*	*tusi*	*the-ta.*
boat	into.water	IMPF:3SG.S-SO.situated

'The boat is in the water.'

c. Dene group B

GND	FIG	MAN+GND	CLV:MAN[FIG]
ts'i	*nibáli*	*t'a ts'i*	*ghe-shił.*
boat	canvas	because.boat	IMPF:3SG.S-motion.because.of.air [92]

'The boat canvas (sail) moves because of the wind.'

d. Dene group B

GND	FIG	LOC	CLV:MAN[FIG]
ts'i	*nibáli*	*k'e*	*ghe-shił.*
boat	canvas	on	IMPF:3SG.S-motion.because.of.air

'The canvas (sail) moves because of the wind.'

92 The stem encodes a flexible object that is moved by the wind as confirmed by the following elicited example: *holąnįbale* (flag) *ghe-shel* (IMPF:3SG.S.movement.caused.by.air) 'The flag is moving/fluttering (caused by the wind).' (See also: *heshi* 'wave' (in the wind): 'It waves in the wind.').

e. Totonac

FIG	POST	LOC+GND
párku	*wi:lh*	*nakxká:n.*
párku	wi:lh	nak=xká:n
boat	sit	LOC=water

'The boat sits on the water.'

f. Totonac

DYN	LOC+FIG	GND
a:má:	*nakxká:n*	*párku.*
a'n+ma:lh	nak=xká:n	párku
go+PRG	LOC=water	boat

'The boat goes on the water.'

g. Totonac

FIG	BP+DYN	LOC+BP[DOS]	GND
barco	*helha'má:lh*	*naxhélhni'*	*xká:n.*
barco	helh+a'n+má:lh	nak=ix+hélh+ni'	xka:n
boat	mouth+GO+PRG	LOC=3PO+mouth+NM	water

'The boat is going on the water.'

h. Totonac

LOC+BP[DOS]	GND	DYN	FIG
naxhélhni'	*xka:n*	*a'ma:lh*	*pu:takítni'.*
nak=ix+hélh+ni'	xka:n	a'+má:lh	pu:takítni'
LOC=3PO+mouth+NM	water	go+PRG	boat

'The boat goes on the water.'

i. Totonac

POST	BP	GND	FIG
wi:lh	*hélhni'*	*xká:n*	*pu:takítni'.*
wi:lh	hélh+ni'	xka:n	pu:takítni'
sit	mouth+NM	water	boat

'A boat sits on the water.'

j. Totonac

FIG	BP+POST	GND
pu:takítni'	*helh wí:lh*	*xká:n.*
pu:takítni'	helh+wí:lh	xka:n
boat	mouth+sit	water

'A boat sits on the water.'

k. Totonac

LOC+BP[DOS]	GND	LOC	FIG
naixhélhni'	*xká:n*	*tojomá:lh*	*barco.*
nak=ix+hélh+ni'	xka:n	tojo+má:lh	barco
LOC=3PO+mouth+NM	water	be.inside+PRG	boat

'The boat is on top of the water.'

These examples effectively illustrate the linguistic variation between speakers and their different spatial foci. Beside the degree of specificity in the encoding of a spatial relation such as 'sit on', 'is on', 'in on top of', a dynamic perspective is also encoded. The figure is in motion ('boat goes on the water'). Different morphosyntactic patterns are in effect, namely body part, posture and existential encoding mechanisms. The profiled motion expressed in (20b–d) and (20f–h) is only indicated by the prompt. Hence, speakers of different languages prototypically answer the question "Where is the boat?" with a static and topological spatial relation; the boat 'is on' water (Thiering 2006, 2009b). Totonac and Dene speakers encode a more dynamic event using pragmatic features of the objects to be aligned (Thiering 2007, 2009b). Totonac speakers additionally specify the figure's position with a posture verb (i.e., 'sit') or a locative construction with a body part 'mouth' (20k).

In (20a) (three younger speakers use this expression) only the movement of the boat is profiled. The ground is inferred and the location of the figure as floating ('on' or 'in' water) is only expressed by the classificatory verb stem. The expression in (20b), however, does locate the boat as being in water (two young speakers used (20b); one young speaker fails to use the appropriate classificatory verb stem for either the sail or the boat in motion). The postposition profiles and conflates the location and the ground on liquid surface. In contrast with (20a), no motion is indicated. While the example in (20a) already encodes a certain movement, the next two examples (20c–d) go so far as to encode the cause of the motion.

The drawing shows the figure as being located in a topological 'on' relation with the ground (i.e., supported by it). The expressions in (20c–d) (three older speakers use expression (20c), and four use (20d)) profile a different figure-ground relation. The older speakers profile the cause of the motion on the basis of extralinguistic knowledge, implying that a sailing boat prototypically moves on the water by the wind in its sail. This is encoded and profiled in the examples. A default spatial predication is provided by the implication that the figure – the boat –typically moves on a liquid surface. An English or German speaker does not require this information; s/he tends to ignore the fact that the motion event has a cause. A direct comparison of the examples in this set shows that the speaker's salient reference point varies according to the profiled entities in a perspectivized context, meaning that experiential knowledge of the world is required in order to describe the situation.

In Totonac the figure either 'sits on the water', 'goes on the water', or is 'on top of the water'. Both static and dynamic encoding patterns are equally distributed through the utterances. The degree of specificity is higher than in Dene, that is, body part and posture verb constructions are used to specify the region. This partitioning is consequently more fine-grained.

This section indicates that Dene and Totonac speakers contextualize certain events as dynamic which speakers of other languages might view as static spatial situations (Thiering 2006, 2007, 2009b). For example, speakers often profile the cause or the source of a motion event. Topological spatial relations which are by definition neutral in terms of the speakers' perspective or contextual knowledge do not contain sufficient semantic parameters for describing the scenes presented by the drawings. Not only is the figure often described as dynamic, we also see that Dene and Totonac speakers employ a high degree of specificity to partition the region.

4.6 Concluding remarks

This chapter focuses on the degree of specificity in spatial semantics with specific focus on the encoding of spatial topological relations with some examples of frames of reference in Dene and Totonac. The Topological Relations Markers elicitation tool was used to outline the semantic scope of spatial topological relations in Dene and Totonac. The data points to a considerable richness of semantic scope in the encoding of topological space in both languages while also revealing significant intralinguistic variation between speakers. One observation is that younger Dene speakers use a more restricted, less detailed range of spatial expressions than older speakers. This is seen in range of variation in the degree of specificity. In some examples, postpositions express general topological relations much like an English description would (see Thiering 2009b). This differs from the additional verbal information offered by older speakers in their use of classificatory verbs. Moreover, attempts by younger speakers to respond with an appropriate expression often fail in terms of the grammatical restrictions of their language (e.g., subject agreement or word order). Older Dene speakers, and all Totonac speakers, specify the scenes in more detail than younger Dene speakers. They assign additional information of the characteristics and location of figure and ground as well as their relations to each other. Older speakers consequently use a richer vocabulary and more semantic variation. Totonac speakers, too, show considerable variation, such that nearly every speaker uses different encoding patterns. Speakers profile various spatial figure-ground alignments as static, but some also as dynamic. Strictly speaking these are not topological relations. In addition, both Dene and Totonac evoke different frames of reference.

One explanation for the variation in spatial semantics relates to the impact of English (Dene) or Spanish (Totonac) as the lingua franca, and the relatively late age at which younger speakers learn (rather than acquire) Dene and Totonac today. Not being able to hear or speak Dene, either at school or at home, and the non-written tradition of the language, also affects younger speakers. The impact of Catholic residential schools in the 1950s and 1960s was also critical in intralingual variation as the next chapter will show. Residential schools had a devastating effect on the Dene language and culture and their way of life, not just because the children were discouraged from (or actively punished for) speaking their native tongue in these schools, but because normal linguistic and cultural transmission between the generations was disrupted. The entire community was adversely affected by the near-total dispersal of the family unit, which was only relaxed for the few weeks each year when children were returned to their families. Elders and children lost the ability to communicate with one another. This linguistic loss was accompanied by the loss of songs, games, stories and ceremonies – in short, a loss of community and culture (see Thiering 2009a). Thiering and Schiefenhövel (2013) argue that such practices are essential for maintaining cultural heritage, especially in cultures with non-written traditions.

A less negative argument is simply that spatial meaning relies on social practices and language games. Speakers encode different scenes with different emphasis, and the choice depends on the detail which speaker decides to profile. So zooming in on a region depends completely on the speaker's choices of semantic detail. The construal of the specific stage depends entirely on the speaker and his/her cultural background as mirrored in language.

This detail of degree of specificity is more fine-grained than results from Germanic and Romance speakers (Thiering 2006, 2007, 2009b). The different social practices marked by language present interesting results when considering language variation as either intra- or interlingual. Finally, it also seems that the encoding patterns are not perspective-free, as Dokic and Pacherie argue with respect to perception in the frames of reference systems (see above).

We have seen that degrees of specificity in the languages in question differ considerably. This difference is interlingual, whereas the next chapter offers a case study of intralingual variation in spatial semantics due to language loss.

Chapter 5: Language loss in spatial semantics: Dene[93]

5.1 Introduction

Previous chapters have established figure-ground asymmetries and degrees of specificity in detail. Languages, or rather speakers, carve up the spatial domain depending on individual choice rather than purely objective coordinates. So far, I have compared different languages to show interlingual differences in semantic choices. This chapter highlights intralingual differences, which illustrate the point that spatial semantic encodings can differ significantly even within a homogeneous speakers community. First and foremost, the data indicates an ongoing process of language loss in the encoding of spatial relations in Dene, the highly endangered Northern Athapaskan language examined in previous chapters. In once again comparing older Dene speakers (age 65 to 85; data elicitation between 2002 and 2006 in Cold Lake, Alberta) with younger speakers (age 45 to 55), we see the critical effects of language loss (and concomitant loss in spatial mental models) in the latter, seen in their descriptions of simple spatial situations.

Younger speakers exhibit a more restricted set of spatial morphemes than their elders. One crucial difference is that older speakers do not generally use spatial morphemes such as adpositions. Moreover, the process of language loss in spatial semantics is indicated by the fact that younger speakers do not use full classificatory verb paradigms (including the relevant grammatical particles) and that their expressions tend to be ungrammatical. On the other hand, older Dene speakers construe and categorize spatial relations by using fine-grained morphosyntactic and semantic encoding patterns, that is, the degree of specificity discussed in the previous chapter. These morphosyntactic affordances-the correlation between the environment and the functional characteristics of objects and the human being-are on the verge of extinction since younger speakers are unable to use these patterns in their descriptions of various spatial scenes. As I argue

93 This chapter is a highly revised version of the 2004 paper "A case study on language loss: Spatial semantics in Dene Suline". *Alaska Native Language Center Working Papers*, Vol. 4. and a different version, "Language loss in spatial semantics: Dene Suline". In: Jim Stanford and Dennis Preston (eds.) 2009. *An Anthology on Quantitative Sociolinguistic Studies of Indigenous Minority Languages. Variationist Approaches to Indigenous Minority Languages.* Philadelphia: Benjamins, 485–516.

in this chapter, this limitation is due to ongoing language loss and the influence of English as the dominant means of communications. It is obvious that English-language culture (and Canadian politics) has an impact on Dene speakers and their communities. The lingua franca eliminates what remains to the Dene people (most of their lands, and by extension their traditional hunting areas and habits, having already been taken by white settlers).

I was able to elicit data using the four different tools, three developed at the Max Planck Institute in Nijmegen and one by myself.[94] All four are perceptually based tools which use either static black-and-white drawings or videos as visual stimuli. The general aim is to present certain spatial relationships between figure and ground, such as a boat on water, and to prompt speakers for a description of these relationships. The question of spatial anchorage, that is, the choice of frames of reference, is also addressed.[95]

The TRM test, as we've seen, enables a comparison of the grammatical marking of topological relations in a wide array of languages, thus allowing us to survey the various degrees of specificity and figure-ground relations. It enables an open-ended exploration of the ways that speakers of different languages use their linguistic resources to carve up the domain of spatial relations. The line drawings are intended to promote discussion on the ways in which the depicted relationships between objects are linguistically encoded. As Pederson, Wilkins, and Bowerman (1998) suggest,

94 These are from the already introduced Topological Relations Markers (Pederson, Wilkins and Bowerman 1998), the Caused Position (Hellwig and Lüpke 2001), and the Spatial Categorization Elicitation (SPACE; Thiering 2005, 2009b); qualitative elicitation tools used to delimit the semantic scope of topological spatial relations in Dene and other languages. The data presented here comes solely from the TRM test. However, the intermediate analysis of the other two tasks strengthens my argument that younger speakers exhibit significant effects of language loss. One critical problem is that the same Dene speakers were asked to respond to multiple prompts. This results in a task effect since speakers are primed after the initial TRM task.

95 For the sake of consistency, this chapter once again offers data from the first elicitation tool I used, the Topological Relational Markers series (TRM) (Pederson, Wilkins and Bowerman 1998; see Thiering 2009b). The 71 simple line drawings are shown in the various figures below. To recap: the general aim of the TRM series is to identify how various languages encode systems of spatial relations (topological, specifically) and to determine the semantics of these spatial systems. As argued above, the authors of the TRM study suggest that a minimum of three speakers is required for initial insights into spatial marking, while 10 speakers are necessary for a cross-linguistic elicitation of any valid and testable data. My study involved interviews with 13 Dene speakers in these sessions. Each was asked, either in English or Dene, to relate the objects shown by answering the question 'Where is object X'?

spatial descriptions can be adapted to locate grammatical distinctions that are not strictly spatial in nature.[96]

5.2 Topological relations in Dene

As highlighted above, topological relations are defined as static locations between objects which specify an objective space relying on geometrical properties that are deemed to be speaker-neutral.[97] Dene speakers encode functional features of the figure, the primary object, as opposed to the secondary object, the ground. As we will see, these features do not suffice in describing the affordances of Dene since additional components are encoded which are not topological in the strict sense.

The first chapter outlined a very general grammatical survey of Dene. Dene requires postpositions, directional prefixes, and figure-based classificatory verbs to express spatial relations as locational relationships between objects. Some of these systems additionally encode more perspectivized constructions, that is, deixis and dynamic motion events (as opposed to static topological relations). They also encode a high degree of specificity. As I argue above, this degree of specificity relates to the amount of semantic detail with which spatial relations are described in various languages.

Language-specific affordances require Dene speakers to depict a scene in a highly specific and often perspectivized and contextualized fashion. Therefore, many of the ostensibly static and idealized situations used in the elicitation tool are encoded as dynamic, and therefore non-idealized. Finally, although it is not central to this chapter, the concept of deixis is critical as we have seen previously.

In a previous footnote, the term 'deixis' was defined as an element that has no stable referent but rather receives its semantic content from the situation or context of an utterance (Bal 1996: 72). Bühler (1999)

96 This is certainly the case in Dene and, as it turns out, the 'Where'-question proposed by Pederson et al. (1998) implies or even forces a topological spatial relation which does not necessarily make for a natural description of a scene for a Dene speaker. This frequently leads to a task effect or response bias.

97 Physical features between figure and ground have been singled out as +/– contact, +/– inclusion, +/– adjacent and functional relations +/– support and +/– containment (Pederson et al. 1998: 1). As previously highlighted in more detail, most Germanic languages use prepositions to encode verticality ('over', 'under', or 'on'). On the horizontal plane the figure is 'beside', 'right', 'left' to the ground with respect to a specific frame of reference. Topological relations are assumed to be cross-linguistically universal and neutral regarding scale, size, perspective and orientation.

makes the point that deixis or the *deiktisches Feld* is crucial in our daily communications. Building on the brief background information on Dene encoding patterns, the next section presents some actual results from the elicitation sessions.

5.2.1 General summary of methods and results

5.2.2 Subjects, equipment, and materials

Native speakers of Dene Suline, primarily resident in the Cold Lake First Nations Reserve, served as paid language consultants for this project. Two groups of Dene-English bilingual speakers took part in the interviews (with a total of 13 respondents). The first, younger, group (A) consisted of five females and one males, ranging in from about 45 to 55 years. The second, older group (B) included seven speakers - four female and three male - ranging in age range from about 65 to 85 years old. Each speaker was presented with the TRM drawings. The recordings of these field sessions were transcribed by hand on a score sheet by a Dene-speaking consultant and myself. In addition to the pencil and sheet notes, the sessions were digitally recorded with the program Sound Studio (on a G4 Power Book). The transcriptions were verified by the consultant and with reference to an electronic Dene-to-English dictionary (Department of Linguistics, University of Alberta).

5.2.3 Overall results

The older speakers of group B use a richer and a more elaborated range of spatial expressions than the younger speakers of group A in describing the drawings. Moreover, older speakers tend to contextualize abstract drawings by adding extralinguistic knowledge, which is often accompanied by certain deictic gestures.[98]

Table 13 shows the overall frequency count of total usages. This table only presents a very general account that is not statistically significant, but which instead shows tendencies. These tendencies are strong enough to indicate intralingual variation between the two speaker groups.

98 The gestures used during the elicitaion sessions point to a whole new field of research on spatial semantics in the languages in question. Gestures accompanied by language have been examined for a while now, and demonstrate parallels in semiotic systems.

Table 13. Dene overall frequency count[99]

	Construction type	Older speakers: % of 948 total tokens	Younger speakers: % of 948 total tokens	+/– use of locative
1.	Figure-clv	21.5 % (204/948)	0	–loc
2.	Ground-figure-clv	21.5% (204/948)	0	–loc
3.	Figure-ground-loc-clv	0	17.7% (168/948)	+loc
4.	Figure-ground-clv	12.0% (114/948)	3.2% (30/948)	–loc
5.	Ground-figure-clv	0	11.4%(108/948)	–loc
6.	Figure-loc-ground-clv	0	6.3% (60/948)	+loc
7.	Ground-loc-clv	0	2.5 (24/948)	+loc
8.	Figure-clv-ground	0	1.3% (12/948)	–loc
9.	Figure-loc-clv	0	1.3% (12/948)	+loc
10.	Figure-clv-ground	0	1.3% (12/948)	–loc
∑		522	426	

The most frequent patterns (both 21.5%[100]) are (1) usages with figure and classificatory verbs but without a locative, and (2) those with a figure-ground reversal pattern without a locative (remembering that the language uses an SOV pattern). Note that the two most frequent patterns come from older speakers. Of the answers given by the younger group, 62% (264/426) are encoded via a static and non-perspectivized locative construction as indicated by the usage of a locative postposition, while only 38% (162/426) are without locative usages. In contrast, the older group encode about 78% (408/522) of situations as contextualized and perspectivized.[101]

99 13 speakers and 948 total tokens.

100 Percentages only represent a very coarse statistical approximation of the distribution, but this coarse sketch is enough to show the encoding variations. The data description is again qualitative. Enlarging the corpus would certainly call for statistical analysis using SPSS or Anova, for example. ELAN is a good tool for capturing gestural data.

101 Here we see a clear contrast in the variation of usages and encodings in determining contextualized perspective. Nearly 90% of the younger speakers' utterances do not encode perspective as opposed to about 100% of the older speakers. If we take into account that

As this shows, older speakers reverse the figure-ground asymmetry to a large extent (i.e., construction type 2 was used for 39% (204/522) of the elder speakers' tokens). This suggests that they choose the reference point according to the contextualized dynamics of the situation, rather than "natural" shape or size. This contextualized dynamics is seen in the example that uses a picture showing butter on a knife with the prompt "Where is the butter?". Here the older speakers focus on the knife and how it came to its position, rather than simply placing the butter (the natural figure). For these speakers, the larger object serves as the figure. Again, this is the inverse of the relation suggested by Talmy's taxonomy.

The emphasis on dynamicity, manner and perspective in the descriptions of ostensibly static situations indicates that group B encodes more semantic details. I argue that these details might be rooted in the language-specific affordances of Dene. These affordances impose a specific spatial semantic system on the speaker's choice of expressions. In contrast with the speakers of group B, the speakers of group A exhibit a less elaborate encoding system. Responses from this group include ungrammatical sentences which violate word order and syntactic constraints, such as subject agreement (see below for examples). This could be due to a lack of Dene language input and the vast impact of English which is spoken at school, in public, and at home in the Cold Lake First Nation Reserve. Therefore this might indicate the influence of English grammar on the rudimentary Dene structures.

The initial results support the hypothesis of an ongoing process of semantic loss in Dene which goes beyond the encoding of topological spatial relations. This process suggests that Dene is an endangered language. The influence of English as the language of everyday communications affects Dene by reducing the semantic potential for expressing spatial topological relations. There is a striking difference between the two age groups when encoding the scenarios represented in the drawings. While group A tend to encode events on the basis of the English language dominant in the community, older speakers have a much richer and less Anglocentric perspective when contextualizing the drawings.

It is inevitable that older speakers will express topological spatial relations with a rich and stable classificatory verb system which includes additional directional prefixes. The figure is not just given as a nominal construction, but is actually specified by the verb cohort or verbal predication. In addition, a single locative spatial morpheme does not provide sufficient

all older speakers opted for construction without locatives, the difference is even more dramatic.

semantic information on the figure-ground asymmetry, rather it only expresses the general spatial location. It is apparent that in Dene, space and Euclidean geometry are not the only parameters for encoding the topological spatial relations indicated by the 71 drawings. Indeed, it seems that spatial parameters are often only secondary in the construal of presumed spatial topological relations.

As indicated above, some Indo-European languages tend to encode spatial relations by using spatial morphemes, that is, adpositions. In Dene, however, descriptions of relations between static figures and grounds are not coded by a simple postpositional phrase. Instead spatial encoding, where it is used at all, favors a more dynamic, perspectivized and contextualized construal rather than a more static and idealized one. Additionally, older speakers often reverse figure and ground elements. The ostensibly larger background does not necessarily serve as a reference point and so it is not a speaker-independent, objective parameter. Older speakers often fail to make any explicit mention of the ground, which instead is inferred.

Many descriptions allow us to assume that the given situations are generally described in terms of the characteristics of the specific figure. The figure's qualities – texture, material, size, shape and containment – are encoded in relation to the ground. The expressions are not based on any inherent, speaker-independent semantic information. Older speakers, however, tend to contextualize the situations shown in the drawings. In terms of the encoding process, an interesting example is the drawing of a boat on water. This picture is described as a figure *floating* on water. This motion and manner verb encodes a specific, uncontrolled manner of the figure. The causation of movement is profiled along with the manner process. Causation means that the boat is moved by the wind. The TRM test prompt is "Where is the boat?".

Not only is a spatial relation expressed by a locative (if this is the case at all), but the causation of the motion is also encoded by the classificatory verb and the aspectual prefix. This causation is not indicated by the static drawing itself, but is based on the experiential knowledge of the speakers. The speakers impose an extralinguistic context on the drawings, showing the language-specific semantic affordances of Dene as opposed to most Indo-European languages. This shows the culturally specific strategies of the relevant spatial mental models. Naturally speakers of different languages can encode such processes, but the first reaction to the prompt "where is the boat?" canonically encodes a static 'on' relation of the figure.

5.3 Results of specific spatial topological relations in Dene

The following sections offer examples of ostensibly topological spatial relations. This essentially concerns the predominant role of non-linguistic influences on spatial cognition and spatial semantics. The focus here is on the spatial orientation and alignment of the figure in relation to the ground. The degree of specificity in the spatial information is more often encoded by older speakers than younger speakers. The different sections are divided into several functional, topological, and projective notions and relations.[102]

5.3.1 Similar expressions of topological relations

The primary focus of this section the encoding patterns shared by younger and elder speakers in expressing the general location of the figure to the ground as encoded by the postposition in addition to the classificatory verb. The data in (21) presents the topological relation of contiguity and support in which the ground supports the figure from below as also seen in example (22).

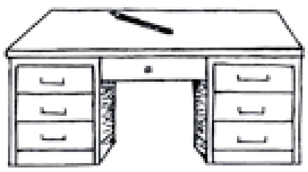

Figure 1. Pencil on desk
Prompt: *Where is the pencil?*

102 As described in the grammatical overview, the semantic distinction of the classificatory verb stems is in accordance with Davidson et al. (1963: 33ff.) and S. Rice (1997: 106). These stems profile existential situations or actions of certain categories of objects and also specify the figure's qualities (Davidson et al. 1963).

(21)

a. Group A

GND	LOC	FIG	CLV:LOC+EXIST[FIG]
bek'eshelyi	*k'e*	*erihtl'ischene*	*da-the-tą.*
table	on	pencil	up-IMPF.3SG.S-SO.situated

'The pencil is up on the table.'

b.Group B

FIG	GND	LOC	CLV:LOC+EXIST[FIG]
eriht'ischene	*hąlzuzi*	*k'e*	*da-the-tą.*
pencil	office.desk	on	up-IMPF.3SG.S-SO.situated

'The pencil is up on the desk'.

In (21a–b), the locative encodes the general location of the figure as being in contact with and in an attachment relation to the ground. Every older speaker uses the construction in (21b), whereas only three (50%) of the younger speakers use the construction in 21a. The other three are ungrammatical constructions. Ungrammatical here means that both on the level of morphosyntax and semantics, the respondent chooses the wrong paradigm. In both examples (21a–b), the horizontal ground – the 'table' – supports the figure – the 'pencil'. The directional prefix *da-* profiles a deictic location of the inanimate figure in addition to the postposition. The salient reference point is similar to that expected in an English or German description, that is, the desk or table. Both age groups are consistent in encoding a static topological spatial 'on' relation.

The following set presents the inanimate figure coincident and attached to the ground in a vertical position.

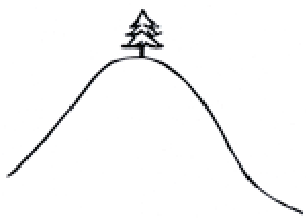

Figure 2. Tree on top of mountain
Prompt: *Where is the tree?*

(22)

Groups A and B

GND	FIG	CLV:POST[FIG]
shethlaé	*el*	*na-ghe?a*
hill-at.the.summit.of	spruce.tree	upright-IMPF.3SG.S-SO.stand

'The tree stands upright on top of the mountain.'

Speakers of both groups express a physical point-to-point contact between figure and ground using the classificatory verb expression *nághe?a* (100%). This means that a ground-based vertical dimension is the spatial coordinate or frame of reference. The topological location is specified by a locative static verb and the postposition expressing the figure's general vertical position in relation to the horizontal ground.

5.4 Differences in spatial marking

As a contrast to the examples above where younger and older speakers agree, I here present cases of semantic differences in describing ostensibly topological static scenes. These examples point to an ongoing process of semantic loss in Dene. The younger speakers have a more limited range in their encoding patterns than older speakers.

The examples in (23) and (24) indicate that the inanimate figure relates to the ground through an attachment relation. Topological relations such as contiguity and support are encoded, and all situations are point-to-point attachments (Bowerman and Choi 2001). Moreover, the data suggests that it is not just a general topological relation which is profiled, but also a temporal frame. This process is seen in the use of classificatory verbs implying movement and manner inferred from the speaker's general knowledge (e.g., that leaves have grown out of a twig).

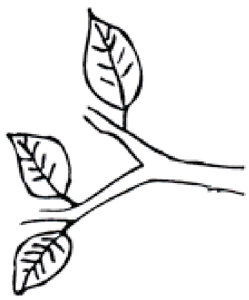

Figure 3. Leaves on twig
Prompt: *Where are the leaves?*

(23)
a. Group A

GND	LOC	FIG	CLV:DIR+MAN[FIG]
*dechen	_k'e_	_et'ąchághe_	_ha-ghi-ṣ-hą._
tree	on	leaves	out.from-[?]-PERF.3SG.S-FO.grow

'Out from one tree the leaves grew.'

b. Group B

FIG	CLV:MAN[FIG]
et'achá.gheʔaẓ	_da-ni-ṣ-hą._
little.leaves	3PL.S-move.up-PERF-FO.grow

'The (little) leaves have grown.'

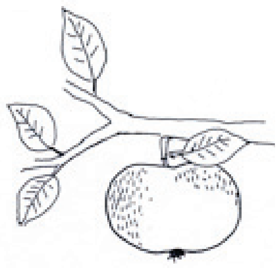

Figure 4. Fruit on tree
Prompt: _Where is the fruit?_

(24)

a. Group A

GND	LOC	FIG	CLV:EXIST[FIG]
*jiedechene	_k'e_	_jie_	_the-ʔą._
fruit.tree	on	fruit	IMPF.3SG.S-RO.situated

'The fruit is (situated) on the tree.'

b. Group B

FIG	CLV:LOC+EXIST[FIG]
jiechok	_da-the-ʔą._
fruit.big	up-IMPF.3SG.S-RO.situated

'The big fruit is situated (up there).'

c. Group B

FIG	CLV:LOC+MAN[FIG]
jiechok	_da-ní-s-hą._
fruit.big	up-move.up-PERF.3SG.PL-RO.grow

'The big fruit grew up (there).'

The inanimate figure in (23a) and (24a) (100% of younger speakers use these expressions) is profiled by a locative marker determining the figure as being situated in a topological relation to the ground by means of the postposition *k'e*. In (23a), the verb stem is missing the locational prefix *da-* present in (23b) (three elder speakers offer (23b)), indicating a general 'up there' location. This morpheme correlates with a neuter verb expressing and conflating the figure and its general location. The figure's semantic specification of the location in a growing upright position is conflated with the verb stem. Younger speakers fail to name the twig and instead use the general word for tree. They also reverse figure and ground and fail to use the verb stem in (23b) with the prefix *da-*.

In an additional session with older speakers, I presented the different data sets and asked them for a translation. In contrast with group A, responses from group B (24b–c) indicate an event, that is, a dynamic process of growing. Note that the prefix *da-* in (24c) (used by three of the elder speakers) encodes the figure as plural.

In this case, the salient feature is not only the location of the figure in an attached point-to-point relation to the ground as expressed by the supported-by-hanging relation in (24a–b), but the motion event. This is indicated by the absence of a postposition. Expressing a static, contact and attached/contiguity relation of the figure to the ground is insufficient. A dynamic perspective is used to support the idea of the figure's motion as implied in the expression of a 'growing-out-of' movement.

In (25), the substance of the figure determines its relation to the ground, leading to a reverse relation of the figure-ground asymmetry in older speakers. In addition, the postposition only gives a general location. This is highlighted above in the German example *Der/das Kaugummi klebt unterm Tisch* 'the chewing gum sticks under the table'.

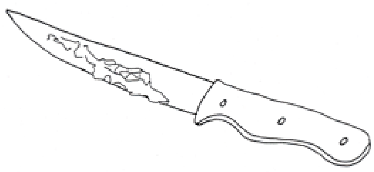

Figure 5. Butter on knife
Prompt: *Where is the butter?*

(25)

a. Group A

FIG	LOC	GND	CLV:VOM+MAN[FIG]
**bes*	*k̨'e*	*tłes*	*he-ł-tth'er.*
knife	on	greasy.substance	IMPF.3SG.S-CL-SO.fall.into

'The knife falls into the butter.'

b. Group B

FIG	GND	LOC	CLV[FIG]
**bes*	*tłes*	*yaghe*	*he-ʔą.*
knife	greasy.substance	under/cover	IMPF.3SG.S-SO.situated

'The knife is covered by the butter (somebody greased in the knife).'

c. Group B

FIG	GND	LOC	CLV:VOM[FIG]
beschok	*tłes*	*yaghe*	*he-ł-tth'er.*
knife.big	greasy.substance	under/cover	PERF.3SG.S-CL-SO.fall.into

'The big knife fell into the butter (it is under and covered by the butter; it got greased in).'

Examples (25a–c) profile the fact that the knife is a stick-like object and the butter a wet or smeary substance. Four of the younger speakers use the construction in (25a). Three speakers fail to use the appropriate classificatory verb. In (25a), the butter is the figure and it is supported by the horizontal ground, that is, the knife. In addition, however, the result of a dynamic event – the knife 'falling into' the butter – is also expressed. As outlined in the chapter above, in (25b–c) three older speakers use the classificatory verb profiling the general location of the knife, while four older speakers express the action of the knife falling into the butter. Once again there is a reversed figure-ground asymmetry where the larger object – the knife – is in an occlusion relation with the butter. The locative plus the classificatory verb encode the figure as inseparably related to the ground. The general location of the figure is expressed in a containment-by-encircling-the-ground relation, to use the terminology offered by Pederson et al. (1998). The verb of handling and manner expressed in 'greasing it in' provides an aspectual and therefore dynamic usage event, and the particular manner is encoded as well. This set indicates a dynamic figure-ground relation by profiling a 'falling into' process. We can therefore claim that the material of which the objects are made, and how they are usually handled, are significant. This should come as no surprise since

Dene features rich classificatory verb systems encoding qualitative aspects of the figure. This has also an impact on the spatial encoding process, because Dene requires additional semantic information on the participants involved. This is in clear contrast to a purely topological and static spatial relation between a small entity and its "natural" larger reference point. It shows the complexity of the relevant spatial mental models.

We can conclude by observing that in many cases, older speakers seem to profile the actual dynamic event while more or less ignoring the static prompt. Younger speakers focus more on the actual topological relation. The dynamicity of an actual implied event, if encoded at all, is merely secondary. This is interesting for a number of reasons. For one, the elicitation task and the idealized situations presented create a task effect. Also, the results show that language patterns only partially suffice in describing spatial relations. More importantly, speakers' knowledge (and consequently cultural factors) are included in the spatial description. A form of cultural practice or spatial semiotics is in effect (Schmauks 2002). I believe that this practice is of specific interest when considering spatial mental models and their manifestation as categorization systems.

5.4.1 Superior and interior spatial relations

The example in (26) shows the figure as superior to the ground. In general, the spatial predication expressed by the preposition 'over' or 'above' indicates that the location of the primary object is "in the sphere of" the reference object (Talmy 1983: 248).

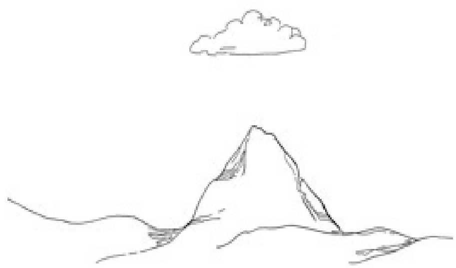

Figure 6. Cloud over mountain
Prompt: *Where is the cloud?*

(26)

a. Group A

GND	LOC	FIG	CLV:MOTION[FIG]
**tthesheth*	*tethe*	*yak̨’odh*	*hu-tɬ’il.*
rock.hill	over	cloud	IMPF.3SG.S-AM.liquid.moving.by(lots.of.clouds)

‘The cloud(s) above the mountain moves.’

b. Group B

GND	LOC	FIG	CLV:MAN+MOTION[FIG]
tthesheth	*daghe*	*yak̨’odhadz*	*ghe-sheɬ.*
rock.hill	above	cloud-small	IMPF.3SG.S.uncontrolled.motion/blown.by. the.wind[103]

‘The small cloud above the mountain moves because of the wind.’

Both cases encode a “partially controlled action” (S. Rice 1997: 103). In example (26a), the figure is described as moving or floating above the ground, and thus does not express a purely static topological location of the figure above the ground. Two of the younger speakers fail to use the appropriate classificatory verb stem although they know that the cloud should be encoded as a moving entity. The remaining four younger speakers respond with the ungrammatical utterance in (26a). In addition, the verb stem cannot be used with objects like clouds, which are amorphous masses moving in an uncontrolled fashion.

Note that the younger speakers use a verb stem that is reserved for liquid objects, not for clouds. In other words, they do not use the appropriate verb. Still, the encoding of the spatial relation is basically a motion event implying, but not expressing, the cause of the movement. The cause is the wind, which drives the motion of the cloud. Again, this is not the right form. While the younger speakers understand the concept and how it should ideally be encoded, they do not seem to have the necessary verbal inventory at their disposal. Speakers actually admitted this in English. They were somewhat frustrated, aware that a different verb paradigm should be used but unable to locate it.

In contrast with the ungrammatical sentence in (26a), the expression in (26b), used by all older speakers, profiles the wind as the cause of the figure’s motion and its manner. On further enquiry the older speakers argue that the figure simply cannot be in a non-moving static position

103 The verb plus prefix *heʔe* means ‘to move’ (various things differently) such as ‘clouds’, ‘ice’, ‘sticks floating’.

above the ground. Both objects are not just vertically aligned, or "in the sphere of" each other, as the idealized static situation in the image might suggest. Instead the encoding of this scene relies primarily on the description of the floating event as a dynamic situation. The locative indicates that the general location of the cloud is above the mountain. As a side note, the diminutive suffix *-az* specifies that the cloud is small.

In the elicitation session, I asked speakers specifically whether they could describe the relation between figure and ground in the scene as a static spatial relation, that is, the cloud above the mountain in a static symmetry. According to them, the inherent motion characteristic of the figure can only be negated with an artificial or decontextualized answer which states that the cloud is over or above the mountain in an English-to-Dene translation.

Again, this expression is rather unlikely in Dene, with speakers refusing to express a static location of the cloud above the mountain. Any form of idealization of the scene which locates the figure above the ground fails to reflect the speakers' knowledge of their experiential world, where clouds are continually in motion. This extralinguistic information is highly relevant for Dene speakers and therefore the ostensibly static scene is encoded as a dynamic event.[104] This argues for the importance of cultural and pragmatic factors that are only partially encoded via language, appearing also in other semiotic systems such as actual practices. This is addressed in more detail in the chapter on Eipo and Dene.

The next set (27) provides examples of the encoding of an animate figure located in an interior relation to the ground. The schema for spatial relations such as this adheres to the idea that the ground not only surrounds the figure, but also encloses and thereby contains it.

104 Of course English or German speakers can also respond with dynamic expressions, but they tend naturally to encode the scene as static when prompted with the question "Where is the cloud?". They can easily decontextualize the scene. However, some of my students have shown that German speakers also contextualize various scenes.

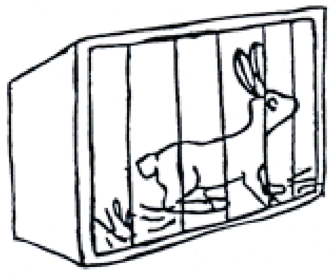

Figure 7. Rabbit in cage
Prompt: *Where is the rabbit?*

(27)

a. Group A

GND	loc	FIG	CLV:LOC+NEUT[FIG]
dechenti	*ye*	*gah*	*ná-dher*.
box	in	rabbit	in.place.of.3SG.S.IMPF.AO.be.in.location (lives.in.a.wooden.box)

'The rabbit is located/lives in a wooden box.'

b. Group B

FIG	CLV:LOC+POST+MAN[FIG]
gah	*be-da-ri-tą*.
rabbit	3SG.S(its)-sitting.position-along.its.side-AO.locked.in[105]

'The rabbit is locked in (is in jail/something is in the way of the rabbit).'

The animate figure in (27a) is located in the ground (the 'wooden box'), i.e., a full inclusion is encoded by the postposition. Two of the six younger speakers do not know the term for rabbit or the appropriate classificatory verb stem. All seven of the older speakers respond with the sentence in (27b) which emphasizes the dynamic process of closing the figure in. This contrasts with a simple 'in' location of the figure. The verb phrase conflates the specific location of the figure and there is no postposition to express topological relation. The older speakers express something 'in the way of' the rabbit. The concept of capturing a rabbit appears somewhat unnatural to them, and therefore we can assume that speakers construe an expression that matches the actual scene where a rabbit is locked in, as an English speaker is likely to do.

105 The modal prefix -*ri*- also encodes a local relationship (Li 1946: 415).

5.4.2 Projective figure-ground spatial relations

This section provides several encoding patterns defined as projective relations known from frames of reference. These examples are of particular interest since they challenge a general projective orientation, such as an orthogonal right-left asymmetry, of the figure in relation to the ground. The examples below depict four cases in which the orientation is contextualized in terms of perspective. This depends on the focal point of the speaker and/or intrinsic features in the figure-ground asymmetry. Strictly speaking these relations are not topological, but they do provide further evidence of semantic loss.

The examples in (28) illustrate an anterior location as indicated by the tree standing 'in front of' the church.

Figure 8. Tree in front of church
Prompt: *Where is the tree?*

(28)

a. Group A

FIG	LOC	GND	CLV:	POST[FIG]
ḳ'es	*gáh*	*yaltiḳoé*	*ho-ʔą.*	
poplar	near	church	3SG.S.IMPF-SO.exist/location(consuming space)	

'The tree is (located) near the church.'[106]

106 See also the related paradim: *K'es yaltiḳǫe gáh ná-ghi-ʔa.* Or: *Yaltiḳǫe gáh ḳ'es na-ghi-ʔa.* Speakers either put the focus on the tree as figure or the church as figure.

b. Group B

FIG	LOC	GND	CLV: POST[FIG]
k’es	*ʔuzį*	*yaltikoé*	*ho-ʔą.*
poplar	out.of.sight	church	3SG.S.IMPF-SO.exist/location(consuming space)

‘The poplar blocks the church which is out of sight (on the other side of the church).’

c. Group B

GND	LOC	FIG	CLV:POST[FIG]
yaltikoé	*hogáh*	*k’escho*	*ná-ghi-ʔą*
church	space.beside/vicinity.of	tree.big	in.place/in.front.of. 3SG.S.IMPF.SO.location(upright)

‘The tree stands close to and in front of the church.’

d. Group B

GND	LOC	FIG	CLV:POST[FIG]
laeskoé	*tsų-k’edhe*	*k’es*	*ná-ghi-ʔą*
church	[?]-alongside	poplar	in.place/in.front.of-3SG.S.IMPF-SO.location(upright)

‘The tree stands in front of/alongside of the church.’

The results in 28c–d consistently point to the speakers’ use of a particular kind of contextualized orientation (Levinson 2003). It is not simply an ‘in front of’ relation between the primary and secondary object. Older Dene speakers ascribe certain intrinsic features to the church, that is, the church serves as the reference point[107]. As for the younger speakers, 28a (although not 28b) represents an ungrammatical form, syntactically and semantically.[108] Four speakers use the ungrammatical form, and one fails to use the appropriate classificatory verb for a solid object. There is only one (older) speaker who uses 28b. Example 28c (two older speakers opt for this description) encodes the tree as blocking the sight of the church.[109]

In other words, the tree is described as being located between the viewer and the church. This example indicates that the secondary reference point serves as a geometric focal point which singles out the portion

107 This is hardly surprising; ever since Christianization churches in West Canada have performed a particular social function. With respect to spatial alignment churches have an intrinsic orientation.

108 I asked elder speakers about this sentence, and they indicated that the right form is *k’es nághįʔa gáh yaltikoé hoʔa.* Hence, ‘the tree is near the church’ (*gáh* = ‘near’).

109 Note again that such an expression is known as ‘non-biased geometry’ (as opposed to a ‘biased geometry’) (Talmy 1983: 240).

of the figure located nearest to the reference point (Talmy 1983: 150). The older speakers encoded a more specific classification of the figure as being in an upright position in relation to the geocentric reference point (two older speakers use the form in 28c, three use 28d). Further, speakers in 28c encode the relation between figure and ground from the perspective of the viewer ('in front of') and also specified the proximity between figure and ground. The response in 28d encodes the 'in front of' relation, as well as the fact that the tree is situated 'alongside' or parallel to the church. This takes into account the perspective of the viewer as well as the intrinsic characteristic of the church as having an intrinsic side.

In summary, not only do some of the younger speakers encode the scene ungrammatically, their descriptions also include less information than those of their elders. Example (29) is similar, but now the asymmetry is between two animate objects, and there is a secondary reference object involved.

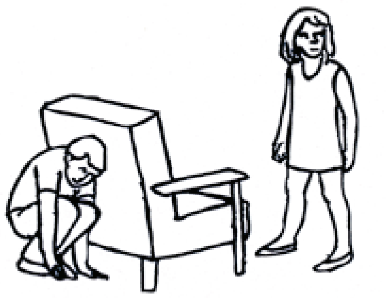

Figure 9. Boy hiding
Prompt: *Where is the boy?*

(29)

a. Group A

GND	LOC	FIG	CLV:LOC[FIG]
edachene	*t'azì*	*deneyuaze*	*he-he-l-ʔ-į*
chair	behind (going.the.other.way)	boy	3SG.S.IMPF:CL-AO.hide.oneself[110]

'The boy hides behind the chair.'

110 A likely related stem is *-edaghe* meaning 'position' (held by a person).

b. Group B

GND	LOC	FIG	LOC	CLV:LOC[FIG]
edachene	*ʔuzį̨*	*ts'ekwaz*	*ch'a*	*he-he-ʔį̨.*
chair	on.the.other.side (out.of.sight)	little.girl	away.from	3SG.S.IMPF:CL-AO.hide.oneself

'The boy hides from the girl behind the chair.'

The distinction between a primary reference object and secondary reference object is insufficient in for this scene. Talmy regards this additional semantic information as necessary in two further categories: the reference objects encompass the primary reference object and those outside of the object (1983: 245). The main semantic function of these additional reference objects is to identify the specific location of the figure. Four of the younger speakers respond with sentence (29a), while two speakers do not know the appropriate classificatory verb. They also fail to mention the girl. In contrast with this reduction, all of the older speakers frame not only the primary point of reference (the chair), but also the secondary point of reference (the girl). This results in a more specific description of the location of the referent objects than the younger speakers.

In example (30), the figure is in a lateral position with relation to the ground. In both data sets, the figure is encoded via the verb stem which profiles a general orientation of the figure as being in a 'sitting' position towards the earth as ground. In (30a), the lateral specification is encoded by the postposition *gáh*. All six of the younger speakers use this expression with one reference point to anchor the figure in a proximity relation to the ground.

Figure 10. Boy next to fire
Prompt: *Where is the boy?*

(30)

a. Group A

GND	LOC	CLV:POST[FIG]
kon	*gáh*	*the-da.*
fire	near/at	IMPF:3SG.S-AO.sit

'An animate object sits near/at the fire.'

b. Group B

FIG	GND_2	GND_1	CLV:POST[FIG]
chilikwi	*kon*	*nih*	*the-da.*
young.man	fire	ground	IMPF:3SG.S-AO.sit

'The young man sits by the fire.'

The boy is situated in a lateral or proximity locational relation expressed by the basic orientational positional verb plus prefix. In (30a) the postposition expresses a more specific proximal relation. The older speakers emphasize a more unspecified location of the reference points. Here, unusually, it is the younger speakers who are more specific. Curiously, older speakers are reluctant to use an English 'beside' or 'next to' translation. Instead, in (30b) *nih* encodes the fact that the boy is sitting 'in the vicinity of' or even 'in the light/heat of' the fire. It is essential to point out that the English morphemes do not capture the ambiguous connotations *gáh* and *nih*. However, as we can see, the younger speakers use a different pattern in which the relation of the figure to the ground is only expressed by the classificatory verb.

5.5 Miscellaneous figure-ground spatial relations

This final section provides a handful of examples of various construction type patterns showing several different spatial relations between figure and ground. This data again offers evidence that in Dene, certain so-called spatial relations are not purely based on topological coordinates, and that older speakers use a different semantic range in their expressions than younger speakers.

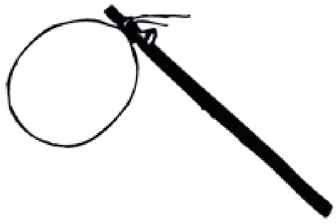

Figure 11. Balloon on stick
Prompt: *Where is the balloon?*

(31)

a. Group A

FIG	GND	CLV:MAN[FIG]
**beyeju'laze*	*dechen*	*he-he-the-tłµ*
balloon	stick	INC-3SG.S.IMPF-FO.tie.itself.to.something

'The balloon is tied to the stick.'

b. Group B

GND+LOC	FIG	CLV:MAN[FIG]
dechen.belaghé	*beyejuli*	*he-he-chedhé.*
stick.end.of.it	balloon	INC-3SG.S.PERF-FO.tie

'The balloon was tied to the end of the stick.'

This example is interesting for the fact that the younger speakers provide six different responses. The example in (31a) is closest to the target sentence in example (31b). One problem for the younger speakers is the encoding of the 'balloon'. Another problem occurs in relating the figure to the ground. Example (31a), offers an ungrammatical construction because of the rather obscure verb form. Additionally, the prefix *heh(e)-* conflicts with the aspectual *-the-* prefix.[111] The chosen form implies that a third person singular subject has tied itself to an object. In both cases, the figure is not encoded as being supported by the ground, but as attached or, more specifically, tied to it. In (31b), however, the stick is tied to the balloon in a passive construction. Moreover the older speakers express the specific location of the balloon, that is, the fact that it is tied to 'the end of' the stick. The verb merely encodes a general 'tied-to' relation and neither example employs a locative.

In example (32), an ostensibly simple scene is encoded as the result of a motion event profiling the figure's motion 'through' the ground. Again,

111 The prefix *heh(e-)* marks not only the inceptive, but also functions as a peg element.

as we have just seen, six younger speakers provide six different responses. The utterance in (32a) is close to the idea represented by the scene. Interestingly, the figure is profiled as being 'speared' through the ground. The location is conceptually secondary to the direction from which the figure has come to its position. While the concept of 'poking through' is key, the younger speakers simply lack the necessary morphosyntactic inventory.

Figure 12. Earring on ear
Prompt: *Where is the earring?*

(32)

a. Group A

FIG GND CLV:MAN+DIR[FIG]
**ʔasi* *bedzaghé* *húh-gor.*
thing 3SG.his/her.ear 3SG.S.PERF-SO.spear
'The stick like object was speared through his/her ear.'

The example in (32a) is an attempt to express that something was poked (through). The older speakers (32b); three offer this utterance) express this motion event as well, while the older speakers in (32c) (four offer this utterance) also add the figure's hanging position in relation to the ground. While the figure is encoded as a stick-like object in (32a) and (32b), thereby emphasizing the 'poking through' motion event, in (32c) the fact of its being a round metallic object is encoded.

b. Group B

GND CLV:MAN+DIR[FIG]
bedzaghé *ghá-ghe-gé.*
ear toward-3SG.S.PERF-SO.poke[112]
'The ear was poked by a stick-like object.'

112 Due to a phonological process *-ghe-* changes to *he* in certain environments.

c. Group B

GND	CLV:MAN[FIG]	LOC	FIG	CLV:POST+LOC[FIG]
bedzaghé	*ghá-ghe-gé*	*k’e*	*tsatsanébadhaz*	*ná-ghe-ge.*
ear	toward-3SG.S.PERF-SO.poke	on	round.iron.thing	in.place.of-3SG.S.PERF-RO.hang

‘The earring (hang on the ear) was poked through (his/her ear).’

These examples show that the bare description – ‘earring on ear’ – of a spatial topological relation is not in question here, but rather the process by which the figure came to its location. To speakers of other languages it may seem that the static drawing in itself does not evoke the semantic event of a process or motion event, but Dene speakers apparently find it necessary to express the idea of dynamicity – ‘poked through’. Example (32c) finds the figure supported by hanging, while also profiling the motion event in which the cause is implied. These expressions are not topological in the strict sense since the scene is described as inherently dynamic.

The figure in (33) suggests, at least to speakers of Germanic languages, that the crack is in a topological ‘in’ relation to the cup. Dene speakers, however, describe the scene quite differently.[113] The figure cannot be separated from the ground in terms of the topological relation indicated by the English proposition ‘crack in cup’, in which the crack is encoded as the figure and the cup as the ground.

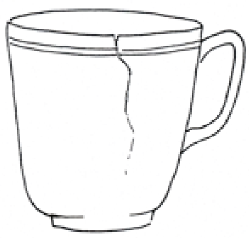

Figure 13. Crack in cup
Prompt: *Where is the crack?*

113 Responses in the Germanic languages are clearly triggered by the artificial test design. The prompt “Where is the crack?” suggests the ‘in’ relationship, although speakers do add that they would prefer to say that the cup is broken.

(33)

a. Group A

GND CLV:MAN+DIR[FIG]
tth'ai *na-ghe-té.*
dish move.downwards[?]-3SG.S.PERF-break (any kind of dish)
'The dish broke.'

b. Group B

GND CLV:MAN+SUBSTANCE[FIG]
lididtth'ai *ghe-ta-ʔa.*
cup 3SG.S.PERF-CL-crack (only certain things can break because of tension)
'The cup cracked (because of tension).'

Neither of these cases encodes an explicit spatial relation but instead infer the relation between figure and ground. Dene speakers encode both objects as being inseparably amalgamated. Even after multiple prompts, speakers of both age groups use this pattern to encode the result of the process of cracking a container. In addition, example (33b) profiles the general cause (tension), that is, how the cup came to its state of being cracked. Despite this convergence, the younger speakers (33a) use a more generic verb form to describe the dish. In fact only two offered this response, while the other four do not know the appropriate classificatory verb. By contrast, all of the elder speakers respond with (33b), describing the cup as well as its specific material (being breakable) by using a particular verb form.

The last example in this chapter shows several construction type patterns of a single scene. The figure is not only situated or supported by the ground, but its moving event and manner is profiled as well. With the exception of (34b), the ground and thus the topological relation between figure and ground are inferred, that is, the description of the scene only implies a physical contact between figure and ground.

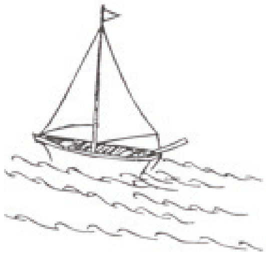

Figure 14. Boat on water
Prompt: *Where is the boat?*

(34)

a. Group A

FIG CLV:MAN+DIR[FIG]
**ts'i* *ghe-l-uł.*
boat PERF.3SG.S-cl-SO.float(no control)
'The boat floated.'

b. Group A

FIG+LOC+GND CLV:FIG+NEUT[FIG]
**ts'itusi* *the-tą.*
boat.into.water IMPF:3SG.S-SO.situated
'The boat is in the water.'

In (34a) (three young speakers use this expression) only the movement of the boat is profiled. The ground is inferred and the location of the figure in a floating event on/in water is expressed by the classificatory verb stem. The expression in (34b), however, does locate the boat in water (two younger speakers use (34b); one younger speaker fails to use the appropriate classificatory verb stem for either the sail or the boat in motion). The postposition profiles and conflates the location and the ground on liquid surface. In contrast with (a), no motion is indicated. While the example in (34a) already encodes a certain movement, the following two examples (34c–d) goes so far as to encode the cause of the motion.

(34)

c. Group B

GND+FIG	FIG	CLV:MAN+MOTION[FIG]
ts'i nibali	*t'ats'i*	*ghe-sheł.*
boat canvas	because boat	IMPF:3SG.S-motion.because.of.air [114]

'The boat canvas (sail) moves because of the wind.'

d. Group B

GND+FIG	LOC	CLV:MAN+MOTION[FIG]
ts'inibali	*ḳ'e*	*ghe-sheł.*
boat canvas	on	IMPF:3SG.S-motion.because.of.air

'The canvas (sail) moves because of the wind.'

The drawing shows the figure as being located in a topological 'on' relation with the ground, that is, supported by it. The expressions in (34c–d) (three older speakers use expression (34c), and four use (34d)) profile a different figure-ground relation. The older speakers profile the cause of the motion on the basis of extralinguistic knowledge, implying that a sailing boat is prototypically moved on the water by the wind in its sail. This is encoded and profiled in the examples. A default spatial predication is given in the implication that the figure – the boat – typically moves on a liquid surface. English and German speakers do not require this information. They tend to ignore the fact that the motion event had a cause. A direct comparison of the examples in this set neatly illustrates how the speaker's salient reference point varies according to the profiled entities in a perspectivized context, that is, experiential knowledge of the world is crucial in describing the situation. This is known from distribution cognition processes (Hutchins 1996).

This chapter indicates that in the elicitation test, Dene speakers contextualize certain events as dynamic which speakers of other languages might view as static spatial situations. For example, there is a tendency to profile the cause or source of motion events, as in (34c–d). Topological spatial relations that are by definition neutral in terms of the speaker's perspective or contextual knowledge do not contain sufficient semantic parameters for describing the scenes shown in the drawings. Not only is the figure often described as dynamic in some of the examples, we also

114 The stem encodes a flexible object that is moved by the wind as confirmed by the following elicited example: *holą̨nį̨bale ghe-shel.* flag IMPF:3SG.S.movement.caused.by.air 'The flag is moving/fluttering (caused by the wind).' (see also: *heshi* 'wave' (in the wind): 'It waves in the wind.'); see also *ts'i nilts'i t'a ghekoth tu ḳ'e naghekoth.*

saw that older and younger Dene speakers use a different range of expression. This might be attributable to the influence of English, which is now many speakers' first language. Younger speakers simply no longer have much exposure to Dene in their daily lives. In comparing data from younger and older speakers we can observe a striking semantic loss in one of the dominant parameters for human cognition, that is, spatial cognition and spatial semantics.

5.6 Concluding remarks

This chapter presented a cognitive semantic description of ostensibly topological spatial relations in Dene with a focus on the impact of language loss. Using the Topological Relations Markers series developed by Pederson et al. (1998), I outlined an initial approach to the semantic scope of certain spatial topological relations in Dene. The data generally indicates a considerable richness of semantic scope in the encoding of topological space in Dene, especially in the response from older speakers. However the data also reveals the impact of language loss. Younger speakers use a more restricted, less detailed range of expressions than older speakers. In some examples, a postposition expresses a general topological relation in a way that is analogous to an English description, rather than the additional verbal information generally used by older speakers. Moreover, younger speakers often fail in their expressions as far as the grammatical restrictions of the language (e.g., subject agreement, word order) are concerned. Older speakers provide more detail than younger speakers in describing scenes, giving additional information on the characteristics and location of figure and ground as well as their relations to each other.

The differences between younger and older speakers may relate to the impact of English and the relatively late age at which younger speakers learn Dene nowadays. Not being able to hear and speak Dene at school or at home, and the non-written tradition of the language, also impacts the younger speakers' knowledge of their language and culture. With no examples of written Dene available, the process of revitalization is even more difficult. Against this backdrop, the current research is not only a contribution to the vast field of spatial semantics, but also an attempt to record Dene data to help counter the ongoing semantic loss in this endangered language.

In using the TRM series I shed light on the complex interplay between conceptual reasoning, language, culture and contextual factors. A further finding of the current research is that in Dene, space in general and topological relations in particular are not only described in terms of topological geometry (Vandeloise 1991). They are often encoded as contextualized events depending on the speaker's extralinguistic experiences (e.g., 'boat on water' or 'cloud above a mountain'). Hence they are not just encoded as static topological relations, but also functional relations such that encodings depend on the various affordances of the objects. Many older speakers describe ostensibly static scenes as dynamic. Figure-ground asymmetries cannot always be traced back to a "natural" larger background, that is, they turn out to be reversed in a number of cases. This reversal pattern emphasizes the importance of both 'salient' entities and the functional component of the primary and secondary objects involved. Texture and material, as well as shape, size and animacy of the figure and ground, are significant in the encoding process. Finally, the act of contextualization implies different orientations of entities based on the focal point of the speaker or the object (e.g., 'tree alongside' or 'in front of' a church).

Part III: Spatial concepts as landmarks: cognitive semantics meets cognitive anthropology

Chapter 6: Spatial concepts, language and practice in Eipo and Dene[115]

6.1 Introduction

Following the previous case studies on micro-scale figure-ground asymmetries, this chapter focuses on the linguistic representation of spatial concepts in two little-known and unrelated languages with non-written traditions. It explores the degree to which environmental experience and spatial orientation is reflected in language and practices. This echoes the anthropological linguistic approach which places language in its social and cultural context, and its cultural practices (Foley 1997; Mark et al. 2011). As such, spatial knowledge is not only encoded in concepts and categories, but also embodied in the lived histories of human beings, and their cultural and linguistic practices (Foley 1997: 177).

The unrelated cultures in question are located interesting environmental settings. One is the mountainous region of the Eipo, the other the vast prairies of the Dene. The mental and perceptual course-maintaining processes in these cultures rely on cognitive maps, that is, orientation techniques which are processes of inference within the structure of cognitive maps (Portugali 1996). They are structures of spatial reasoning as an activity of unconscious inference. The aim is to employ cognitive maps that match "real world" cues such as objects and places to their symbolic equivalents in the cognitive maps. This chapter deviates from descriptions of landscape features in the sense that it adopts cognitive maps that are referred to in "dead reckoning" orientation techniques, that is, the previously discussed process of navigating without physical instruments. This kind of navigation uses dynamic cognitive maps and mental triangulation processes so that navigators have a spatial conception of their position at any time. I argue that this is also of specific importance for orienting oneself in the mountainous regions of the Eipo or the vast Alberta prairies of the Dene. I again adopt the premise that

115 This chapter was published in a different version in the Max Planck Institute for the History of Science Preprint Series in 2013, Vol. 447. It will also be published in another different version in: Matthias Schemmel (ed.) 2014. *Spatial Thinking and External Representation: Towards a Historical Epistemology of Space.* Max Planck Research Library for the History and Development of Knowledge. Berlin. The chapter has been extensively revised for this book.

> descriptions of space, or allusions to space in language, must rest on two kinds of knowledge. The first appears to be based on models (maps, representations) which people construct to guide *spatial behavior*. The second appears to consist of a linguistic symbol-system that allows the models to be shared within a community of discourse. (Siegel and White 1975: 11)

The question is: Are there commonalities between the two unrelated languages, and what is the linguistic and conceptual nature of their differences? The following quotation locates the point of departure.

> Man, in confronting reality, faces a kaleidoscope of phenomena ranging from the natural to the man-made, to the imaginary, to the totally abstract. Comprehension of such a broad inventory of reality and non-reality requires language, the tool that permits man to take verbal stock of objective and subjective experiences alike. In man's ongoing endeavor to conceptualize and verbalize a world that can never be fully known, language is the vital intermediary. (Malotki 1983: 13)

The research question concerns the relationship between non-linguistic information and spatial language. The point of departure in the argumentation is that non-linguistic information has an impact on spatial language and categorization, that is, references to space and its relation to semiotic systems. Language data will demonstrate the influence and constructive process of environmental landmarks and cultural heritage on the shaping of spatial categorization in the two languages.

I begin with the fundamental assumption that Homo sapiens, like all other animals, is equipped with a biological, specifically neurobiological disposition which enables orientation in space. The broad aim of this chapter is to survey some of the most fundamental spatial notions based on environmental or regional landmarks. Landmarks, as we have seen, are defined as any kind of environmental reference points. This could be a mountain, a river, a house or even a tree. Landmarks are point references external to the person. In a city, landmarks may be distant buildings or geographical features that can be seen from many angles and distances, or they may be more local in nature—buildings, signs, trees, storefronts, doorknobs and other urban details (Miller and Johnson-Laird 1976: 378). Landmarks are used as proximate course-maintaining devices for orientation as seen in dead-reckoning navigation systems. These landmarks shape and determine a detailed topographical cognitive map of the environment as represented in language and various practices.

It is argued that landmarks shape and determine a detailed topographical map of the environment. Consequently, a mental model or cognitive map is represented in language, but also practices and other semiotic systems (Thiering 2012). On the other hand, spatial orientation is, additionally governed by general geographic principles such as the absolute directions of 'uphill', 'downriver' as well as, at least in the cultures under survey, cardinal directions, prevailing winds, the position of the sun, moon, stars and the like. It should be noted that the term "map" as a dynamic mental representation is not understood as a chart-like or coordinate system in the mathematical sense. At this point in the research it imposing a coordinate system upon a speaker's mental organization would not be helpful. Further data elicitation is required.

In referring to landmarks and the environment I defer to the following quote by Fowler and Turner which again summarizes the function of landmarks and geographic features in particular. This quote also summarizes the point of departure in terms of the function of environmental knowledge and its reflection in language (Miller and Johnson-Laird 1976: 377).

> The naming of geographic features as part of territorial marking and orientation is a common occurrence in all cultures topographical. Names reflect specific cultural interests and historical developments within the possibilities given by the morphology of the language. (Fowler and Turner 1999: 424)

Fowler and Turner point out that the process of naming geographic and territorial landmarks is crucial in every culture. Topographical names indicate particular cultural interest as represented by the language repertoire or language-specific affordances. The data here points to a dense linguistic network of topographical maps. Place names serve as mental maps for spatial orientation and navigation. Furthermore, we see the rich fabric of terms of spatial deixis in both cultures. This means that the notion of frames of reference is also essential, since they profile spatial relationships between the speaker-hearer and the environment. I argue that human beings instantiate relations between objects, relying on various frames of reference which, as the name implies, serve as reference. A reference point anchors a specific orientation between objects and the viewer (Carlson 1999, 2003; Carlson and Radvansky 1996; Carlson and Darrell 1993, Carlson and Gordon 2001; Levinson 2003; Levinson and Wilkins 2006).

Note that in a spatial situation more than one coordinate system might be in effect. The stage model discussed earlier indicates that different grids may use different reference points. Generally speaking, these linguistic coordinates are important for the description of topographical 'at', 'on', and 'in' spatial relations in Dene and Eipo, as they are for the description of projective left-right relations in general (Malotki 1983: 16). They are also important in macro-scale orientation processes in which figure-ground asymmetries are taken 'into the wild', to paraphrase Hutchins' *Cognition in the Wild.*

According to Malotki, the term "linguistic coordinate" implies the division of a spatial configuration into a speaker, a hearer and a third part (a person or a thing the speaker-hearer refers to). Hence, a linguistic coordinate system is not just a geographically or mathematically abstract concept, but also a means of spatial configuration in the linguistic encoding.

As we have seen above, the encoding of spatial relations depends on certain spatial (and temporal) parameters which set the linguistic coordinate reference system for the speaker-hearer. In general, spatial marking is based on one of three different reference frames as discussed earlier. These are assigned to the objects profiled in the situation (Carlson 1999, 2003; Carlson and Radvansky 1996; Carlson and Darrell 1993, Carlson and Gordon 2001; Coventry and Garrod 2004; Levinson 2003, but also see Jackendoff 1996 who proposes eight frames of reference).[116]

As far as the figure/ground asymmetry is concerned, I have already argued in favor of Talmy's adaptation of the gestalt psychology approach. But I also believe we need to go further than Talmy's simplifications of gestalt notions. For this reason, I have returned to the founders of gestalt psychology and their detailed outline of various cognitive contours. Certain cognitive categories arguably play an important role in attributing the primary and secondary objects of a scene (Talmy 1983: 230). These functions are encoded as the figure and ground of a spatial scene in staged settings. In other words, the already familiar variable element or positive space, versus the reference element or negative space, are the primary imaging parameters (Talmy 1978: 627; Hofstadter 1980; Talmy 1983: 232, Talmy 2000). Again, the former is usually the smaller, moveable object whereas the latter is usually the larger, permanently located object.[117]

In this chapter, I primarily focus on the semantic features of location and direction of the figure. I will also describe semantic event features as well as various other imaging parameters (Fillmore 1968; Frawley 1992; Talmy 2000; S. Rice 2002).

I argue that ascriptions of imaging parameters are determined by cultural, environmental and language-specific affordances (Whorf 1956; Watzlawick 1981; Wygotski 1964; Hunt and Agnoli 1991; Lucy 1992a,b). These in turn depend on the speaker-imposed figure/ground asymmetries

116 As we have seen the three frames of reference divide into: a. the viewer/ego-centered or relative frame, b. an object-centered or intrinsic frame, and c. the environment-centered or absolute frame.

117 The Table 2 above outlines the basic imaging parameters. It is important to note that three basic factors determine the contrast between figure and ground: the size, movement, and position of the figure in relation to the ground in the shared knowledge of the discourse participants. Talmy states that adpositional phrases profile relationships such as the location of the figure in relation to the ground, the time of the unfolding event, the manner in which the event unfolds, and the transition, motion and path of the figure (Talmy 2000).

(see below) that are attributed to the respective objects (Talmy 1978, 1983, 2000).

This chapter works from the assumption that spatial concepts are constructed on the basis of evolutionary processes for orientation in space and via experience based on the ontogeny of a speaker and common concepts in the speaker's community in a particular culture at a particular time. Some fundamental spatial concepts and representations are presented throughout which are based on anthropomorphic spatial knowledge in Eipo and Dene. This is knowledge that members of both cultures have developed on the basis of human phylogenetic adaptations, throughout their ontogenesis in a remote areas of Papua province and Western Canada. The chapter provides a snapshot of spatial semantics represented by the two languages. Moreover, this chapter bases its arguments on the species-specific cognitive organization that mature and shape in the course of ontogenesis during sensomotoric action and sociocultural learning (Piaget and Inhelder 1956). As I have stressed, spatial cognition is externally represented in language and other semiotic systems as well as in culture-specific practices (Foley 1997: 169–178). Note again that language is understood as an external representation of spatial mental concepts or, as Boas puts it, that human language is one of the most important manifestations of mental life (Boas 1997: 68).

In the case of Eipo, ethnolinguistic data comes from the Eipo dictionary which contains actual usages of the recorded words and thereby allows insight into the mental concepts of its speakers. Further data comes from published material by Schiefenhövel and Heeschen (Heeschen and Schiefenhövel 1983; on the relation between Humboldt and ethnolinguistics see Miller 1968). There is additional reference to a collection of myths, songs, and stories from Eipo speakers (Heeschen 1990; and film recordings of their daily activities).

In the case of Dene, first hand data was elicited from Dene speakers based on various elicitation tools by Thiering, and Dene stories as relayed in a number of interviews (Thiering 2006, 2009, 2010; field notes). I examine culture-specific structures and behaviors that reflect experiences with local environmental conditions, e.g., natural boundaries or important delimiting features such as rivers and mountains in Eipo or rivers and lakes in Dene (see Smith and Mark 2001). At the outset I referred to Fowler and Turner's outline which states that

> [i]f peoples choose to orient themselves to coasts or seas, rivers or mountains, the sun's path, or some other feature, some aspect of this will usually show up in their place-names. (Fowler 1999: 424)

Adopting Fowler and Turner's point, we will see that people in both cultures do indeed use place names in their specific environments to construct a linguistically dense topographical reference system for orientation. This means that environmental experience is also represented via language and language in turn shapes spatial concepts or mental models (Thiering 2012, 2014).

Finally, this chapter presents various ideas of space in Eipo and Dene (Malotki 1979). It is argued that such ideas of space, that is, the speaker's basic delimitation of his/her world of experience, are as important in Eipo and Dene as they are in any other language and culture. These ideas of space include the deictic parsing of space into 'here', 'there' and 'over there', or simply 'celestial space' versus the 'earth' as encoded via 'above' and 'down'. We also have ideas of space such as 'left' and 'right' asymmetries, 'in front of' and 'behind', 'up' and 'down', 'near' and 'far away', 'inside' and 'outside', 'in' and 'on', the cardinal directions 'North', 'South', 'West', and 'East', 'back' and 'forward', man-made places such as 'a house' and 'geographic places' or 'surfaces' (Malotki 1979: 294, 297).[118]

Malotki's survey presents various facets of Hopi encoding of spatial relations, demonstrating a high degree of specificity (Svorou 1993; Thiering 2013a). In Chapter 5 of his analysis, Malotki gives a detailed account, including various illustrations of the different representations of space and spatial semantics as linguistically summarized in a total of 43 locational morpheme markers specifying space in Hopi; the alphabetically ordered spatial morphemes are described in terms of content or semantic fields in Malotki's concluding remarks (Malotki 1979: 144–145, 261 and 295, 298; see also Robering 2013). He states that Hopi uses a fine-grained linguistic system to encode spatial relations and spatial concepts which also differ to a certain degree from most other languages (Malotki 1979: 293). This should come as no surprise since we have seen that different languages present language-specific affordances. Again, this is the semantic content hard-wired into specific morphosyntactic devices or morphosyntactic patterns. As such, spatial concepts are linguistically represented in different forms which are rooted in the respective language system. Malotki concludes that

118 Note that in contrast to Hopi, the Eipo language does not have true terms for cardinal directions. Yet I believe that expressions such as 'downstream' and 'upstream' have a similar semantic function. One could therefore state that Eipo also evokes a tripartite system of deictic reference. Note also that this three-way separation is similar to the German hier 'here', da 'there', dort 'over there', differentiating between proximal and distal distances taking the speaker as the anchor of his/her perspective.

> die Hopi-Sprache auf Grund ihrer differenzierten Gestaltung des Lokativs mit seinen punktiven und diffusen Subsystemen sowie des Lokativs und Destinativs mit ihren extremen bzw. nicht-extremen Untergliederungen ihre Sprecher zu einer schärferen Beachtung gewisser Bereiche der räumlichen Realität zwingt, als dies die meisten (Standard Average European; M.T.) Sprachen tun. (Malotki 1979: 299)

Thus, Malotki claims that Hopi-speakers are forced by their language, and, as I assume, by their environment, to pay more attention to spatial reality. He does not claim Hopi's encoding of space differs from that of other languages, nor does he assume that the Hopi's *Weltbild* is unique (Malotki 1979: 301). He points out the idea of space that might be culture- and language-specific. Indeed, Malotki believes that a different focus on particular aspects of spatial relations might lead to differences in thinking about space, i.e., he appears to conclude with a linguistic relativity principle in modest form (Malotki 1979: 301). It is possible to verify this assumption, but direct proof appears rather difficult at this point. It could be argued that spatial deixis terms used, for example, by peoples in the alpine regions of Europe, reflect similarly precise relationship between the environment and language (Berthele 2006).

Obviously Eipo and Dene present crucial environment-dependent encoding patterns mirrored in the languages. Mountains and rivers are important limitations in Eipo while lakes, rocks, trees and rivers figure prominently in the Dene culture, echoed in their language patterns and the carving-up of spatial concepts at the language level. Malotki concludes that for Hopi, the language uses a fine-grained linguistic system to encode spatial relations, and thus offers a high degree of specificity.

This chapter begins with some brief theoretical fundamentals of cognitive linguistics, building on chapters 1 and 2, followed by anthropological outlines of Dene and Eipo. After this are selected examples of spatial concepts in Eipo (center and periphery and natural limitations, distance, and orientation) and corresponding spatial concepts in Dene. Finally, there is a comparison of respective representations of spaces in Dene and Eipo, based on a variety of data sets before the chapter concludes with some general comments. A short introduction to the respective grammars is given above.

6.2 Spatial mental models as cognitive maps

As noted in the theory outline, descriptions of space are based on internal models of knowledge representation of the environment. Such models are defined in cognitive psychology as 'mental models'. More specifically, the term 'cognitive maps' represents the geometric (Euclidean) layout of differentiated topography of a space (via toponyms). By definition, a cognitive map or survey representation of a spatial layout encodes Euclidean relations (straight line distances and directions) between behaviorally relevant landmarks within a coordinate reference system centered on the environment. The term is used rather loosely, or as an analogy, since I do not believe in a strict mathematical coordinate system represented in the brain, at least not with respect to the cultures under review. Still, when considering spatial conceptualization the analogy helps to model and describe the cognitive function of representing environmental frames of reference as a cognitive device.

Cognitive maps serve to support navigation, and, in turn, are created *by* navigation and exploration of large-scale space. In the course of navigation and exploratory spatial behavior, landmarks are experienced sequentially in space and time (the previously mentioned sequential versus serial scanning processes; Langacker 1987: 144–145). The process of constructing a cognitive map can be thought of as a process that places a mental copy of each sequentially experienced landmark into a simultaneous system that preserves metric information about the straight-line distance and direction of landmarks relative to one another. Mental triangulation processes enable computing algorithms to match real-time decisions in the different navigation and pilotage orientations. One important, recently emerging property of simultaneous systems is that the spatial relations between landmarks entered in the system are equally available, even those relations not directly experienced.

In the introduction we saw that cognitive maps express the essential structure of spatial information encoded in our memories through learning processes and implicit knowledge structures. Like cartographic maps, cognitive maps can be constructed from many different sources of information and encoding processes. Some cognitive maps may be stored as permanent structures in long-term memory (e.g., a cognitive map of a familiar city), while others may be temporary structures of the current state of a dynamic environment (e.g., a parent keeping track of the locations of children as they play in a park). In either case the characteristics of objects are thought to be stored along with their spatial locations. This means that a cognitive map is, in the simplest terms, the encoding of a structure in our memory of "what is where", i.e., essentially individualized internal representations or models of the worlds in which we live.

The processes used in acquiring spatial knowledge appear to have a fundamental impact on the character of a cognitive map. The nature of cognitive maps produced by different encoding processes and the focus on understanding the circumstances that produce cognitive maps with fixed orientations, and those that produce orientation-free cognitive maps, is at issue here. Cognitive mapping is

> the process composed of a series of psychological transformations by which an individual acquires, stores, recalls, and decodes information about relative locations and attributes of the phenomena in his everyday spatial environment. (Downs and Stea 1973: 7)

The end product of a cognitive mapping process (or conceptual blending) is a cognitive map (Kuipers 1978, 1982; Tolman 1948).

Cognitive mapping is a process of recording the existence of an object and its known location in space in the memory (Burgmanis, Krisjane and Skilters 2014: 373).[119] A graphical map of a city uses the cognitive mechanisms of visual space to convey information about the large-scale space. Within a given visual image, a large number of landmarks are simultaneously visible, making relative distances and directions easy to judge (Kuipers 1982: 203). The next section examines the usage of cognitive maps with respect to landmarks serving as anchorage points for navigating and orienting oneself in a known or unknown environment.

6.3 Cognitive maps of landmarks for orientation and navigation

In both of the very different environments under review (mountains and prairies), the focus is on landmarks as external points of reference. Moreover, landmarks are here defined as any kind of culture-specific environmental reference points. This could be the abovementioned mountains, rivers, houses, rocks, or even a tree. Landmarks are point references external to the person. In a city, landmarks may be distant buildings or geographical features that can be seen from many angles and distances, or they may be primarily local such as buildings, signs, trees, storefronts,

119 With respect to mental spaces, Fauconnier argues in favour of connectors that link two objects based on pragmatic function (Fauconnier 1994: 3).

doorknobs and other urban details (Miller and Johnson-Laird 1976: 378).[120]

Arguably, landmarks shape and determine a detailed topographical map of the environment as represented via language. Fowler and Turner point out that the process of naming geographic and territorial landmarks is crucial in every culture (Fowler 1999: 424). More specifically, they conclude that topographical names indicate particular cultural interests as represented by the language repertoire, toponyms and language-specific affordances. Indeed, the data points to a rather dense linguistic system of topographical maps seen, for example, in place names serving as mental maps for orientation. The notion of frames of reference is also crucial when considering environmental information since they profile spatial relationships between the speaker-hearer and the environment.

It is believed that travelers locate their current position on the Earth's surface symbolically within a cognitive map. For orientation in the environment relying on toponyms means that the traveler must compare the necessary travel toward the destination with reference orientation of the respective cognitive map. To manage a survey without instruments, distance and direction are conceptualized as movement, or change of position within a cognitive map. At any given time the traveler can estimate distance and direction to known points, including the starting point. More difficult is retaining a sense of direction when out of sight of any landmarks, as is required by dead reckoning navigation, for instance (Gladwin 1970; Hutchins 1996; Riesenberg 1972; Sarfert 1911). Orientation processes on land and at sea are based on fundamentals in mental triangulation and gestalt theory conceptions of spatial relations.

We have already seen a prominent example concerning orientation on water in these dead reckoning techniques, that is, navigation without mechanical instruments (Hutchins 1996: 65–93; see also Hutchins 1983). More specifically, this method of navigation depends on an ability to determine one's position at any time based on the distance and direction travelled since leaving the last known location (Gladwin 1970: 144). The navigator monitors the motion of the boat to determine the displacement

120 I have already referred to the following quote above, but as a reminder again: "landmarks are unique configurations of perceptual events (patterns). They identify a specific geographical location. A person's account of his spatial representations generally begins with landmarks, and these landmarks are the strategic foci to and from which the person moves or travels. Landmarks are used as proximate course-maintaining devices. Not only do they identify beginnings and endings, but also serve to maintain course." (Siegel and White 1975: 23)

from a previous position (Hutchins 1996: 56). This mental computing or mental triangulation, that is, the transformation and propagation of representational states, is arguably also used on land (Hutchins 1996: 49). In addition to this method, travellers' reports, stories, symbols, icons, winds, roads and any other kind of representations can be surveyed in the reconstruction of cognitive maps of spatial orientation based on implicit knowledge systems.

Cognitive maps form the basis of cognitive information-processing systems of spatial orientation (Marr 1982). As I argue, the specific encoding patterns vary between different orientation reference systems. Moreover, spatial reference frames construe a dense matrix or gestalt-like representations of knowledge systems. As such, course-maintaining systems on land and at sea based on different sorts of semiotic systems are of specific interest. The rationale is to argue in favor of cognitive maps as gestalt-like representations of environmental cues forming a dynamic mental model/cognitive map. What might be common to every culture, and hence universal, is the gestalt-like constructive process of cognitive maps as highlighted above. These cognitive maps function as implicit knowledge systems which enable people to explicitly navigate in a specific environment at a given time and place.

With this description of some basic theoretical features in hand we shall now move to the two cultures in question. Some of the notions raised in the immediately preceding text are important in analyzing the following language examples. It might also be helpful to return to the theoretical issues on imaging parameters covered earlier.

6.4 Anthropological and linguistic background: Dene

This section presents anthropological background information on Dene culture and the linguistic knowledge that speakers of Dene relied on in their daily interaction with the environment. The past tense indicates the drastic change Dene culture has undergone in recent decades. Information on the Dene cultural background is provided as well as examples of spatial orientation in language. The ensuing section looks at Eipo language and culture. The grammars for both of these cultures were briefly sketched in the beginning of the book. The reader may refer to the descriptions, but these are not essential for understanding the following examples and data points.

6.4.1 Contact history and recent acculturation

The current status quo of Dene is interesting in terms of both inherent cultural heritage and the influence of Western culture. Eipo, by contrast, was very isolated right up until the 1970s. Dene belongs to the Northern branch of the Athapaskan language family (spoken primarily in northwestern Canada). The Dene territory extends (or rather extended) from the southern shore of the Great Slave Lake (Northwest Territories) east to Churchill, Manitoba and south to central Alberta and Saskatchewan. Sarsi, Beaver, Carrier, Chilcotin, Dogrib, Eyak, Slavey and all the languages spoken northeast of these also belong to the Northern Athapaskan phylum (assumed to belong to both Athapaskan and Tlingit; Hoijer 1946: 11). Hare, Kutchin, Sarsi, Sekani, Slave, Tahltan, Tsetsaut, Tutchone and presumably all the languages spoken northeast of these also belong to the Northern Athapaskan phylum (Hoijer 1946: 11; K. Rice 1989). As is the case with the Hopi, it is perhaps this geographic isolation which explains why, the Cold Lake dialect is somewhat conservative with a particularly rich morphology (Malotki 1979, 1983). There are only about 2000 speakers left in Cold Lake, and at most 10 % of them speak Dene fluently and on a daily basis.

The Cold Lake First Nations Dene Suline live near Cold Lake, Alberta, approximately 300 kilometers northeast of Edmonton on the Alberta-Saskatchewan border. Sapir hypothesized that the Athapaskan language family is part of a larger language phylum that he called Na-Dene which also includes Tlingit and Haida; Sapir 1915: 12; see Buschmann 1855; Hoijer 1946).

The history of First Nation peoples of North America was greatly influenced by the arrival of white settlers. The initial clash between indigenous peoples and settlers had a devastating effect on most aboriginal cultures. Between 1795 and 1945, European colonists killed some 50 million indigenous people worldwide (Bodley 1999: 465). Bodley also rightfully claims that these colonial encounters were not just human disasters, but cultural disasters as well:

> Colonialism was the first phase of a dramatic world-wide cultural transformation that produced a single global-scale culture based on the commercial market economy. (Bodley 1999: 465)

On the other hand, the arrival of Europeans in the subarctic region also brought new technology, schools and economic opportunities. The First Nations of Canada's subarctic region were traditionally caribou hunters. The caribou was the most important source of food and clothing, and the Dene people followed the caribou's migratory routes. This is exemplified by the term *edagha* 'a narrow place or area in the lake where the caribous are accustomed to cross and where people sit a little way above [referring to the current] to wait for them'. Moreover, and importantly, following the caribou determined and structured the seasonal cycle and socioterritorial organization (Smith 1981: 273).

Canada's Hudson's Bay Company had a severe impact on Dene culture. Established in 1670, the Hudson's Bay Company is one of the oldest companies in the world. It was primarily occupied with fur-trading in British North America, and the widespread settlement of white immigrants during the gold rush.

Historically, the Dene people lived in family groups on lands encompassing roughly 150,000 square kilometers. They were evidently a nomadic people of hunter-gatherers who maintained both summer (*sine* or *zinę̀*) camps and winter (*háye*) camps, travelling between them by foot or dog team. This is important since building tents (*bét'asi* 'outside of the house, tent') and traps while travelling or following big game depended on the actual material sources of the particular place.

After the signing of Treaty or Contract Six in 1876, many families worked on their reserve farms in summer raising cattle and horses. In winter, they continued to travel north to hunt, trap and fish. In the early 1950s, the federal government turned most of the traditional Dene Suline territory into an air force installation, the 'Canadian Forces Base Cold Lake'. This simply means that Dene people can no longer use their old hunting and spiritual grounds, or family locations of the ancestors. The reserve lands that they now inhabit represent less than one percent of their original traditional territory. It is important to note that they lost access to their hunting and fishing grounds as well as their lands. Moreover, they were relocated to three small reserves near Cold Lake totaling approximately 18,720 hectares (as opposed to their original 150,000 hectares).

Although the Dene live partly in their original habitat (around Cold Lake), their historical hunting grounds are off-limits. A map approximately of 3x4 meters dimension at the Cold Lake reserve band house (band being a First Nations group) shows the actual dimensions of their former grounds.

This map indicates every band member and family and their origins, meaning that every place or location in Cold Lake once had a human placeholder. This topology of names is similar to the topology of names that the Eipo use in their mountainous environment (see below).

As well as the military base, the world's second-largest oil sand fields are situated around Cold Lake meaning that this territory, too, is off-limits for the Dene people. There are few visual reminders of indigenous traditions in Cold Lake, which is similar to many urban settlements in Western Canada and indeed across North America, dominated as it is by fast food stores, grocery stores and shopping malls. In sum, Cold Lake is just a Western Canadian town in Alberta, located far from the nearest major city (Edmonton) and dominated by Western culture.

The Dene primarily speak English and most of them, particularly younger people are keen to assimilate with white Canadians people and concentrate on job opportunities and education. Their traditional language and thus the preservation of their culture, appear to be secondary concerns for the present-day Dene.

Although there is no longer an official policy of language discrimination, many older Dene speakers simply refuse to use the language. This is often linked to the ill-treatment they experienced in the residential schools which led to a reluctance to speak Dene at home. The result is that the ensuing generation (age 45 to 55) already exhibits critical effects of language attrition, to say nothing of the present-day younger generation (see Thiering 2009a on the linguistic loss of spatial language in Dene, and the chapter above). As such, Dene presents an interesting, yet difficult language and culture requiring one to dig deep to get an idea of the culture and practices of speakers in terms of traditional habits and history. Some of those traditional habits have survived through oral history . Elders, particularly, are able to recall various hunting techniques and the different functions of traps. With their traditional way of life so fundamentally changed, this knowledge is no longer required for day-to-day life. This chapter, then, aims to provide an initial glimpse into the intricate interplay of culture, rituals, habits and language in Eipo and Dene. It also attempts to capture some of their spatial knowledge while it is still accessible.

6.4.2 Material culture and subsistence techniques

> The aboriginal inhabitants of what is now northeast British Columbia are the inheritors of one of the purest forms of hunting economy; purest in the sense that they are peoples who are flexible in the face of every changing circumstance, to whom material possessions are more of a hindrance than a help, and whose skills and mobility secured (as long as their hunts were successful) a life of relative affluence and good health. (Brody 1982: 85)

This introductory quote indicates the importance of flexibility in the Dene culture in which hunting was the main means of survival. The Dene were primarily hunters and the most important food animals were the caribou (*etthén*) of the northern transitional forest and the tundra. Moose and woodland caribou were also important for survival. Caribou could generally be found in large groups during their migrations between winter and summer, and in other times they were scattered in small groups. These behavioral characteristics often determined the manner in which the animals were hunted. One linguistic example is the classificatory verb stem for caribou arriving, i.e., *etthén níltah* 'arrive' as opposed to *-tl'ah* which is the verb stem reserved for caribou, as in 'the caribou arrived'. The semantic difference is in the momentaneous resultative act of arriving as opposed to the telic end result of the arrival indicated by the perfective form. Another specification is the process of the caribou's return, as in *etthén nahéltah* 'return' (only used of caribou) or 'the caribou returned'. It is apparent that knowledge of the caribou's location has been vital for the Dene since caribou migration structured their seasonal distribution, socioterritorial organization and technology (Smith 1981: 273). The caribou were also the focus of religious beliefs and oral literature.

During migration phase they used the "chute and pound". The Dene and their dogs encircled (up to a mile or more in circumference) the caribou herd using a variety of snares (traps) fastened to poles or tree stumps (see also Eipo films on the construction of traps, bridges and houses; there are approximately 104 films about Eipo and various activities, such as *Bau und Demonstration von Gewichts- und Schwippgalgenfallen* (E 2761); *Bauen einer Gewichtfalle* (E 2659); see also the ethnozoological description in Blum 1983; Koch 1984; Eibl-Eibesfeldt 1995).[121] The construction of a snare or deadfall are highly sophisticated techniques, although they do not require a sound understanding of the fundamental principles of physics of the behavioral characteristics of the particular species. Instead it is practical knowledge transmitted from one generation to the next that enables such techniques. Their material components are largely comprised of materials which can be found littered about the boreal forest landscape. Dene deadfalls were used mainly for the *tha* 'marten', *thachogh* 'fisher', *thelchuẕi* 'mink', *nágídhi* 'fox', *sas* 'bear', *dlézí* 'grizzly bear', *sas delgai* 'polar bear', *sas delẕeni* 'black bear', *nábie* 'otter', *dẕen* 'muskrat', tsá 'beaver', and *nághai* 'wolverine'. Snares were chiefly set for grouse, hares, foxes, bears, caribou, and moose; different techniques were generally required for different animals. Since the most important animal was the caribou, the methods of hunting them will be detailed to serve as an example of hunting methods.

121 Note that the former IWF Knowledge and Media film archive in Göttingen has been terminated in 2010. The Max Planck Institute for the History of Science Berlin (MPIWG) keeps the Eipofilms on dvd. The IWF running numbers are also used at the MPIWG.

Once a herd was detected, the caribou were maneuvered into the mouth of a prepared chute and driven to the pound. Once inside the pound the caribou were entangled by snares or traps. In Individual caribou were also hunted with spears or shot with arrows. With knowledge of their tracks, another option was simply spearing them while they crossed rivers and lakes. This meant it was important to know the specific water conditions or the respective river as linguistically represented in expressions such as *des dánétʔá* the river is full' and *des héli nálthah* 'the river is flowing fast'. Both expressions were important in fishing and in locating caribou. Hunting techniques were adapted to the behavioral characteristics of the animals. Big game, for instance, use rivers and lakes for their water supply. Of course, since the arrival of white settlers rifles are used more frequently.

Unlike caribou, moose do not gather in herds, but instead are more solitary. Once they have finished eating, moose retrace their steps to windward to rest. Hunters adapted themselves to this technique. They would follow the trail to one side and windward, checking every once in a while whether the animal had returned. If so, the hunter knew the moose's exact location. The Dene occasionally hunted bears, while beaver was an important food source. They were usually caught in winter when it was easier to locate their homes. Ice conditions limited the beavers' movements. In essence, the method for catching beavers was simple: block the entrance and then break into their lodge. This involved a variety of traps such as the tossing pole, spring pole, stationary snare, deadfalls of various sizes and trigger mechanisms, bows made of birch; strings were made from twisted babiche, rawhide, or sinew and arrows made of straight-grained spruce or birch. Snares were used to catching hare; though it was only after contact with Europeans that small mammals were hunted or trapped, and then only for their fur.

The dog was the only domesticated animal used for hunting moose, bears, beavers, and geese. While big game like caribou generally sufficed for most clans, a few also fished for food.. Seasonal climatic conditions, in conjunction with the behavioral characteristics of the fish, indicated the appropriate seasons of exploitation and the techniques to be employed to catch them. Trout were caught by hook in open water or through ice holes in late winter. Fish spears were also used. Fishnets were traditionally made of willow or babiche, while industrially produced twines and nets predominated after contact with white settlers.

With the approach of fall, the Dene left their summer gathering centers to seek food in preparation for the long, cold winter. They carried little with them, preferring to make whatever they required quickly and with local materials at hand. Although the land required unique survival skills, these skills did not rely on highly specialized technology for acting within the environment (with the exception of trap-making). This is not to suggest that indigenous technology was unsophisticated, - in fact it was often extremely complex - merely that its production did not require specialized labor. Most people could make most things used within the society. Indigenous people of the North accommodated lived by a principle of balanced needs, using what was available to them within their local environment. They did not need much in everyday life. The inventory of plants they used for food and other material purposes was extensive.

6.4.3 Social structures

Regional bands ranged in size from about 200 to 300 people. Local bands varied between 30 and 100 people and their movements, too, were based on the migration of the herds. Families shifted frequently and so the bands became amalgamated and heterogeneous. We can also assumed that dialects changed or converged (as in Eipo; see below). Most families were related to each other. Band membership was known to be fluid, i.e., bilateral kinship and marriage provided avenues for new affiliations (Smith 1981: 277).

Substantial social realignments followed the introduction of previously unknown European diseases,. Smallpox, tuberculosis and influenza affected the Dene in the 1920s (Smith 1981: 274). In the post-war era, most children were sent to Catholic residential schools off the reserve to receive a Euro-Canadian education. The entire community was adversely affected by the near total break-up of the family unit, only relayed for the few weeks of the year when children returned to their families. Over time, elders and children lost the ability to communicate with one another.

These schools had a particularly devastating effect on the Dene way of life and their language (Thiering 2009a, 2010); not only were children were discouraged from – or actively punished for – speaking their native tongue in these schools, the normal linguistic and cultural transmission between the generations was also greatly disrupted.

This is quite different from the Eipo situation, as will be outlined below. The Eipo retain strong family and community bonds and thus a detailed topography of their environment. Paralleling the linguistic loss in Dene was the loss of songs, games, rituals, ceremonies, stories and techniques, such as building the highly complicated traps, and ceremonies; essentially a loss of community and culture. The last 50 years have seen a steady decline in the numbers of Dene Suline in Cold Lake who can fully communicate in their traditional language (Thiering 2009a). A 1998 survey commissioned by the Department of Indian and Northern Affairs' Registry System identified 285. That number is now down to about 200 fluent or conversant speakers of Dene Suline out of an official band membership of 1908 (see Smith's table of Chipewyan population in 1970 in Smith 1981: 75).

This means that less than 10 to 15% of band members speak their aboriginal language to some degree of competency (a small proportion of the band is Cree). The 1960s were traumatic for the people known as Caribou Eater Chipewyan, with their contact-traditional way of life changing drastically and suddenly. The different bands were relocated, in one instance to a subarctic town now notorious as one of Canada's worst slums. Five regional bands were named after geographic areas:

1.	Duck Lake/Churchill band	'east people'
2.	Barren Lands band	'flat-area-dwelling people'
3.	Hatchet Lake band	'hatchet-lake people'
4.	Black Lake band	'upland or western people'
5.	Fond du Lac band	'pine-house people'

This relocation had a devastating effect, leaving the Dene disoriented and demoralized (Smith 1981: 282). The imposed village life profoundly changed the traditional living habits of the hunter-gatherer culture. Men were supposed to leave families behind while hunting, meaning the former division of labor was disrupted. The distance from the village to the hunting grounds made it difficult to kill a large number of animals as hunters were limited to the amount of their dog teams could transport (Smith 1981: 282).

6.4.4 Traditional religion

Myths about places, rituals and objects, powers, spiritual and medical knowledge, stories, dances and music were all religious in nature. The following short outline is based on the Canada's First Nation webpage, (http://firstpeoplesofcanada.com/fp_groups/fp_groups_overview.html; last retrieval September 2014).

Hunting and gathering were the most important activities for survival, spirituality was linked to finding food and was therefore also important for survival in the harsh climate. Hunters tried to appease the spirits with offerings when looking for food and thanked them when they found it. One key spiritual creature was the Kakhani, a supernatural being, half-man and half-monster. It was said to steal children. In contrast with the Eipo, who left most of their tools – even the holy digging-stick (see below) – unadorned, the Dene decorated their snowshoes with paint and strings of shells and wove amulets into them to keep the wearer safe from unfriendly spirits.

6.4.5 Physical environment

The environment of the Dene people is made up of tundra, forest (black spruce, white spruce, birch, aspen; also called the 'land of the little sticks'), and boreal forest. There are essentially two seasons: long, harsh winters and short, mild summers. The severe winter limited activities and survival required maximal exertion. Varying snow conditions affected the behavior of the fauna (which provided food and clothing) and, in turn, traditional techniques for their exploitation. In summer they traveled on foot, following water-courses, or by canoe on open waters. Around late autumn (September/October) water began to freeze which limited mobility. Winter required the use of dog sleds and snowshoes. Game animals provided most of the raw materials, such as bones, antlers and hides for needles, spears, arrowheads, fishhooks, bowstrings, lines, bags and lodge coverings. The forest (forest-tundra) provided most of the remaining raw materials for bows, arrows and spear shafts, containers, dishes, net gauges, snowshoes, canoe frames, snow shovels, toboggans, boxes, and coverings for lodges and canoes.

The climate was generally the dominant, active element in the subarctic environment. This region is known as the cold snow forest category, hence, the weather conditions affect the life circle of the Dene people. Rivers and lakes played an important role, with drainage patterns and water surfaces providing important movement and communication routes and thus focal points for settlement and other activities during both winter and summer. A knowledge of games routes, especially along rivers, helped ensure that the band had sufficient food.

The wealth of fish, lumber, and wood pulp attracted white traders in the form of the Hudson's Bay Company. This, of course, also changed the life habits of the Dene people.

6.4.6 Relationships to neighboring groups

With their the marginal location in relation to transportation and trade routes, their dependence on caribou and low interest in European goods, sociocultural change was slow to take hold among the Dene (Smith 1981: 282). It was only in the 1960s that these changes accelerated, when they finally established relations with whites. Their only known enemies were the Cree to the south and the Inuit to the north.

We have covered some key aspects of Dene culture and language. The next section presents some background on anthropological and linguistic aspects in Eipo.

6.5 Anthropological and linguistic background: Eipo

The Eipo are members of the Mek group of Trans-New-Guinea-Highland Papuan languages (Wurm 1982) and cultures, and live on the northern slope of the central cordillera in a valley of the Eipomek river, (Schiefenhövel 1976, 1979, 1991; Heeschen 1990, 1998; Heeschen and Schiefenhövel 1983; Eibl-Eibesfeldt, Schiefenhövel and Heeschen 1991). It is located at a longitude of approximately 140 degrees east, and a latitude of 27 degrees south in what is now called Kabupaten Pegunungan Bintang ('Star Mountains District') of the Indonesian province of Papua (formerly Irian Jaya). Eipo is one of an estimated 760 Papuan languages grouped into sixty language families with a total of around 4 to 5 million speakers (Bußmann 2008; Foley 1986; Wurm 1982). Foley provides a comprehensive overview of the Papuan phylum, its location and its historical background (Foley 1986; Wurm 1982). One key fact raised by Foley's analysis is that Papuan languages are not genetically related, i.e., they do not trace their origin back to a single ancestral language (Foley 1986: 3; but see also Heeschen 1992 who maintains that Highland Papuan languages are in fact genetically related). The *mek* of the Eipomek river associated with the Eipo is the term for both water and river (in other dialects of the Mek language it is also *mak, me*.) Their territory is located in the center of the Mek region.

In contrast with the Dene, the typical Eipo community consisted, until about 1980, of hamlets of 35 to 200 people each located between 1300 and 2000 meters above sea level, with their hunting grounds extending up to 4000 meters above sea level. Foley points out that Papuan societies are generally small, based on hamlets of between 100 and 300 people (Foley

1986: 14). He argues that ecological conditions kept communities small, with the difficult terrain preventing movement of people (see below).

However, a number of Eipo men report climbing 2000 meters in darkness, leaving their village by dusk and arriving at the pass (3700 m above sea level) by dawn. While this usually occurred on clear nights with a good moon, it is still an extraordinary feat, navigating paths which are often barely visible even in bright daylight with many treacherous, potentially deadly stretches. These reports and personal experiences (Wulf Schiefenhövel) of walking long distances at high altitudes with the Eipo demonstrate that they, in common with other highland Papuans, are adapted to their environment with a perfection that foreigners can hardly fathom.

The Mek share some cultural features with their neighbors in the east (the Mountain Ok; see Pouwer 1964) and the west the Yali (Jali/Jalí), a subgroup of the Dani (Koch 1984). The term *mek*, as mentioned above, means 'water', 'river' or 'brook', but also 'sweat' and other semantic units which generally represent watery liquids (see 3894).

Table 14 below is based on a dictionary of Eipo which not only contains words and their German and English translations, but also sound files of spoken phrases, sections of legends, songs etc. (Heeschen and Schiefenhövel 1983). These entries explain Eipo terms such that the monograph is more an ethnographic wordbook than a mere dictionary. These entries were transformed into the aforementioned electronic data file. Additionally, examples of Heeschen's substantial *Ethnographic Grammar of the Eipo Language* (Heeschen 1998) and field notes of Wulf Schiefenhövel's field notes are used in this chapter.

Mek was a logical choice of ethnonym to designate the cultures and languages of the Mek area. The relationships between groups in this region and their linguistic and cultural unity were, until 1975, unknown to locals (Schiefenhövel 1976).

The Eipo River, or Eipomek, is the main river of the area where Eipo was spoken by approximately 800 people when fieldwork began in 1974; the total of Mek speakers north and south of the central range may then have numbered about 15,000. By 2009 the number of speakers had at least doubled. A further 700 or so people in the Eipo area spoke other dialects, so when research began in 1974, there were around 1500 speakers of Eipo and related dialects in the area. The previously quoted population range of 35 to 200 inhabitants rose dramatically due to population growth typical for the highlands and other regions in Papua province as well as neighboring Papua New Guinea (UN 2010, Internet source). In the past, village communities and political alliances tended to be relatively small, following a pattern found in many highland Societies on the island of New Guinea (see the Foley quotation above), except where wide valleys brought about different settlement patterns (e.g., the Balim Valley of Papua province and the Whagi Valley of Papua New Guinea), with much larger populations (Strauss 1962; Strathern 1971). The phrases in Table 14 illustrate the importance of rivers and similar features of *mek* as landmarks and the origin of mental concepts and metaphors in the Eipo language.

Table 14. Semantic variation of 'river' in Eipo[122]

	Expression	Description	Entry
a.	*mek burwe*	'head water region'	—
b.	*mek youkwetam*	'downstream', 'towards the foothills', 'north'	3894/31
c.	*mek bongbong*	'(narrow) valley'	—
d.	*mek arum*	'water surface'	191/1
e.	*mek lu*	'water surface'; *lu* = 'even', 'flat', 'down', 'low'	3623/2
f.	*mek amwe*	'bed/bottom of a river, a lake'	—
g.	*meke ebrarik*	'water', 'rivers split up/join', 'river junction'	—
h.	*mek bene*	'stagnant water', 'swamp'	—
i.	*mek kwen*	'lake', 'pond'	—
j.	*mek bun*	'bridge'	936
k.	*mek dala*	'river bank'	3894
l.	*mek denemna*	'border of a brook'	—
m.	*mek duman*	'the river shore, along the river'	—
n.	*mek irikna*	'river bank' or 'edge of a river'	2220/1
o.	*mek deya*	'hollowed out river bank'	3894/6
p.	*mek dorobna*	'small spring'	
q.	*mek lum*	'waterfall', lit.: 'water veil'	3894/8
r.	*mek ib*	'to dam a water'	3894/10
s.	*mek kate*	'ice', lit.: 'hard water'	2427/9
t.	*mek loktena*	'hollow/cavity made by the water'	3575
u.	*mek- arye*	'that which is caused by water', 'steam'	—
v.	*mek burbur anmal*	'the river swells up'	—
w.	*moke wik meke bo'lun-mak*	'when there is a lot of rain the rivers swell up'	—
x.	*wakna mek*	'actual course of the water'	3446/2

122 Numerous other semantic usages of *mek* with not reference to spatial deixis, have been ommitted. Note that the Arabic numerals in parenthesis refer to the entry in the unpublished File Maker corpus of Eipo at the Max Planck Institute for the History of Science.

Eipo speakers differentiate between various kinds of water and base their directional system on the river stream system (see Brown 1983). The spatial terms *ou* ‘down the river’, *or* ‘across the river on same level or below own position’, *ei* ‘up the river’, *er* ‘across the river above own position’, and others, are river based. As the list above also indicates, many metaphors use river and water as *tertium comperationis*, as in *mek-arye* ‘steam’ and *mek kate* ‘ice’. Some shape terms are based on the morpheme *mek*, e.g., the bowl shape formed by water hollowing out a certain spot or a cavity, *mek loktena*. Hence, *mek* profiles an absolute frame of reference.

As far as natural boundaries are concerned, it is difficult, but usually possible to traverse the rainforest adjacent to inhabited areas like those in the Mek region, as well as the mountainous regions of Papua New Guinea. The swampland found in lower altitudes poses greater problems for human mobility and has probably contributed to the distinctive cultural and linguistic diversity for which the island of New Guinea is renowned. As Foley states, the terrain imposes genuine barriers to human social interaction which would certainly favor linguistic diversity (Foley 1986: 9; for another explanation of this striking linguistic and cultural diversity in Melanesia as an effect of intergroup aggression favoring pseudospeciation see Schiefenhövel 2001).

It does indeed appear likely that the extraordinary variety of languages and cultures in this part of the world is also the product of a (warrior-like) aggression between groups, even neighboring inhabitants of a single valley. Intergroup warfare increases intragroup cohesion and is very likely to have led, through a process of character enhancement, to the highly fragmented cultural and linguistic conditions typical for New Guinea and other islands in the archipelago (Schiefenhövel 2001). These arguments shed a more sophisticated light on the Sapir-Whorf linguistic relativity hypothesis which holds that different languages influence the thoughts of those who speak them (Everett 2013; Gumperz and Levinson 1996; Levinson 2003; Levinson and Wilkins 2006; Lucy 1992a; Thiering 2013b) and thus lead to cultural variance and societies which have little in common with each other. The data from New Guinea, on the other hand, suggests that the process of pseudospecification is set in motion by biopsychological factors. Of course linguistic markers of ethnic identity, along with the dynamism of languages developing away from a common origin, also play a key role in this process as well. As noted previously, Foley’s hypothesis may hold true for the inundated or swampy regions of the lowlands, but it is safe to say that neither high mountain ranges (almost 4000 m altitude) nor large rivers (such as the Idenburg-Mamberamo system north of the Mek region) have managed to inhibit human mobility.

This is in contrast to what Europeans would assume in view of these formidable barriers.

Our species is extremely mobile; the ancestors of today's Papuans crossed the open seas at the Wallace line between Bali and Lombok, arriving on the New Guinea coast some 50 to 60 thousand years ago (Swadling 1981) and went on to establish settlements throughout the hinterland. Much later, Papuans (initially, it seems, on the islands and coasts of the Bird's Head area in the westernmost part of the island), mixed with voyagers from Southern China and/or Taiwan (Proto-Austronesians) and, as Austronesian seafarers settled almost every island in Melanesia, Micronesia and Polynesia long before the arrival of James Cook, a truly extraordinary feat of spatial orientation and human expansion across the vast, inhospitable Pacific Ocean.

6.5.1 Contact history and recent acculturation

The Eipo were first contacted in 1959 by members of Pierre Gaisseau's expedition which crossed the western side of the island from south to north coast. Further contact came in 1969 when a group of Indonesian military personnel, joined by Gaisseau, parachuted into the southern Eipomek Valley, spending a number of weeks there and in neighboring regions further east. They produced a small amount of valuable ethnographic and linguistic data and are still remembered by local people. In the early 1970s, missionaries of the Unevangelized Fields Mission (UFM) traversed the Tanime, Eipomek and Nalcemak valleys on foot, evaluating sites for possible mission stations.

When an interdisciplinary German research team (funded by the Deutsche Forschungsgemeinschaft) began its fieldwork in 1974, the Eipomek Valley had neither an airfield nor a mission station. Its inhabitants lived in marked isolation. Moreover, very few metal tools (bush knives, axes) or introduced plant species (e.g. *Zea mays*, *Sechium edule*) had found their way into this area. The first phase of Wulf Schiefenhövel's fieldwork between 1974 and 1976, and further expeditions in 1979, 1980, 2008, 2009, 2010 and 2012 largely concentrated on the village of Munggona, the cultural and religious center of the southern Eipomek Valley. However he also covered neighboring valleys to the east and west, the Heime Valley south of the central range and regions at the northern and western fringes of Mek culture (the Idenburgh river region and the In Valley around Kosarek, respectively) and the hitherto uncontacted area inhabited by the Lauenang north of Kosarek.

In 1979 the inhabitants of the Eipomek valley adopted Christianity. It is important to note that this decision was essentially political rather than religious. Aware that they had been living apart from the rest of the world and its overwhelming wealth of material goods and technologies, the Eipo decided they wanted to become part of this world. As in other regions of Melanesia, the new religion was seen as a means of connecting them with a hitherto almost completely unknown way of life. To date (2014), this strategy of adopting Christianity as an avenue to the modern world has paid dividends. Many children go to school and are performing well, with young adults attending Cenderawasih University in the provincial capital of Jayapura and other Indonesian academic institutions, as far afield as the capital Jakarta. This remarkable change all came about in one generation and continues to impact the Eipo culture and language. So far the Eipo have remained unaffected by religious revival movements such as the classic cargo cult with their millenarian prophecies, remaining resistant to utopian ideas. They appear to understand that the only way to survive and prosper as a cultural and political group is through education.

While many elements of their traditional lives have changed, some ways are little changed since 1974, due in part to the lack of roads connecting their region with other centers in the province. For the foreseeable future, the only means of transport will remain the plane and the foot.

One of the most dramatic changes in the political arena came when the Eipo and their neighbors became aware of their mutual membership of a larger ethnic group with a shared Mek language and very similar cultural traditions. This awareness has led them cooperate in the field of provincial politics. This in turn has led to a new spatial-political concept which parallels their new, expanded horizons. Eipo are known to travel by plane to other regional centers such as Jayapura, the provincial capital on the north coast (about 200 km as the crow flies and one-and-a-half hours' flight) and Wamena, the main hub of the Papua province highlands. Walking beyond the restrictive borders of their ancestral homelands is also common now. A number of Eipo, even the middle-aged, walk to Oksibil, a regional center to the east of the Mek region close to the Papua New Guinea border. Some choose to live there for periods although they are unfamiliar with the local Ok language, the lingua franca being Bahasa Indonesia which many Eipo have mastered. *Ok* is the term for water and river in this part of the New Guinea highlands. Most administrative posts – including the governorship of the province and the rectorate of Cenderawasih University – are filled by people of Papuan origin. Eipomek, the name given to the airfield and administrative seat of the upper Eipomek

Valley, has offices reserved for public servants which remain as yet unoccupied.

6.5.2 Material culture and subsistence techniques

Traditional tools include the *ya* 'stone adze', *kape* 'stone knife', *fa* 'bamboo knife', *kama* 'wooden digging stick', *yin* 'large bow', *mal* 'arrow', *aleng* 'string bags' (of various sizes), *towar* 'ratan liana' for binding and fire-sawing and other, smaller tools, as well as a range of body decorations (for a complete inventory of the Eipo's material culture see Koch 1984).

Subsistence techniques were a combination of horticulture, hunting and gathering. The New Guinea Highlands are home to a number of important cultivated food crops, which made it one of the world's few centers of early agriculture. These autochthonous foods include *am* 'taro' (*Colocasia esculenta*), *kuye* 'sugar cane' (*Saccharum officinarum*), *bace*, a related plant eaten as a vegetable (*Saccharum edule*) known as 'pitpit' in Neomelanesian Pidgin, the protein-rich leafy greens *mula* (*Rungia klossii*), *towa* (*Abelmoschus manihot*) and probably also *kwalye* 'banana' (*Musa paradisiacal*). The main staple, and major source of carbohydrate energy, are the various cultivars of sweet potato (*kwaning*, *Ipomoea batatas*); there is still debate about whether they arrived after colonial settlement or through early Polynesian transpacific contacts. Hunting with bow and arrow was an activity held in high esteem by Eipo men, often assisted by specially trained dogs, or using snares and traps. Although the local species of marsupials, mice, rats, opossum-type animals of the *Phalangeridae* family are small, they provide essential amino acids. Game hunting retains ritual significance (for instance, when hosting honored guests, or as part of a dowry). Basam 'pig' (*Sus scrofa*) and *kam* 'dog' (*Canis familiaris*) are placental, i.e. non-marsupial human imports and foreign to the ex-Sahul fauna typical of New Guinea and Australia, such as kangaroos and wallabies. The Eipo do not eat dogs, whereas the pig was and still is a major source of protein and fat. Unable to forage for their own food, they are fed, usually sweet potato, and thus represent a luxury food reserved for special occasions. They also remain important in ceremonial exchange.

Horticulture provides the staple foods of the Eipo. Gardens (*wa*) were usually established in areas which had been previously cultivated then allowed to lie fallow for approximately 15 years. The actual period was determined by a bioindicator, once the *urye* tree (*Trema tomentosa*) reaches a certain height and diameter the soil was said to have recovered, ready for further planting and harvesting. Fallow periods have shortened in recent years due to the significant population increase and greater need for food. The garden land is owned by patrilineal families. Some clans, said to have arrived relatively recently, do not formally own land in the Eipomek Valley but are given plots to grow food. This ensure that, under normal conditions, there was no shortage of suitable land or garden produce. Those who were physically able could work in the garden and feed themselves and their families.

Garden land is sacrosanct. Individual plots are identifiable by the sacred *yurye* (*Cordyline terminalis*) planted at corners and other key points along the garden border. There are several known cultivars of this small tree which often has reddish, lancet-shaped leaves; it is also planted at other critical places, e.g. near the sacred men's house, at meeting places or at the head of the long cane bridges which span roaring rivers. Interestingly, this plant guards religious sites throughout the Pacific, including Balinese temples and holy sites throughout Polynesia. It remains an open question whether the surprisingly wide distribution of this plant as a religious symbol is pure coincidence or an effect of cultural exchange. In Eipo gardens, the visual line connecting the *yurye* is the border (*wa wiliba*, literally: 'the garden work-stopper'). Disrespecting this border by clandestinely or openly transgressing and planting or harvesting in a neighbor's land can lead to serious conflict, verbal and sometimes even physical. This law is universally known and usually upheld. Garden land, it should be noted, is owned by the family rather than the community.

The geometry of the gardens, their general shape, gradient, geological condition and suitability for particular crops is common knowledge, so too the area both immediately surrounding the village and beyond, which is represented by a rich network of place names.

Walking on paths leading from the village to the periphery one crosses from zone to zone, all with defined borders, specific place names and histories of events in mythic, remembered, and recent times. Known space is, therefore, meaningful territory, a carpet of culturally encoded signals, enriched with one's own experience, with emotionally and cognitively relevant contexts. Arguably, this might be true of any people in rural environments who daily encounter its spatial and other features; it is certainly true of the Dene.

6.5.3 Social structures

Social structures are still dominated by patrilineal descent and virilocal residence (i.e., where the wife moves to the husband's village). The marked division of the society into female and male spheres (seen in men's and women's houses, both religiously meaningful, and other cultural institutions) seen in the Eipo culture, has relaxed in recent years, as it has among other Papuan groups in the New Guinea Highlands. As with other Papuan societies, leadership roles in the public arena were generally filled by the 'big men' (*sisinang*, literally: 'the ones who speak'). They obtained these positions through a mix of personal characteristics, of which intelligence, vitality, rhetoric and social skills were most important. This meritocratic system without heritable chieftainship governed all public affairs, including the decision to wage war or make peace with the traditional enemy in the adjacent western Famek Valley. Today there are new leadership positions in churches, schools and other settings. Incipient forms of election are also becoming institutionalized. Clan exogamy remains the guiding principle for marriage. In the past 12 % of all men had multiples wives (usually two, exceptionally three); they abandoned this discretionary polygyny when they adopted Christianity. Divorce was common, the woman usually taking the younger children with her and returning to her own family and usually remarrying soon after.

6.5.4 Traditional religion

This section examines notions of the formerly animistic religion of the Eipo. Like other New Guinea Highland religions, and more generally Melanesian religions, it was based on the belief that the visible and invisible world is filled with beings, i.e., *isa* 'spirits' of various kinds (this is also similar to the Dene tradition). Chief among them were creator spirits, e.g., the *Yaleenye*. Almost as powerful was the sacred pig and a number of female spirits including the kwaning fatane kil, the 'spirit woman who is always hungry for food'. Some of them were thought to still exist, interfering in people's lives. Yaleenye (literally: 'the one coming from the east') and other 'creator gods', as one may call them, shaped the earth, making its formerly swampy surface inhabitable by wedging stones into it and planting sacred trees. This created the kind of earth in which plants, especially vital food plants, could grow. They also formed the beds of large and small rivers and instructed in early inhabitants leading good lives. They showed them how to make stone adzes from rocks in the Heime

Valley, establish men's and women's houses and conduct ritual ceremonies.

One mythical account tells how the first humans, dwelling underground, dug their way to the surface with their foreheads. *Yaleenye* taught them how to change their disfigured, dirty faces by cleaning them with leaves and pig fat and decorating them with ochre, and so become real humans with beautiful faces. Other *isa* were those of the animals (wild and domesticated), of rivers, conspicuous rocks, trees, certain places (like that of the sacred pig *kwemdina basam*) and all dead persons (*ise dib* 'the true spirits'). These agencies dwelling in different spheres closer or further away from people's homes were able to influence human lives, the fertility of their gardens and other major factors of livelihood. Diseases were thought to be caused by one of these spirits or by harmful black magic (*kire*). Specific ceremonies (*kwetena*) for improving the condition of the afflicted were carried out by male or female healers (*kwetenenang*) thought to be able to communicate with the spirit world. Sorcerers suspected of murder were sometimes 'divined' by a seer (*asing ketenenang*, literally: 'someone whose eyes are sharpened') and subsequently killed by the family of the deceased.

Religion and secular life were not distinct, but essentially intertwined. Before dancers of the Heime Valley descended from the mountain pass to the village of their hosts, where they would carry out spectacular dance performances, they prayed to *Murkonye*, one of the powerful creator spirits, to make them radiant with beauty and vitality (see the film *mote*, visiting feast, Simon and Schiefenhövel 1976). Religious ceremonies were also interwoven with everyday acts. Before felling a tree with a stone adze, one would first carry out a ceremony designed to safeguard the procedure, to prevent damage to oneself and one's tool and ensure the tree falls quickly into the right direction. Approaching a rock shelter in the high mountains one would address the spirit believed to dwell there so it would offer welcome and protect the visitors from the harsh and dangerous surroundings.

6.5.5 Physical environment

This section concerns the local topography, and so the spatial coordinates defined above are of particular importance. The Jayawijaya Mountains, the stretch of the central cordillera separating the northern and southern Mek groups are part of the formidable massif of New Guinea Highlands. The lowest north-south passes cross at around 3700 m altitude; the highest summit of the province, the Puncak Jaya or Carstensz Top, reaches

5000 m, the highest peaks in Eipo territory (e.g. Abom, Mt. Juliana, Gunung Mandala) are around 4700 m. Geological conditions are such that the northern slope is a much more gentle gradient than the southern side, where steep cliffs often make human access difficult. Local people do still traverse these high ranges, despite their cold climate and lack of food sources. Survival depends on suitable rock shelters where one can build fires in the narrow, rain-protected margin under overhanging rocks, using a makeshift windbreak of branches, grass and bushes. The Eipo and their neighbors continue to undertake these dangerous trips for a number of reasons, mostly for visiting trade and marriage partners on the other side of the range, or for hunting the small marsupial rats and mice which live at this altitude. There is a chance of death, the most feared way of dying in fact: *moke baybubuk* 'he/she died out there in the rain without protection'. It is the isolation and exposure to the forces of nature which feared more than death as such, which was and is usually accepted with the fatalism which results from the normative power of the factual.[123]

As well as hunting and trapping, the mountain forests above regularly inhabited areas were exploited for building materials and wild food sources. Of these, *Pandanus brosimos* was especially important; the nut-like seeds of the large compound fruits contain a high amount of fat, otherwise very rare in the Eipo diet. Other edible plants, such as berries and mushrooms, were also gathered in this region.

The radius of firsthand geographic knowledge among the Eipo (and the other peoples in this part of highland Papua province) was about three days fast walking. They did not venture further as they would not find relatives who might provide food and protection. While walking remains the primary means of mobility, there is now a handful of airstrips for longer trips. Small children very soon acquire considerable skills in mastering difficult terrain with bare feet. It is impressive to see the relative ease with which all ages, including the elderly, navigate slippery, narrow logs, wade through deep swamps and find footholds in stretches of vertical walls. None of the respondents complained about the necessity of travelling to distant gardens, hunting grounds or villages on foot (Schiefenhövel, personal communication).

123 One is surdounded by death: plants, animals and humans all die and there was no remedy (apart from religious, i.e. psychosomatic forms of medical treatment).

6.5.6 Relationship to neighboring groups

The Heime River flows south in a kind of mirror image of the north-flowing Eipomek River (again *mek* is the term for river or water in this Una dialect group of the Mek languages; see Louwerse 1978, 1988). In the Heime Valley village of Langda is an andesite quarry, which supplies the material for high quality adze blades. The next nearest quarry is some 150 kilometers away in Balim Valley. Relations between the Eipo and the Heime were, therefore, of vital importance: without stone adzes, neolithic life would have been impossible. The Eipo paid for the unpolished blades with string bags and foodstuffs which were otherwise hard to find in the Heime Valley); along with these trading relations, inhabitants of the two valleys often sought marriage partners across the dividing range. This led to regular excursions, either in small, family groups or larger expeditions who were invited to dance and feast (see films from Eipo West-Neuguinea, Zentrales Hochland; 'Sonnertanz sang mote als Kinder-spielfilm', E 2686; Simon and Schiefenhövel 1976). These trips required a climb from 1700 m (the altitude of Munggona, the central village of the upper Eipomek valley) to 3700 m (the pass) and then approximately 2000 m down again to Langda and other villages on the southern side. Sometimes locals conquered the 4000 m in a single day. As we saw previously, the mountain range therefore didn't represent a "natural border" for these Papuan groups.

Relations with their neighbors in the Tanime Valley east of Eipomek were cordial if not as close, while Famek Valley dwellers to the west were the traditional enemy. Warfare, *ise mal, male fey bin-*, was common (taking up 11 months of the first phase of fieldwork between 1974 and 1976); this and intragroup fighting (*abala*) within village and political alliances caused many deaths: 25% of men fell victim to armed conflict (Schiefenhövel 2001). There was no recourse to a third party in resolving conflicts, meaning that the desire for revenge and a spiraling escalation of aggression led to a high mortality rate and, as mentioned above, the high degree of cultural pseudospeciation typical of New Guinea. Cannibalism (*ninye dina*) only ever occurred in the course of warfare. When an enemy warrior was killed and his body could not be defended by his own group, it would be cut up, carried to the village and prepared for a ritual meal in a traditional earthen oven. Some refused to participate in these ceremonies which respondents stated, were designed to utterly destroy one's slain enemy with one's teeth (Heeschen 1990). The *pax christiana* introduced in 1979 has halted warfare between the Eipomek and the Famek Valley and dramatically reduced intragroup homicide.

6.6 Excursus: center and periphery in Eipo

This section examines spatial concepts which are specific to the Eipo, for which there is presently far more comprehensive data then for the Dene. Center and periphery depend, among other things, on a concept of distance.

6.6.1 Building an Eipo house

House-building among the Eipo is an interesting phenomenon which makes visible old traditions and practices. It is a tradition based on joint action rather than orally transmitted knowledge. As previously noted, the center of community life was the men's house *yoek aik*, a vital point of reference. Sometimes there were two or three of those sacred houses in a community. Any other socially significant structures were usually positioned concentrically around the sacred men's house. Hamlet, garden and forest created more or less circular rings around the *yoek aik* and the sacred village ground, *asik kata*. Every place or location in the garden area, be it a hillside, or a knoll, had an owner. A fine-grained network of place names is represented in mental maps which are well developed even in children and juveniles who are able to give accurate accounts of this aspect of local geography.

The mountains above the garden land was used for collecting and hunting and connected to specific clans, although others were able to exploit it as well. Sacred places could be found all around the living space within a sacred matrix or topology of precisely determined locations based on sacred arrays in the area.

One of the major points of departure in orienting oneself in Eipo culture was the house, either the men's house or the women's house (*bary eik*) or one of the family houses (*dib aik*). The men's house signifies the center while the women's house was at the periphery of the village. As a broad concept the house was perceived as shelter, a universal place which offered humans protection from the environment, a place of safety and comfort, a place in which the family unit functioned as a small-scale community in itself.

It is worth taking a closer look at the various usages in which 'house' appears as a point of location, either as a point of departure or as the location of an event in the life of the Eipo (see the entries under *aik* in the dictionary, Heeschen and Schiefenhövel 1983). The house also has crucial locational functions in other cultures such as the Hopi. This is hardly surprising as it provides shelter and is the location of ritual habits, just as it prising as it provides shelter and is the location of ritual habits, just as it does in Western cultures. Moreover, the concept of 'home', signifying the place where a family or similar group lives, is primarily psychological, not architectural.

The following summary is based on Koch's work, specifically the section on building family houses and men's houses (Koch 1984: 38, 56). It examines not just the techniques and the different steps for building a house in the Eipo culture, but also the central significance of houses, including their various sacred objects. There is an additional look at a number of semantic structures extracted from the Eipo dictionary, where possible with their language contexts.

The noun *aik* encodes 'house' and various usages imply its importance or significance for the Eipo community. The first alphabetical entry after *aik* itself in the abovementioned Eipo corpus is *ninye aik bun berekilbin* 'people are meeting in the core of the house'. The entry for *aik* contains a number of related expressions specifying the function and importance of the house. First and foremost is *aik asin*, which means the 'fireplace in the house' (*aiktam* 'in the house', 'inside'; note the locational construction N + suffix to encode 'inside' based on the interior of the house). The way home, or to the house, is encoded as *aik bisik*. *Aik* is also used for illness as in *aika* or *aik mek dikmal* 'a sickness caused by a spirit': a gravely ill person remains in the house, often until he or she dies.

The basic form of an Eipo house was round with a conical roof, houses of poorer construction were rectangular with ridge roofs. Today Eipo houses come in a relatively large variety of shapes and sizes. The average diameter of a family house was between two and three meters, the height around two meters. The average men's house (*yoek aik*) had a diameter of between five and six meters and were around four meters high. This difference in size alone indicates the significance of the men's house. Most houses had an elevated ground floor around 40 to 100 centimeters from the ground. The space underneath was sometimes used as a hog pen, or for storing firewood and ashes –a kind of general stockyard. There was around one to two square meters' living space per person (Röll 1979). The Eipo did not perceive this confinement as a disadvantage, but rather a welcome means of staying (literally) in direct contact with each other. Building a house was primarily men's business and the process involved classic group and assembly work. All the necessary construction materials, including the planks for the walls hewn from specific mountain forest trees, were gathered weeks beforehand, i.e., the process of building a house was similar to assembly on a construction site. Women contributed, even in the construction of sacred men's houses, by carrying building material to storage places or the building site (a practice which continues today). Reusable material from old houses was, and is, incorporated into the new building. Roofs of old houses are reused, so too planks and other parts as long as they are still in good condition.

The Eipo mainly used one universal tool, the well-made adze *ya* with its stone blade. This specific kind of hatchet was used to fell trees, split logs, shape posts and other building materials, including rattan for binding. One could say that for the Eipo, the stone adze was a kind of 'Leatherman' or 'Swiss Army Knife' – a universal tool. Below we will examine the different stages in constructing a house using the example of the men's house, *yoek aik*.

As previously noted, this was the most socially, politically and religiously significant building in the village, the most important anchor in the Eipo community. Its continuity was ensured by retaining the same location, the same sacred objects and by reusing old building materials. Koch and Schiefenhövel (1979) documented the reconstruction of an old men's house in the village of Munggona. The 'Binalgekebnaik' was approximately six meters in diameter. Its construction was planned far in advance with some of the necessary sacred rituals carried out in the forest beforehand.

The men first removed the sacred *kwemdina kama* (a relic from mythical times, the dawn of creation) and placed it against another men's house for the duration of the reconstruction. Normal digging sticks, *kama*, were used as tools for digging, harvesting, weeding and leveling the ground (Michel 1983: 66). The *kwemdina kama* was the most important sacred object in the southern Eipomek Valley; a Holy Grail, so to speak. The men then took off the cone roof and placed it beside the building site. While the old house was demolished, reusable materials were salvaged. Phrases describing this process include *aik nonge ulobuka dobnab* 'we take away/pull down the house (except the roof)', *aik nonge duk'namab* 'we will take the house apart', *aik kolubrabuk* 'one broke down the house/the house is destroyed'. In this process spirit houses *isa aik* become visible. They were usually hidden beneath the floor (e.g., *ambonga* 'space underneath the house') which, as noted earlier, was between 40 and 100 centimeters above the ground.

After leveling the ground, the men bring *ayukumna*, long house posts which provided the main structure of the house. This part was orchestrated like a procession and performed in an ecstatic, rhythmic dance, accompanied by the typical inspiratory whistling which provides the basic rhythm during Eipo dance feasts. The *ayukumna* were driven about 40 centimeters into the ground. Rolls of bark from a specific confer were brought into the circle of posts to determine whether they fit the diameter of the house. This was the only measurement with all other pieces positioned intuitively. The bark would later cover the floor and thereby provide a soft, even top layer (*amsona*).

The next step was to set the four slim poles *ateka* to delimit the fire place (*ukwe asin* 'fire place in the house'). Two of these were called *mem ateka* (taboo poles) and had sacred meaning. They were covered with fern leaves to protect the men from burns. Their arrival again inspired dance and rhythmic chants. Several layers of circular transverse struts *afanya* were then carefully bound to the *ayukumna*. They held the house posts in place and provided a horizontal rim which supported the floor. Later another ring of *afanya* was fixed at the upper end of the posts, stabilizing them and providing support for the roof.

The next step in building a men's house, or other houses, was to place, in a criss-cross fashion, long flexible sticks, slightly exceeding the diameter of the house, on the horizontal rim provided by the *afanya*. This created a flexible floor with a slight slanted towards the center; this made more efficient use of the heat from the central fireplace. With 30 or more men inside the men's house at any given time, crossbeams *wanun yo* were fitted horizontally underneath the floor layers to offer much-needed stability. In family houses reeds (*Miscanthus floridulus, fina*) sometimes replaced wooden sticks as they were easier to come by. Short planks, *abelenga*, reached from the ground to the floor and were fixed with rattan, the traditional material for all bindings. This first circle of short planks, typical for the men's house, blocked the view of the space below the floor where new, little spirit houses were being built. The planks forming the wall of the men's house from the floor to the roof were gradually fixed as well. Even today, these planks are cut from a tree (*Galbulimima belgraveana, lue*) which splits easily and so provides even boards.

Even now that Christianity has superseded their belief in spirits, the Eipo seal the walls of their houses as tightly as possible: small openings and cracks could let in spirits and other harmful agents, and previously also arrows.

The following language examples illustrate the importance of spirits in the former Eipo tradition: *aika* 'sickness' (caused by house spirits); *isa kum angnulamak* 'the spirits come up to the neck (i.e. they eat the person, make him fall sick)', *aik mek dikmal* 'water is stuck to the house/[metaphorically] the spirits are catching them [the inhabitants]', *isenang* 'the spirits, [met.] the enemies', *kingkin bisik keniklamak* 'they are caulking the clefts [between the boards of the wall of the house as protection against arrows and spirits]'.

This last example in particular indicates how important it was to protect the house from spirits. They officially resided in small, roughly built houses underneath the ground floor of the men's houses and, so were contained such that that they did not come into direct contact with people. Devastating earthquakes in June and October 1976, both measuring more than 7 on the Richter scale, were blamed on a giant spirit (*Memnye*) living deep underground.

In building the men's house various kinds of sacred ritual practices were considered necessary for calming and appeasing the spirits. Again: for the, Eipo earthquakes, sickness, accidents or other mishaps were considered punishment for broken taboos or disrespect toward the spirits. The massive earthquakes which killed several Eipo and completely destroyed the village of Munggona along with its men's houses and sacred objects, left a deep impact. They facilitated the transition to Christianity and so initiated a rapid process of acculturation. This in part interrupted the oral transmission of cultural knowledge in the form of myths (Heeschen 1990: 143).

The final steps in building the sacred *Binalgekebnaik* men's house included the construction of support to hold the conical roof, most of its weight supported by a short central pole was attached to the four poles, *ateka*, that delineated the fireplace. The outer rim of the roof rested on the upper end of the *ayukumna* house posts, stabilized by the top ring of *afanya*. Finally, the old roof was carefully put in place; numerous men, and sometimes even women, participated in this concluding climax of sacred actions.

6.7 Natural limitations in Eipo

Not surprisingly, mountains and the sky define the limits of the Eipo world. The place where the mountain and the sky meet is called *motokwe ime ebrarik* 'mountain [or land] and sky, the two meet' (more or less the concept of 'horizon'; File Maker entry 1692).

Along with the obvious, visible limitation of the sky, the mountainous region had an impact on Eipo culture and language in terms of places and natural limitations. The following examples all indicate the importance of environmental landmarks, such as mountains, and their function in Eipo culture. Table 15 presents various semantic differentiations of the concept 'mountain' in Eipo.

Table 15. Semantic variation of mountains as landmarks in Eipo

	Expression	Description	Entry
a.	*motokwe aryuk-*	'(myth.) to pile up' or 'create the mountain'	194
b.	*motokwe berengne*	'a world of emptiness' or 'solitude, i.e., without any plants'	475
c.	*motokwe akonum berek-singibuk*	'the land lay bare, nothing grew'	476
d.	*motokwe cange wik*	'mountain is spacious' or 'big'	1050
e.	*motokwe dandoble*	'the mountain' or 'the area is uninhabited'	1176
f.	*motokwe kon dinib'mak*	'they go round the ridge of the mountain (in order to avoid climbing it)'	1442
g.	*motokwe dok*	'flank of a mountain'	1502
h.	*motokwe dub*;	'top of a mountain'	1592/2
i.	*motokwe seringsarang fab-minyak*	'(mag.) the empty earth shall bear flowers'	1797
j.	*bebengdina, bebengdin*	mountain top (a mountain range is often the border between two regions, for example, between the Eipo and the Marikla, who were enemies; the same metaphor is used for the border between the world of man and the world of the spirits)	—
k.	*motokwe filibable*	'the mountain becomes smooth' or 'flat (met. for 'to faint', 'to become unconscious')	1962/1
l.	*motokwe kwakwa lakab-danamle*	'the world will be transformed into a butterfly (when praying to the ancestors it is asked that the leaves of all food plants should move in the wind like the wings of a butterfly)'	3102/1
m.	*doa motokwe-dam lelelamle*	'the clouds are piling up at the mountain there'	3425/7
n.	*loun motokwe*	'an area or a mountain not tabooed where everybody is allowed to go'	3620/1
o.	*marman, motokwe marman*	'transverse (path) under a cliff'	3867
p.	*motokwe kon*	'mountain top ridge'; *sin* 'mountain top', 'high plateau'	4087/4

q.	*motokwe tob-nang*	'those who know about the world are able to explain the world'; *toba* = 'it is there'; 'is/are present', 'continous'	4087/6
r.	*motokwe yim*	'mountain (ridge edge'); *bisik wamumna* 'ridge')	4087/7
s.	*tarekna motokwe*	'(lit.) cold mountains' or 'high mountains'	4087/9
t.	*motokwe erelamle nun gum ob*	'the mountains rose at a time when we weren't yet there'	4448/2
u.	*sik motokwe*	'(this is) their mountain' or 'area or hunting ground'	4708/2
v.	*motokwe tilibak*	'places or areas where the trees grow densely or where there is a lot of growth'	5181
w.	*motokwe yupa*	'pass'; *Tekiltakalyan-* 'to climb up and meet', 'to meet on a mountain top, a pass'	5920; 5103

Mountainous regions have a central, culture-specific meaning in the Eipo language and culture, as they do in other region with such environmental specificities. For the Eipo, mountains have a number of functions such as orientation, as well as related concepts detailed below. The mountains Dakul and Lyene were formerly believed to be the 'mythical abode of sun and moon' (1143, 3732).

The direct connection between the moon and the Eipo region is expressed in the term *Yaburye* 'mythical river attributed to moon and sun' (5683). Both the sun and the moon have specific cultural values, as in *ketinge-ton wale-ton Dukuramduweik a-kururak* 'sun and moon, the two of them created the Dukuramduweik-men's house here' (3038) in the village of Dingerkon, or *im maka* 'secretion of the sky [code for: sun and moon]' (3776/4). Below are descriptions of various phases of the moon and metaphorical expressions regarding its changing position.

(35)

a.

wal su eleklamle.
'the moon is wrapped in leaves/can no longer be seen' (5450/6)

b.

wal yulamle.
'the moon is cooking (in the earth oven)', 'new moon' (5450/7)

c.

wale yang kelamle.
'the moon is or becomes like a tusk', 'crescent moon' (5775/2)

As is apparent, the moon in its different phases is encoded via figurative usages which intuitively make sense to a Western speaker as well. The widespread association of the moon with fertility is also evident in Eipo. The Eipo interpreted the waxing and waning of the moon as transitions in menstruation, i.e., residing in the women's (menstruation/birthing) house to its reappearance at the end of menstruation, when it leaves this special and sacred place. The moon additionally denotes, the connection between a mythical spirit and the bare landscape, in particular the high surrounding mountains.

6.8 Distance in Eipo

Data from the Eipo dictionary and Heeschen's grammar (Heeschen 1998, the various ethnographic films), along with myths, suggest that the Eipo do not possess abstract terms for distance, metric and volume. This led to an interesting observation during the construction of the airstrip. For a number of weeks, locals had been working under the supervision of Wulf Schiefenhövel and an assistant from Ilu, a mission station in Dani country west of the Mek area. The general shape of the landing field was already visible, delineated by longitudinal ditches dug to drain off the considerable quantities of daily rainfall. This determined the width, as well as the lower and upper ends. When Wulf and Grete Schiefenhövel announced that they were going to walk to Bime, the nearest mission station which had been opened two years previously and from where the advance group of the German research team had started its five-day walk to Eipomek, several men and boys said they would come along. As soon as the group arrived in Bime, some of the men began looking for string – long sections of bast and other fibres. They connected numerous pieces with knots and when the string was long enough, measured the width of Bime airstrip, noting its size before putting the string away.

Wulf Schiefenhövel was surprised by this activity and asked what they were doing. "We are comparing [*kiklib-*] the 'axillary wing' [*ke fol*] of the airplane. We know that the plane can land here and we want to check whether the *ke fol* of the airstrip we are building, with so much effort, in Eipomek has the same size so that the plane can also land there". The "Stone-Age" Eipo were verifying the work of a Western fieldworker as wanted to ensure that engineering was to standard. This is quite a scientific procedure. On their return, they were happy to discover that the *ke fol* of their future landing field was of the correct width. This measurement was not carried out by counting steps or feet, but by a quasi-holistic act of comparison, i.e., using a gestalt-like mental map. Implicit knowledge structure were employed in measuring the airstrip.

In a somewhat similar way, garden land, *wa*, (usually old gardens reused after approximately 15 years of lying fallow, sometimes newly cleared primary forest) is divided into individual plots without employing fixed units of distance. The borders of the plots passed down in patrilineal inheritance are commonly marked by small trees (*yurye, Cordyline terminalis*, a sacred plant in many regions of the Pacific, as we have seen) in such a way that the line connecting the *yurye* defines the end of one plot and the beginning of another. To encroach onto the land of another family is considered a serious offence and can lead to open conflict.

Some morphemes indirectly represent ideas of distances, such as 'in between', i.e., a specific distance between two landmarks. This means that the Eipo use distance and other spatial and geometrical concepts. Table 16 gives an impression of the various concepts.

Table 16. Various expressions of distance in Eipo

	Expression	Description	Entry
a.	*boltak-, boltakab-*	'to keep distance from someone or something'	732
b.	*yanyane faye bin-*	'to leave footprints (song and dance texts for) to walk long distances'	1874
c.	*inib-, enib-*	'(to make see) to search, to invite over a long distance'	2190
d.	*karen, karin*	'unoccupied, keeping distance'	2395
e.	*karenkaren bala-mak*	'they go separately, keep distance'	2395/2
f.	*aik kwakne bisik*	'the path through / in-between the houses'	3098
g.	*lukfara ban-*	'to look out, to look out into the dis-tance'	3647
h.	*nisin diberen-*	'to look into the distance'	4395
i.	*onob-*	'to refuse, to turn down, to keep at a distance'	4527
j.	*yan onolbin-*	'to make a big step' (on the day when the sacred men's-house is built one is not allowed to walk a long distance. The taboo is apparently taken away by mak-ing a big step over a puddle or a small pond.)	4528/1
k.	*tamublabdongob-*	'to gain a greater distance to someone who is following, to keep a distance when walking'	5000
l.	*tekisib-*	'to keep a distance'	5107
m.	*tekisibnin balamak*	'the women keep a distance (to the men while walking)'	5107/1
n.	*usamkila*	'clouds rising in the distance'	5411
o.	*webrongob-*	'to follow at close distance, to be at-tracted'	5526
p.	*winilkidik-*	'to wander about, to walk long distances (said of the ancestors)'	5627
q.	*bisik*	'way, path, direction'	612
r.	*bisik dukuble*	'the path/entrance is just wide enough (to be able to carry something through)'	612/5
s.	*bisik kwangdanya*	'fork in the road'	—

The most common word used to express distance is *fera, fere* 'distant', 'far away', requiring a long walk. The term *fera*, along with the phrases listed above, do not, of course, specify a precise measure of distance, such as step, mile or kilometer. But for an adult member of the Eipo society, who knows her or his territory extremely well and has also walked to further away places, this term is sufficient. The problems arise when foreigners, like Western researchers, hope to extract some metric or time measurement from their informants: *fera* can be quite close, but also very distant. We can state, then, that there is no technical term for distance in Eipo, but rather a variety of context-dependent phrases and words for which one can use the term 'distance' as a translation.

Nevertheless, when it comes to building houses, traps and bridges the Eipo are able to conceptualize the exact structure and architecture and order of actions necessary in assembling the various materials to build the different types of houses, technically advanced traps (cf. the Dene) and bridges. An explicit, abstract measure is apparently unnecessary in constructing buildings or even the sophisticated cane bridges spanning wide rivers, examples of "neolithic high-tech". Nor are abstract terms for distance necessary for applying static and other principles of physics (see Bödeker 2006 on intuitive physical knowledge); they are used implicitly. The abstract concept of *pi*, for instance, is not required;, knowing and applying the idea of a circle in the strict geometrical sense is not important. The Eipo and other traditional peoples have developed certain forms and principles which are functionally and economically better than others and, thereby, became part of their culture.

6.9 Representations of spaces in Eipo and Dene

The two languages under review are compared with respect to their spatial concepts and categorization, i.e., linguistic spatial markers of environmental landmarks as represented. As stated in the introduction, my interpretation of Eipo and Dene spatial concepts is guided by the fine-grained analysis of Hopi space or rather the Hopi ideas of space, or *Raumvorstellungen* (Malotki 1979). Malotki's survey seeks to present the various facets of this language and their function of encoding spatial relations to a high degree of specificity (Svorou 1993). Eipo and Dene present specific environment-dependent encoding patterns mirrored in their languages. For the Eipo it is the mountains and rivers as significant limitations, in Dene culture it is Cold Lake; they have an impact on language patterns and the carving-up of spatial concepts at the language level. In the following sections I will offer a examples from Eipo and Dene which show various ideas of space.

6.9.1 Orientation in Eipomek

The following summary on Eipo structures presents some first-hand data (Heeschen 1990; Koch and Schiefenhövel1979, 1984; field notes Schiefenhövel 2008, 2009, 2010).

As we saw above, the Eipo religious tradition holds that humans appeared on earth from underground and gathered in groups. The men's house became their most important place (*yoek aik*; see below). It was a pivotal place which ensured the life and prosperity of the hamlet, a literal and spiritual center. It was also the center of network of paths, arrangements and limitations which began inside the house itself (seen in specific seating arrangements and placement of sacred objects) and extended to the periphery of the village. Each Eipo village had one or two women's houses, which were also sacred and taboo for the men, with the obverse applying to women in the case of the men's houses. This social organization, which adhered to a marked gender dichotomy and specific environmental conditions, is well established in language structure and religion. Many points used to orient oneself are semantically filled with culture-specific entities or landmarks. The following data examples illustrate this specificity.

(36)

a.

A-kame	*ara*	*lulukene mem.*
here-stick	THEME	shake/make.forbidden

'As to this sacred digging-stick, it is forbidden to cause it to shake.'

b.

Am	*bob-m-ik-ine, ou-Dek bob-ik.*
Taro	carry-DUR.-3PL./PA.III-SC, down/there-Dek carry-3PL./PA.III

'They were carrying the taro, and then they carried them to the Dek River down there.'

c.

A-motokwe	*u-lam-ik-ane u-bisik,*	*Dabo-tam bisik be-(y)ik.*
here-mountain	be-HAB.-3PL./PA.III-SC.down there-way,	Dabo-side way.go-3PL./PA.III

'They were staying here, and then they went down there.'
(or: in this area here, into the direction down there), they went into the northern area)

These examples involve objects which are important to the Eipo, e.g., the sacred digging-stick *kama*, sometimes pronounced *kame*. Joining this most important religious item are the ritually significant ancient food plant *am* 'taro', and places with a specific meaning, e.g., the Dek River, or the northern lowland area. Moreover, these examples indicate the importance of culture-specific habits which rely on certain practices. For example, the digging-stick as a sacred object is also responsible for a certain order or ritual as in *kama bukwotebnin yanamuk* which can be translated as 'the primeval digging-stick came putting everything in order and smoothing everything'. As the stick of creation it was kept in a specific place, a kind of shrine in the men's house (Heeschen 1990; Koch and Schiefenhövel 1979: 85). Interestingly, in every case a deictic marker is used to indicate the exact position of the place, direction or event (36a).

Eipo speakers orient themselves in their mountainous environment through a fine-grained network of names for mountains, hills, slopes, rivers and plains (Foley 1986; Heeschen 1998: 143). Heeschen states of this environmental topology:

> Eipo speakers mainly use the spatial deictics as a condensed and abbreviated structure in face-to-face-communication: here the deictics are accompanied by a pointing gesture. (Heeschen 1998: 143)

Basic orientation in space for the Eipo is, as noted above, provided by five deictic points of reference based on the one's position, 'here', 'there', 'up-valley', 'down-valley' (note that both valley-related orientations function just like cardinal directions in Eipo), 'across', i.e., a relative frame of reference.

The basic set of deictic markers consists of the following morphemes, taken from the Eipo dictionary and Heeschen 1998 and Schiefenhövel's field notes.

Table 17. 'Here' and 'there': general deixis in Eipo

	Morpheme	Description
a.	*a-*	'here'
b.	*ei-*	'up there'
c.	*ou- u-*	'down there'
d.	*or-*	'accross here', 'across the valley', 'on the other side', 'the other slope (but not upwards)' (4536)
e.	*or-asik*	'the hamlet over there' (4536/1)
f.	*or-deibsilyam*	'put it there (at the same height)'
g.	*ortiba*	'it's over there', 'across the valley, spot across the river'
h.	*er-*	'across the valley/the river', 'upward of own position'

These examples exemplify the various usages of the dual distinction between 'here' and 'there', i.e., the horizontal distance and place of a speaker being 'here', and the vertical 'up' and 'down' distinction. All of these usages are relatively unspecific in terms of metrical distance between the speaker and a potential hearer. We also see the importance of the environment in orientation, e.g., 'river' and 'valley'. The prefix *d-* is added to deictic morphemes to form longer distances or sharper contrast. The above data set presents a more detailed semantics of the basic deictic markers. The added prefix increases the spatial semantic detail in the encoding of proximal, medial and distal distances. More detailed examples include vertical specification or specification of altitude (Heeschen 1998: 144).

Table 18. Specified deixis in landmark orientation in Eipo

	Morpheme	Description
a.	*da-*	'here' (in a wider area around the speaker and hearer, here and there)
b.	*dei-*	'very far up there' (across the mountains) vs. *fera* = 'far way', as opposed to *dam*'; *dam* 'close by', 'short (way)' *dam banmarak* 'the two of them are coming closer', 'they are approaching'
c.	*dou-*	'very far down there' ('very far down the valley')
d.	*dor-*	'very far across the ridges in the next valley'; 'at same level or lower than own position'
e.	*der-*	'very far across the ridge in the next valley'; 'higher than own position' (Heeschen 1998: 144)

These examples indicate that the Eipo rely on a dense topographical system which includes, in these last cases, distances in various metric situations, i.e., proximal, medial and distal. Syntactically the deictic markers are bound morphemes which combine with other parts of speech such as verbs, nouns, postpositions and predicativizing suffixes (Heeschen 1998: 143). In the example below the deictic marker refers to a distance between oneself and another group of people.

(37)

Marikle-nang	*lukenyan*	*or-yan-ma-se-ak,*	*a-mab-ma-lam-buk*
Marikle-people	night	from/across-come-DUR-us-3PL.PRES,	here-sleep-DUR-2SG.PRES-when(different.subject)

'During the night the Marikle people come to us from across (the valley) there, while you are asleep here.' (Heeschen 1998: 143)

The deictic marker encodes the trajectory of the figure (the Marikla people, i.e., the enemy living across the valley, are coming) and their transition from their home place (the non-specific 'from across the valley') to an implied speaker or vantage point ('us').

An interesting example in terms of a location that is imagined or transformed is presented in (38) (see Heeschen 1998: 144).

(38)

A-kil	*ara,*	*a-yanga-lam-lye-ak-da*	*a-tek-am-lul.*
Here-woman	THEME	here-come-HAB-3SG.MED-at-but	here-stand-PERF-3SG.HORT

A-ei-am-ki-n	*winyab-lul.*
here-see-PERF-you-1SG-PAST.I	say-3SG.HORT

'As to the woman here, she may have come to the place where he might have been standing. I have seen you here (or there)! she may have said.'

The deictic marker *a-* used in the above example encodes an imagined or abstract space which is removed from the speaker to a distance in which 'here' (depending on the ego) is not the location of the speaker in a real context. The locational marker removes the scene from the actual speaker/discourse. Heeschen argues that a place is imagined that the Eipo speakers do not know. From a morphosyntactic point of view it is interesting that the deictic marker is used repeatedly. Every possible location is marked for each location of the figure and the ground.

The example below gives a flavor of the encoding of imagined things that a speaker describes to a hearer who does not know the spatial landmarks (Heeschen 1998: 144).

(39)

Aike	*irikna*	*a-ub-ma-le-to-ak,*	*ou-tonun li-am-ik-ye-ak*	*aik*	*dike*
hut	edge	here-be-dur-3SG.PRES-as-at	down-as put.into-PERF-3PL.med-and-at	hut	food
ou-deli-lam-ak.					
down-put-hab-3PL.PRES					

'They put away food at one edge of the hut, at a place which is similar to this one here (the speaker points to something), in a similar way they have put down there (things into a string bag).' (This is a specific ritual.)

It is apparent that this last example can only be understood in its real speech act context since the speaker is actually pointing at a particular place. As outlined above, another interesting aspect is the delimination via mountains and thus a apparently non-specific distance (Heeschen 1998: 144).

(40)

An	*yuk*	*asik*	*a-ub-na-lyam,*	*nun-da der-motokwe*	*bi-nam-ab.*
you	alone	hamlet	here-be-FUT.II-2SG.HORT	we-but very/far/across/up/there-mountain	go-FUT.III-1PL.

'You alone should stay in this hamlet here, but we will go to the mountain very far across there.'

Note, as mentioned above, that the future tense (FUT) in *aubnalyam* is divided into three stages[124]:

FUT I	=	immediate future
FUT II	=	near future
FUT III	=	far future

The idea of 'very far across there' seems rather vague for a speaker unfamiliar with the environment, but the Eipo speaker is very much aware of the distance to the central range in the south. Also, it seems evident that the future tense marker encodes a distance in space as well. The hortative (modus of the verb specifying an act of collective action) construction

[124] See again Heeschen (1998: 12).

lyam encodes the modus of the verb to a collective action, i.e., the English translation introduced by 'You should stay' and ending with 'we will go'. Both utterances are related to specific places, i.e., the 'hamlet' and the 'mountain'. The opposite of *asik* 'village' or 'hamlet' is *bay* meaning 'outside' and thereby carrying the notion of 'wilderness', 'uncontrolled', 'dangerous' (see *bure, budu* 'outside'; *bure ketib-* 'someone who stays outside, comes back to the village late'; *bure* is purely deictic, i.e., not used metaphorically to signify danger, threat etc.). *Motokwe* has several additional meanings such as 'land', 'landscape', 'region', 'place', and 'world'. The prefixed bound morpheme *a-*, as we have already seen, has several meanings depending on the context, as summarized below.

Table 19. Deictic expressions in landmark orientation in Eipo

	Morpheme	Description
a.	*a-*	'here', 'there' (as opposed to 'over there')
b.	*a-tam*	'here', 'this way' (indicating direction and place; -*tam* = 'side') (see *u-tam* = 'down there', 'down the valley' (indicating direction); *u-tiba* = 'it is down there', 'down the valley/the river')
c.	*a-teba*	'here it is' (-*teba* = predicative particle with deictic pronouns)
d.	*a-tebuk*	'here', 'this here' (-*tebuk* = predicative particle with deictic pronouns, pointing to something which is past or which had been mentioned before; what has been mentioned in the past or in the preceding conversation and is thus known to the speaker)
e.	*a-binmal*	'here'/'there he/she/it comes'
f	*a-bisik*	'this way', 'along here'
g.	*a-motokwe*	(lit:) 'this mountain here', but also: 'here', 'with us', 'in our place'
h.	*a-nirya*	'all this'
i.	*a-yo*	'the wood'/'the tree here', 'this tree'/'this wood'

The prefixed deictic marker *a-* encodes two possible locations depending on the speaker's intention to indicate a specific direction, i.e., 'here' and 'there'. Note again that the morpheme *ortam* (*or-tam*) encodes 'over there', 'across the valley', 'across the river (indicating direction)' (4544). The next section presents some general considerations about the Dene's delimitations and limits that are mirrored in their language.

6.9.2 Orientation in Dene

The previous section addressed some basic spatial concepts in Eipo, based primarily on environmental landmarks. This section examines data from Dene based on my fieldwork (see also Cook 2004; Li 1946). This language has interesting spatial concepts, such as 'up above' (*yudaghe* 'above, at a certain place above'; *betthiye* 'above it' (current, wind), 'down below', 'up-stream' or 'up river' (north), 'downstream' (south), 'up from shore', 'down toward shore', 'out to sea or forward' (into or out to open sea), 'inside', 'outside'. These terms are very similar to corresponding terms in Eipo. Most of the concepts are related and oriented to lakes or rivers, particularly those around Cold Lake. Related languages such as Carrier, Eyak, Hupa, Koyukon, Navajo, Slave and Tlingit also encode spatial concepts based on the immediate environment, such as rivers navigated for fishing (Leer 1989). We can assume that Dene behaves in a similar way to its neighbors/cousins, as the information below will show.

The data sets in the following tables concern affiliated languages - Tlingit, Carrier, Koyukon, Hupa and Navajo - and some of their spatial concepts in which they bear a similarity to Dene (Leer 1989: 613, 622).[125] Note that a detailed analysis of every spatial morpheme in the different languages is unnecessary here. What is evident and striking with respect to the subject of this chapter is that in all the languages above (with the exception of Navajo in these examples) spatial marking is aligned to an environmental landmark, e.g., house ('toward or back to the house'), water or river *des* in Dene (up- or downstream). In addition, the direction of the water is paralleled with cardinal directions, as seen in Hupa.

125 On a close relative language to Dene see Kari's analysis of Athna toponyms (Kari 1979, 2011: 239–260).

Table 20. Environmental spatial concepts in Tlingit and Carrier

Tlingit		Carrier	ALL*	LOC	ABL
up above	*ḱé-*	up above, over	*-do*	*-doh*	*-des*
down below	*ye-, ya-*	down, underneath	*-yo*	*-yoh*	*-yes*
upstream (ne)	*naḱí* (n)	upstream, away up (from the outlet of a lake)	*-nuʔ*	*-nud*	*-nuẓ*
downstream (s)	*ʔix-ḱí*	downstream	*-daʔ*	*-dad*	*-daẓ*
up from shore, interior	*dag*	north	*-no*	*-noh*	*-nes*
down toward shore	*yeg, ʔig*	down toward a body of water	*-cen*	*-cid*	*-ciẓ*
out to sea, out into open	*de-ḱí*	forward	*-nes*	*-nes*	
across, on the other side (of water)	*yan*	behind, at the rear, away from a body of water	*-niʔ*	*-nid*	*-niẓ*
inside	*nel*	on the opposite side (of the water)	*-yan*	*-yad*	*-yaẓ*
outside	*gán* (n)	away, off	*-ʔen*	*-ʔad*	*-ʔaẓ*

Table 21. Environmental spatial concepts in Koyukon, Hupa, and Navajo

Koyukon	ALL	AREAL	Hupa	LOC*	SUF	Navajo	LOC	SUF
up above	*-dege*	*-degu*	——	——	—	up	*-dah*	*-de*
down below	*-yege*	*-yegu*	——	——	—	down	*-yah*	*-ya*
upstream, back behind, to the rear	*-na'e*	*-nuye*	upstream (SE)	*-nage*	*-nah-*	behind	*-ne*	*-ne*
downstream	*-do'*	*-duye*	downstream (NW)	*-de?*	*-da-*	——	—	—
up from shore, up on or above shore (from water), toward back (of house)	*-nege-*	*-negu*	away from the stream (NE)	*-dage*	*-dah*	——	—	—
down to shore, toward front (of house)	*-ene*	*-uye*	toward the stream, downhill (SW)	*-ce?ne*	*-sen-*	——	—	—
ahead, out on open water	*-nela*	*-nelye*	——	——	—	——	—	—
across, on the other side (of the water)	*-nane*		across the stream (SW)	*-mane*	*-?an-*	across	*-na*	*-na*
off to the side, away	*-?ene*	*-?uye*	——	——	—	beyond, on the other side	*-?a*	*-?a*

These examples bear a striking similarity to the Dene data. Like these affiliated languages, Dene bases its orientation on environmental landmarks, but additionally uses the cardinal system (*sayesi* 'East from under the sun'; *-da, yethda* 'The Great Bear constellation'). For example, the north *yatthé* also profiles 'up' (see *tthi* 'in the north'; *yatthi* 'to the north'; *ghadhe* 'West'; *dási* 'west', 'from down river', 'to the West of'). The direction of the wind *betthiye* (up current), above it (current, wind) is also marked by the cardinal direction, e.g., *tthísníltsi* is 'wind from north' (concept of the North Pole *yatthé néné laghil*) versus *nasniltsi*, which encodes the 'wind from the south' (concept of the South Pole *níl holaghe*).

More precisely, the Dene territory was precisely delimited by water systems, the large streams and numerous lakes, as well as extensive swamps, prairies, barrens and forests (Curtis 1976: 3). That water systems represent the main limitations can be seen in the following Dene expressions which delimit the territory. Note that the Dene's former hunting grounds stretched from Cold Lake, Edmonton to the Hudson Bay in the east (ca. 1700 km distance), to Yellowknife in the Northwest Territories in the north (1775 km), and bordering the Rocky Mountains to the west (1700 km).

Kechagha-hotínne 'down-stream they-dwell' is placed west and southwest of Great Slave lake (A), near the mouth of the 702 kilometer long Hay River (C) along the 1738 kilometer Mackenzie River (B), and the lower course of Liard River (D) which stretches approximately 1115 kilometers from the Yukon to British Columbia and the Northwest Territories (Curtis 1976: 5)[126]. A simple Google Maps search shows the different toponyms and their distances.

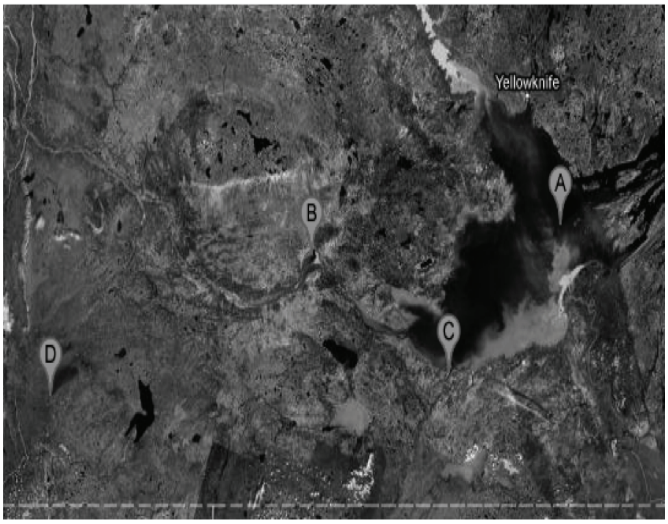

Figure 15. Dene toponyms

126 These distances are the result of a GIS analysis relating the different historical place names.

The expression *Kaí-theli-ke-hotínne* means something like 'willow flat-country up they-dwell'. This region is centered on the western end of Lake Athabasca lake Fort Chipewyan and extends north to Fort Smith on Slave River and south to Fort McMurray on Athabasca River (Curtis 1976: 3). *Kes-ye-hotínne* 'aspen house they dwell' encodes a place near the head of the Churchill River system (Lac Isle la Crosse, Portage la Loche, Cold Lake, Heart Lake, Onion Lake). *Háthé-hotínne* 'lowland they-dwell' is the region of Reindeer Lake which drains southward into Churchill River. *Sa-yísí-dene* 'sun under (the eastern) people' is in the barrens between Reindeer Lake, Hudson Bay, and Chesterfield Inlet. *Tandzán-hotínne* is on the northern shore of Great Slave Lake along Yellowknife River *Dení-nu-eke-tówe* 'moose island up lake-on'. The *Hli-chá-dene* are the 'dog flank people' (Dogrib) between Great Slave and Great Bear lakes, and La Martre and Coppermine River.

Comparing the Eipo deictic information seen above, Hopi, a very distant language cousin, has all three distances 'here', 'there', 'over there' in the example below, but expands the deictic system into a more refined pattern which includes medial information (also seen in Dene) (Thiering 2006). Note that the basic space structure in Hopi is threefold based on the following case system: a locative, destinative and an ablative determine the place or site, destination, and point of origin (Malotki 1979: 23, 84). Hence, a clear linguistic carving up via spatial deixis markers and general orientation is encoded, as it is in Eipo and Dene. This points to a high degree of specificity in spatial semantics (Thiering 2013a,b).

Hopi separates this deictic space into a four-way matrix, such as *ya-ng* 'here' (proximal), *a-* (medial), *e-p/pa-* 'there' (distal), and *ay* 'over there' (extreme-distal) (Malotki 1979: 27, 59, 145; 1983: 17). Note that the morpheme *da-* is similar in meaning to 'here', but not as far away as 'there', (poss.) 'here and there' (see *deira, doro, doura* in Eipo).

Central to any analysis of spatial configuration are the linguistic coordinates that dissect the area taken up by the speaker (first person), the hearer (second person), and the persons or things other than the speaker and hearer (third person). English basically structures the terrain occupied by these entities into 'here' and 'there'. Formally adverbs, the semantic thrust of 'here' and 'there' is deictic, with 'here' indicating a point in the immediate vicinity of the speaker and 'there' somewhere further removed. (Malotki 1983: 16)

Hopi examples

(41)

a.

ʔiʔ ya-ng nepni pas kwangw-ʔeway.
this here.DIF edibl.herb INTNS good-seem
'The herbs in this region look very fresh.' (Malotki 1979: 58)

b.

ʔe-p kwusu-ʔu.
there-PKT pick.up-IMP
'Pick it (this one there) up!' (Malotki 1979: 27)[127]

A more detailed account of Dene will show an even greater interaction between environmental landmarks and their representation in language as seen in Eipo. The following examples are of very basic directional locative markers in Dene.

127 See also the following example: *ya pam haki-y kwaa-hu-ʔat ʔay-q kitsʔo-ve-q qatu fe*
this who-AKK eagle-ABS-be & over.there-PKT.EX roof-PKT-EX sit
'Whose eagle is sitting on the roof there?' (Malotki 1979: 159)

Table 22. Basic directional locative markers in Dene

	Dene	Translation	Example
a.	(*ne)ja*	'here'	(*ne)ja nanidá* here 3SG.IMPF.sit.down.again 'Sit down here again.' (Cook 2004: 302)
b.	*ʔeyer*	'there'	*ber xa ʔeyer hots'en héya.* meat for there there-to he-go 'He went there for (to get) meat.' (lit. 'He went toward there for meat.'). (Cook 2004: 289) (note that this word profiles a medial distance)
c.	*yughé*	'over there'	*li yuwé/yughé theda li* dog over.there 3SG.IMPF.AO.sit 'A dog used to sit over there. (Cook 2004: 302)
d.	*ekozi*	'near there'	——
e.	*hoch'a zi*	'away from there/it (time, place)'	——
f.	*-k'ezi*	'over'; 'out on' (lake, hill, prairie, flat surface)	——
g.	*nizi*	'in presence of' (close proximity)	——
h.	*yuwé nigha*	'go (over there)' (verb) 'You go over there.'	——
i	*-thethe*	'above', 'over'	——
j.	*nadaghe*	'in front of'	——

Table 23: Basic directional locatives in Dene

	Dene	English Translation	Example
a.	*náhésja*	'go' (start across)	'I started across.'
b.	*náhédel*	'go' (start across)	'They (plural) started across.'
c.	*náhélgé*	'go' (start across) (animal)	'He has started across.'
d.	*nalé*	'in sight of' (person, at a distance)	no entry available
e.	*nidhá*	'far'	'It is far.'
f.	*nidháíle*	'near', 'close by'	——
g.	*nu tedhe*	'over us' (dual and plural)	——
h.	*-thethe*	'above', 'over'	——
i.	*ho tedhe*	'geographic'	——
j.	*be tedhe*	'person'	'thing over a person or something'
k.	*se tedhe*	'over me'; 'above', 'over my head'	(metaphorical) 'I do not understand.'
l.	*nu tedhe*	'over us' (dual and plural)	——
m.	*hube tedhe*	'over them' (plural)	——
n.	*ni dúe*	'standing close together'	——
o.	*-gáh*	'close', 'near' (beside physically)	——
p.	*hube tedhe*	'over them' (plural)	——
q.	*t'ázį*	'behind' ('going the other way'); 'leaning against'	——
r.	*ne-t'azį*	'behind your back'	——
s.	*tanizį*	'centre', 'middle'	——
t.	*tajáhai*		'In the middle of the lake.'
u.	*t'abábel*	'near the shore line'	——

These examples indicate that Dene (and also Hopi) exhaust a large range of spatial concepts, which also depend on environmental landmarks, (e.g., lakes, as here). Additionally, distances are specified, as mentioned before, in a threefold system encoding proximal, medial, and distal relationships between the figure and ground. These are only approximate distances which do not rely on exact geometrical or mathematical concepts.

Along with these obvious spatial concepts which profile certain spatial configurations, the next data set presents a case in which true environmental landmarks are the focus. An initial word count in the Elford dictionary of the noun 'water' and related constructions returns 199 entries for water alone. The aggregate 'ice' returns about 70 entries[128].

128 See also the following entries: 'river' = 22, 'lake' = 31 –as opposed to 'mountain' = 3 -, 'land' = 37; 'shore' = 6; 'fish', 'fishing' = 106.

Table 24. Variation of ice in Dene

	Dene	English translation	Example
a.	*ten*	'ice'	——
b.	*ten deteni*	'ice' (thick) (noun/verb)	'The ice is thick.'
c.	*ten déch'el*	'cracked ice' (verb)	'The ice is cracked (with one big crack).'
d.	*ten dzíré líi*	'ice' (drifting) (noun)	no entry available
e.	*ten elt't'aghidze-ghi*	'iceberg'(noun)	no entry available
f.	*ten héltál*	'cracked ice' (verb)	'The ice is cracked (with one small crack).'
g.	*ten hóeni*	'dangerous' (verb)	'The ice is dangerous.'
h.	*ten húlár*	'float' (verb)	'Ice floated past.'
i.	*ten nádhilteni*	'icicle' (noun)	——
j	*ten nádénitthel*	'chop ice (to make a way)' (verb)	'He chopped ice away.'
k.	*ten nágheltal*	'crack (ice)' (verb)	'The ice is cracked (with many small cracks).'
l.	*ten náthelá*	'float' (verb)	'Ice lifted or floated up.'
m.	*ten nithelár*	'float' (verb)	'Ice (large pan) floated to shore out again.'
n.	*ten táthedzegh*	'float' (verb)	'Ice floated to shore.'
o.	*táthela; ten táthelar*	'float' (verb)	'Ice (large pan) floated to shore.'
p.	*ten táthelár*	'float' (verb)	'Ice lifted or floated up.'
q.	*ten táthi*	'float' (verb)	'Ice is floating (to shore).'
r.	*ten ts'et'ani*	'ice (thin)' (noun)	——
s.	*ten tsele*	'ice (fall)' (noun)	——
t.	*ten ts'íli*	'ice (spring)' (noun)	——

This set of examples of various linguistic constructions encoding different qualities of 'ice' neatly complements the Eipo data on 'river' as an important landmark. In the fishing season, the Dene had to know the specific qualities of ice, such as thickness. Ice fishing required an exact knowledge of a location where the ice was thin enough to drill a hole but also above the fish shoals. Note that in Dene most of the linguistic constructions quoted above are, nowadays, used only by a few fluent elders. We can assume that most of the constructions will be gone in a generation from now (Thiering 2009a, 2010).

6.10 Conclusion

This chapter examined certain aspects of spatial cognition and/or more mental models in two unrelated languages. Some aspects of spatial cognition are culture-specific, being shaped, for instance, by culture-specific practices of spatial orientation and organization.

Siegel and White quote Kaplan (1975) and his evolutionary analysis of cognitive maps, which held

> that the cooperative hunting of big game required a cognitive map. Perception, prediction, evaluation, and possible courses of future action can be represented in a map. Spatial representations provide frames of reference for understanding information for which locus is or could be an issue. (Siegel and White 1975: 22)

Arguably, language here plays a double role as an external representation or semiotic system, on the one hand shedding light on structures of cognition and on the other shaping cognition and influencing its structure. Based on this sample study of two unrelated cultures and utterances in their respective languages, this chapter attempted to distinguish aspects of spatial cognition. Some might be candidates for universals although they may find different expressions in different languages. I am aware that an argument in favor of universals which relies on just two different cultures and languages would be premature and even careless, but in preparing this book project I have shed some additional light on this intricate question.

We have observed aspects of spatial topography that are truly culture specific in the sense of different cultures developing different cognitive structures. We have seen examples of deixis and other references to, and conceptualizations of, space. Moreover, this chapter presented cultural and language specific ideas of space in Eipo and Dene as well as other languages, such as Hopi. This revealed the vital importance of such spatial concepts in the two ethnic groups and related language cousins. People in both cultures lived in complex environments, travelled long distances into dangerous terrain and usually made their way back safely. Survival in their habitats depended on evolved capacities typical of our species' efficient management of orientation in space. Moreover, it depended on ontogenetic learning about the geography with its many specific features, and on a culturally transmitted, linguistically encoded spatial reference system sufficiently precise to foster the process of forming mental maps of their respective lands.

We examined linguistic information about the encoding of such spatial concepts. These concepts are topography-based and related to environmental landmarks. These include mountains, rivers and lakes, or an individual's own experience of walking to and returning from various distant places. They further encompass culture-specific practices and techniques, e.g., the Eipo society's practice of cultivating gardens, hunting and snaring in high altitudes and the partly ritualized process of building a men's house, or hunting in the Dene society.

Foley believes that Papuan societies had no political structures which could enforce moral or legal sanctions for antisocial acts (Foley 1986: 16–17). This is an extreme interpretation of these acephalic societies which were, however, not without political institutions and leadership. Along with fundamental human empathy, religious beliefs and traditions ensured basic adherence to rules and norms. The *dub-nang* 'big men' held political power, including the power of sanction, and the society as a whole used gossip and agonistic behavior as a functional institution safeguarding its sacrosanct rules. The most important "authority" in the Eipo culture was their religion; one aspect of this was the men's houses which functioned as spiritual centers and hence also as social and political centers for village communities.

It seems that the power of orally transmitted tradition is highly underestimated, especially from a Western, written tradition point of view. Certain traditions and rituals are joint actions, used over and over again, and it is likely that this transmission of knowledge is as powerful as any written system. This can be seen in the Eipo traditions of building houses and bridges, and in certain hunting habits, such as the construction of complicated traps.

The various films of Eipo house-building make fascinating viewing since most of the collective work (which involves up to 40 people at the same time) happens without directives and is predominantly non-verbal. The actual conceptual matrix of a house reveals a relatively complex architectural structure combining posts, floor, walls, fireplace and roof, all carefully bound together to form a stable functional unit. It is remarkable that the Eipo culture has maintained this tradition without a written format from one generation to the next, probably since time immemorial. Building a sacred men's house, the largest and most elaborate example of Eipo architecture, was embedded in ritual and a striking proof of this kind of knowledge embodied in action.

One significant disruption leading to a linguistic, referential taboo, and one directly related to the change of language, is to refer to certain religious traditions before the 1976 earthquakes (June 26 and October 29). As outlined above, for the Eipo, earthquakes, sickness and death were the result of broken taboos or the interference of spirits that had not been propitiated or diverted. Around Christmas 1979 the Eipo burnt most of their sacred objects and many ritual traditions subsequently came to an end. In 1983 the first children were baptized (Heeschen 1990: 9). The radical impact of this cultural change in less than 10 years is interesting in understanding the Eipo culture and language. As I argue here, most words and concepts about space were not affected by these events, which implies that certain spatial representations and ideas are still transmitted down the generations. This is different from the case of Dene where a critical loss of spatial semantics occurred during recent decades (Thiering 2009; see the chapter on language loss above). The disruption here was simpaly the arrival of Westerners. First Nation Dene people were send to residential schools, forbidden to speak their mother tongue and punished by missionaries when they tried. This led to a reluctance to speak Dene, even at home, which resulted in the language loss seen in the present day. Along with language, and words, culture-specific concepts were also lost.

Heeschen cites Konrad Lorenz, who states that human thinking is nothing but movement in space, that is, moving on probation in imagined spaces (Heeschen 1998: 198). For the Eipo and Dene, spatial classification implies locating the objects i.e., defining places is basically deliminating, based on the environment. Speakers parse up their environment into an important and necessary topography or spatial matrix which is represented in the language via a vast matrix of mountain, river and place names. Eipo and Dene traditional myths function as a chronological topology of places. The description of such components, as Malotki rightfully points out, should include anthropological and cultural aspects of the language (Malotki 1979: 301).

The interrelation of culture, environment and language is seen in this chapter for Dene and Eipo. As a result, in these two languages the environment acts on the mental concepts typical for our species. These concepts, or spatial mental models, have been proven to function as orientation systems. These systems act on language and action which in turn influence the mental construction of space. This should come as no surprise since every language has language-specific affordances, i.e., the previously noted semantic content hard-wired into specific morphosyntactic devices or morphosyntactic patterns. As such, spatial concepts are linguistically represented and differently based on the respective language system.

I have already referred to Malotki. He points out that for the Hopi, especially, the idea of space might be cultural and language specific (see also Robering 2013). As we have seen, such ideas of space are also crucial in Dene and Eipo and indeed demonstrate culture-specific patterns.

This chapter has also shown the rich linguistic inventory of detailed spatial concepts encoded in the two cultures. Finally, one can conceive (linguistic) meaning and the understanding of an utterance as the concrete manifestation of a semantic horizon which generally exists prior to the heard utterance. As quoted above, Heeschen points out the importance of space in daily routines.

> it is certainly space, which forms such a 'Sinn-Horizont' or, in other words, a principle which has a determining influence upon the semantic layer of language. [Heeschen's translation of the German original: "Konkretisierung eines allgemein schon vor der gehörten Äußerung vorhandenen Sinn-Horizontes"]. (Hörmann 1978: 394), cited and translated in Heeschen 1998: 29)

The goal was to show the influence of culture on language (and vice versa) and cognition. Questions such as, what is cultural or language-specific, and what might be candidates for universals, framed the interest in the different languages and cultures under review. These questions, of course, mirror discussions seen as long ago as Aristotle and other ancient Greek philosophers who argued that language expresses thoughts that are a priori given (as Kant also highlighted). Moreover, Gottlieb Frege and the early Ludwig Wittgenstein argue that all cognitive activity is linguistic. This culminates in Wittgenstein's *Tractatus* where he claims that the limits of one's language are the limits of one's world (Wittgenstein 2003). It has been shown that this view does not hold for the languages under review. Certain practices, habits, and environmental landmarks have an impact on language (as shown in some selected linguistic examples). As such, this research into Amerindian and Mek languages mirrors some insights from such early nineteenth and twentieth century scholars as Franz Boas, Edward Sapir, and Benjamin Lee Whorf (and contemporary scholars such as Helmut Gipper and Ekkehart Malotki). Those insights were built on Humboldt's idea of *Weltansichten* 'world perspectives', that is, the idea that the structure of language influences the thought process (Everett 2013; Thiering 2013b; Trabant 2012).

In North America, this concept is known as the linguistic relativity principle or the (Neo)Sapir-Whorf theory (Thiering 2013b for an overview). They support the idea that languages differ in the way they shape our world perspectives, but also hold that non-linguistic information has an impact on spatial language and categorization. Therefore this research aimed to show ideas of space as a web of intertwined interaction of language, culture, and cognition.

Heeschen summarizes the function of non-linguistic information on language (environmental, cultural etc.), in this case the Mek language. I subscribe to his point of view with respect to the reference of space and its relation to semiotic systems.[129] The language data presented shows the influence and constructive process of environmental landmarks and cultural heritage in the shaping of spatial categorization in the two languages. Arguably, this is a common denominator in most languages.

Finally, it should be noted that the future of Dene, or rather the Cold Lake dialect, appears particularly bleak. There are barely 180 speakers left with mastery of their language, let alone its complex spatial vocabulary (Thiering 2009a, 2010).

Soon, one of numerous once rich and viable cultures, with complex traditions and meaningful concepts of the world in general and of the spatial environment in particular, will have died out. A pale shadow of it will survive in dictionaries and ethnographic accounts. It remains to be seen wow the Eipo will fare in the future. They are opening up their society, which was almost completely isolated and based on a neolithic toolkit just one generation ago, adopting Indonesian and Western ideas with breathtaking speed. Many villagers, including women, speak Bahasa Indonesia which is infiltrating their traditional vocabulary via loanwords, etc. (as English did for the Dene). Yet, their own Eipo language does not yet seem to have suffered from neologisms and other linguistic imports. Eipo is spoken in every household and people are proud of their language. The complete lack of roads means they will remain isolated for some time to come, which will keep outside influence in check. The Eipo are part of the relatively large group of Mek cultures and mutually intelligible languages, and are now aware of the need for political unity and collective action, and so probably stand a good chance of keeping their cultural identity and surviving as one of the populations of the Papuan mountains.

Finally, I hope to have shown that spatial knowledge is embedded in cultural and linguistic practices. This was outlined above as the guiding principle in this book. Spatial knowledge is not only encoded in spatial mental concepts, but also embodied in the lived histories of human beings. These histories are represented by cultural and linguistic practices. Therefore my notion arguing in favor of the influence of non-linguistic information on spatial language and categorization in the beginning of this chapter and indeed the book, has been shown. The selected empirical data points do indeed indicate the influence and even constructive process of

129 See again Heeschen's quote above that "[t]he importance of reference to space, the social context of giving and taking, and references to non-verbal communication shape the content of the vocabulary. The characteristics and peculiarities of everyday interaction and speech follow from the fact that speech is complemented by, and related to, other semiotic systems" (Heeschen and Schiefenhövel 1983: 381).

environmental landmarks and cultural heritage in shaping spatial categorization in the two languages.

The survey of Dene results in a range of intralingual differences varying from one speaker to another (Thiering 2009a). It might therefore be the case that small speech communities such as the Dene and the Eipo lack consistent language patterns over a long period of time because of the absence of norm-giving institutions, e.g., an archival history of written knowledge to preserve language and culture (Heeschen 1998: 24). This could also mean that old expressions of spatial concepts may not be registered and will die out. In other words: "chances that something new is set up as a norm and is handed down over a long period and in many groups, are a lot smaller because of the absence of institutions" (Heeschen 1998: 29). In fact, there are few institutionalized structures that transmit power and authority. I have shown for the Dene case that spatial semantics is exposed to spatial language death of linguistic encoding patterns and practices. These practices, such as hunting techniques and canoe building, are in danger of dying out. This also leads to a loss of spatial knowledge. The Canadian government's control of the Dene's ancestral lands, means that the environmentally-based knowledge systems encoded in different objects such as rocks, trees, paths, rivers etc. are lost for good. In this sense, at least, the Eipo are better off (Heeschen and Schiefenhövel personal communication) and it will be interesting to see how they maintain their cultural and linguistic heritage.

Chapter 7: Closing the stage

7.1 Final comments and outlook

This book started out with the general comment that humans move in space on a daily basis and that as a daily practice, they consciously talk about space, and unconsciously use spatial metaphors. The ensuing chapters supported the idea that humans also impose mediate and immediate spatial relations encoded as symbolic, analogue and digital structures. The claim was that spatial encoding mechanisms are essential prerequisites for spatial orientation, or rather cognitive strategies as a daily routine. Different knowledge systems operate at the conceptual level. These have been understood as underlying categorization patterns of spatial orientation processes in the different figure-ground asymmetries. These are based on various imaging parameters.

I have shown that different semiotic systems play a crucial role in the instantiation of immediate and mediate spatial relations, and that language is just one part of the spatial story, though an important one. My argument was that this spatial story combines, among other aspects, cultural, linguistic and cognitive structures based on mental images and environmental input. The literature shows that humans mark different aspects of spatial scenes, they mentally rotate relationships, they add cognitive contours and they include a variety of aspects based on their knowledge systems, that is, encyclopedic knowledge, declarative and procedural cognitive systems. Therefore it is fair to state that spatial language and spatial cognition are constant, daily companions based on culture-specific spatial mental models. These in turn are shared universally among human beings.

My argument was that the human capacity for constructing and relating objects in space depends not only on objectively given features, but also, if not primarily, on subjective encoding strategies. The hypothesis was that the parallels between language, cognition and visual perception indicate a bridging element between those levels of human conceptual organization. I argued that there is no neutral or absolute construal, but a construal that either mentions the vantage point of the speaker or does not. The speaker's perspective is expressed in some languages, for example, and not in others. I surveyed these assumptions with respect to spatial language and spatial cognition. The constant construal of figure-ground asymmetries follows the general visually-based principles outlined in the stage model. These figure-ground asymmetries are applied in small- and largescale spatial encoding processes in language and in real-life orientation.

More specifically, the book explored the degree to which environmental experience and spatial orientation is reflected in texts, myths, language and practices as joint action procedures. It has been argued that non-linguistic information as cultural practice and implicit knowledge system has an impact on spatial language and categorization. Data was presented which showed the constructive process of environmental landmarks and cultural heritage on mediate shaping of spatial categorization, as well as speakers' choice of immediate spatial construals in figure-ground relations.

Previously published papers were extensively revised to emphasize the focus on spatial language and spatial cognition in general. Consequently, the book examined not just empirical linguistic data on the spatial conceptualization of specific spatial relations, but also spatial practices. I have shown that different coding devices operate in the mastery of spatial orientation and spatial coordination, or, again, "given the fundamental nature and importance of spatial cognition, it is of considerable interest to determine the ways in which it connects to language" (Peterson, Nadel, Bloom and Garrett 1996: 553). My approach was therefore an "investigation into the meaning of spatial language that regards language as an integrated part of human cognition" (Zlatev 2007: 318). To do this I have defined language as a semiotic system similar to practices of joint action. Therefore language, as a semiotic system, externalizes implicit knowledge presentations known as mental models or cultural models. As such, language as a semiotic system is also "an integral part of human cognition".

We have seen that for large-scale orientation and navigation of any kind involves the use of real or imagined landmarks on land and at sea as proximate course-maintaining devices for orientation. These landmarks shape and determine a detailed topographical mental model of the environment as represented via language and various practices. I defined landmarks as any kind of culture-specific environmental reference points. They are point references external to the person. Landmarks are unique, that is, culture-specific configurations of perceptual events. They can identify a specific geographical location. I have shown that a person's account of his/her spatial representation begins with landmarks as reference points or anchors, and these function as the strategic foci to and from which the person moves or travels.

A specific case of moving landmarks that can be construed to the convenience of the traveller was taken from navigation techniques in Micronesian cultures. I argued that landmarks are used as proximate course-maintaining devices in the encoding of figure-ground asymmetries acting in a way that is similar to flip-flop images in visual perception (just as Wittgenstein's duck-rabbit example presented above). It has also been argued that these landmarks shape and determine a detailed topographical map of the environment as represented via semiotic systems, e.g., language and practices.

One aim of this book was to present some fundamental spatial notions based on environmental or regional landmarks as transmitted and represented in different empirical sources to apply figure-ground parsing construals of immediate and mediate spaces in the encoding of spatial relations.

Based on mental model theories, I have shown that these models map spatial structures onto conceptual structures and that spatial mental models specifically represent spatial information at an abstract conceptual level of cognitive representation. They are thus a cognitive layout of the spatial environment and human experience. This experience appears to be closely tied to perceptual systems. Indeed I argued that these spatial mental models are based on gestalt principles which help to mentally triangulate a reference or coordinate system.

Cognition is a mediator between the phenomenological world and the semiotic representation, and spatial mental models are the actual constructing devices or rather abstract mental representation of the projected world or "the real world".

I have argued that linguistic cues are symbolic systems reflecting patterns of thought, but that they do not mirror conceptual representations. Jackendoff brings this argument forward, claiming the existence of a projected or mental world (Jackendoff 1983: 23–29). So: cognition is a mediator between the speaker and the phenomenological world.

The claim that culture through language acts upon cognition has been a subject of renewed discussion since the early 1990s. The Sapir-Whorf theory (or, since the 1990s, the Neo-Whorfian theory) raises epistemological questions regarding different coding systems and their relation to cognition. How do languages influence or even determine the shaping of cognitive structures?

I believe that language, cognition and culture are interlocked. I argue that language is a form of symbolic encoding pattern based on spatial mental models. As such, languages also follow perceptual, experiential and environmental input. It is not only language and visual perception acting on cognition, but also the obverse, from cognition to language. I support the idea that different languages point to different encoding decisions based on culture-specific spatial mental models. I also argue that different cultures have different strategies for encoding these spatial relationships. Moreover, the different chapters in this book follow the idea that cultural knowledge as symbolic practices, as I call them, is interwoven with cognitive structures and cognitive semantics in particular. The aim was to employ spatial mental models that draw a correspondence between "real world" cues, such as objects and places, and their symbolic equivalents in the models. This, therefore, is a cognitive-cultural view.

As Heeschen and others claim, semantics and more specifically spatial semantics and semiotics have to be viewed as an "inseparable part of knowledge of other kinds of [semiotic; M.T.] conventions and social practices". I believe that the book does show this crucial aspect of spatial mental models.

The actual practices in spatial orientation refer to a number of spatial information systems which are not only linguistically available, but are encoded in actual usages or applications as joint action (for example, collectively house-building in Eipo). In a nutshell, this research addressed questions of universality and culture-dependence of spatial thinking in societies codifying spatial knowledge almost exclusively by means of spoken language and joint action. These questions were approached by comparing spatial languages and practices in two independent non-literate societies, Eipo and Dene, located in a mountainous region (Eipo) and the prairies of Western Canada (Dene), as well as Upper Necaxa Totonac. For the sake of data evidence other languages were also included.

The analytical focus was on the various figure-ground asymmetries and degrees of specificity in spatial language and spatial cognition. The approach based its guiding assumption on gestalt psychology and phenomenological insights which regard visual perceptual processes as embodied. The hypothesis was that different orientation and navigation processes are only partially related to universal gestalt conceptions, also involving subjective decision patterns. Other components are operating, known as *subjective constructions* (or intersubjectivity, as Zlatev argues with respect to Husserl; cf. Zlatev 2010, also Zlatev personal communication). I claim that the bridging element between visual perception or rather spatial cognition and spatial language is *embodied cognition*, or the bodily basis of meaning in constant interaction with the environment (Gibson 1986). This element might be a crucial mediator between the two information levels or modalities (Johnson 1987, but see Zlatev 2010 for a crucial criticism on Johnson). This bodily basis acts in favor of gestalt psychology approaches that argue the existence of perceptual constraints in visual perception. I also argue that the later Wittgenstein, in the second part of his *Philosophical Investigations*, presents a clear alternative to the *Körper/Leib* discussion (or body schema vs. body image, in the words of Gallagher 2005). He does not see a dualism, but rather an interchanging (or, as I argue, interfeeding) system which instantiates visual subject/object relations. This is the idea of a constant shift of meanings as known from ambiguous figures or flip-flop images. These relations are not dyadic, but triadic as Bühler points out (Bühler 1999).

I argue that the very fundamental figure-ground dichotomy in visual perception helps to categorize the world at large, it thus favors a cognitive semiotic approach. Merleau-Ponty argues that

> [j]ede äußere Wahrnehmung ist unmittelbar einer bestimmten Wahrnehmung meines Leibes synonym, so wie jede Wahrnehmung meines Leibes sich in der Sprache äußerer Wahrnehmung auslegt. […] Die Theore des Körperschemas ist *implicite* schon eine Theorie der Wahrnehmung. (Merleau-Ponty 1974: 242)

If every external visual perception ("jede äußere Wahrnehmung") is synonymous with an immediate, specific visual perception ("unmittelbar einer bestimmten Wahrnehmung meines Leibes synonym") then we see the (inter)subjectivity between the observer and the observed and his/her construction of the particular construed stage constellation.

More specifically, we have seen that figure-ground relations are sometimes linguistically reversed, as they are visually (flip-flop images). It seems that they do not only follow perceptual cues, i.e., a larger entity can serve as a reference for a smaller entity (Koffka 1935: 178). It has also been claimed that visual perception is indeed more than objective figural grouping, for example, based on geometric properties. The decision to encode a figure or a ground in a particular staged constellation depends on the speaker's choice of what s/he regards as foregrounded or backgrounded. It is a relatively subjective construction. It also depends on the object's affordances (see Bredekamp's *Bildakttheorie*, 'picture or image act'; 2010)[130]. Interestingly, the examples presented show rather subjective and pragmatic decision patterns in construing figure-ground relations. Arguably, these patterns are based on the body image (and body schema; cf. Gallagher 2005). This should come as no surprise since the literature claims that speakers ascribe subjective and functional properties to objects (Labov 1973; Rosch 1973, 1977, 1978). These subjective differences are shown in the variations in gestalt configurations, that is, perceptual relationships or, as shown here, linguistic ones. This indicates an interplay of universal perceptual mechanisms and linguistic specifications which might

130 Bredekamp highlights that speech act theory is to a certain extent a predecessor of his picture act theory, but argues convincingly that language is only one significant semiotic system.

differ from figure-ground relations. Again, this interplay may be represented on the intermediate level which has been termed embodied cognition that is combined with distributed cognition. This has been seen in the orientation techniques of dead reckoning practices of large-scale spatial navigation.

Some aspects of spatial cognition are culture-specific, being shaped, for instance, by culture-specific practices of spatial orientation and organization. Practices of space are known from Michel de Certeau's theory entitled *The Practice of Everyday Life* (de Certeau 1984). He argues that practices of space should be the focus, and not structures of organizations of spaces. Moreover, with respect to the cognitive semiotic approach presented, language and practices play a dual role as external presentational behavior of joint action (Tomasello 2003: 21–31; Bredekamp 2010 on the term 'presentation' as opposed to 'representation'). The examples presented shed light on structures of cognitive behavior as presented in language and practices while also indicating the shaping of spatial cognition and influencing its structure. Arguably, some structures might be candidates for universals based on gestalt principles although they may find different expressions and practices in different languages.

We have seen aspects of spatial topography, landmarks, frames of reference to name just a few, that are truly culture-specific in the sense that unrelated cultures develop different cognitive structures based on, for example, different environmental coordinates and spatial practices.

Examples were provided in the form of deixis, other frames of references, toponyms, and landmarks to and conceptualizations of spatial cognition and spatial language. Moreover, the book presented culture- and language-specific ideas of space. Such spatial concepts were seen to be of critical importance in the ethnic groups and related language cousins. Those in the cultures in question live in complex and contrasting environments, travelled long distances into dangerous terrain and usually made their way back safely. Survival in their habitats depended on evolved capacities typical of human beings efficiently managing orientation and navigation in space. Moreover, it depended on ontogenetic learning about geography with its many specific features and on a culturally transmitted, linguistically encoded spatial reference system sufficiently precise to foster the process of forming mental maps of their land. Linguistic information about the encoding of such spatial concepts was provided. These concepts are topography-based and related to environmental landmarks. These landmarks can include mountains, rivers and lakes, as well as one's own experience walking to and from various distant places. They can also be culture-specific practices and techniques, e.g., Eipo society's construction of gardens, hunting and snaring in high altitudes and the partly ritualized process of building a men's house, and hunting in Dene society.

For the Eipo and the Dene as for any other culture, spatial classification implies locating the objects i.e., defining places is basically deliminating, based on the environment. Speakers parse up their environment into an important and necessary topography or spatial matrix which is represented in the language via a vast matrix of mountain, river and place names (Mark et al. 2011). Eipo and Dene traditional myths function as a chronological topology of places. The description of such components, as Malotki rightfully points out, should include anthropological and cultural aspects of the language (Malotki 1979: 301).

The interrelation between culture, the environment, and language was shown in the chapter on Dene and Eipo. As a result, it can be stated for these two languages that the environment acts on mental concepts which have proven to function and thus upon language and action, which in turn influence the mental construction of space. This is hardly surprising since every language has language-specific affordances, i.e., the semantic content hard-wired into specific morphosyntactic devices and patterns. As such, spatial concepts are linguistically represented and based on the respective language systems. Malotki points out the idea of a Hopi *Raumbild* or 'idea of space' that might be culture and language-specific. It has been shown that such ideas of space are also crucial for Dene, Eipo, and Totonac.

This book has also shown the rich linguistic inventory of detailed spatial concepts encoded in the different cultures. The goal was: a) to show the influence of cultural landmarks on language (and vice versa) and cognition, and b) to present a bridging element between spatial cognition and cognitive mental models. Questions such as "what is culture- or language-specific?" and "what might be candidates for universals?" framed the interest in the different languages and cultures under review. Certain practices, habits, and environmental landmarks have an impact on language (as shown in the selected linguistic examples). The idea here is that languages differ in the way they shape our world perspectives, but I believe that non-linguistic information has an impact on spatial language and categorization (Everett 2013). The current research therefore aimed to show ideas of space as a web of intertwined interaction of language, culture, and cognition.

Heeschen's point of view regarding the reference of space and its relation to semiotic systems is proven (see Heeschen 1998: 381). The data show the influence and constructive process of environmental landmarks and cultural heritage in shaping of spatial categorization in the languages.

Hopefully, it has also been shown that spatial knowledge is embedded in cultural and linguistic practices. This was outlined above as the guiding principle, i.e., that spatial knowledge is not only encoded in mental concepts, but also embodied in the lived histories of human beings. These histories are represented by cultural and linguistic practices. This proves the notion, in the beginning of this book, which argued in favor of the influence of non-linguistic information on spatial language and categorization. The selected empirical data points do indeed indicate the influence and constructive process of environmental landmarks and cultural heritage in the shaping of spatial categorization in the languages.

For future descriptions of spatial relations and ethnogeographic data, this book suggest more extensive use of practices of externalized implicit knowledge, which also serves as a semiotic system just as language does (Bühler 1999).

This book also focused on the semantic detail speakers assign to spatial relations. This is known as degree of specificity in spatial semantics with specific focus on the encoding of spatial topological relations and some examples of frames of reference in Dene and Totonac. Using the elicitation tool developed by Pederson et al. (1998), I outlined the semantic scope of some spatial topological relations in Dene and Totonac. The data indicate a considerable richness of semantic scope in the encoding of topological space in both languages. However the data also reveals crucial intralinguistic variation between speakers, as shown in the chapter on semantic loss.

One observation is that younger Dene speakers use a more restricted and less detailed range of spatial expressions than older speakers. This is shown by the variation span in the degree of specificity. In some examples, a postposition expresses a general topological relation in a way analogous to an English description (cf. Thiering 2009b). This is different from the additional verbal information via classificatory verbs generally used by older speakers. Moreover, attempts by younger speakers to come up with an appropriate expression often fail according to the grammatical restrictions of their language, such as subject agreement or word order. Older Dene speakers, and all Totonac speakers, specify scenes in more detail than the younger Dene speakers, giving additional information on the characteristics and location of figure and ground as well as their relations to each other. Older speakers therefore use a richer vocabulary and semantic variation. Totonac speakers, on the other hand, also show considerable variation, such that nearly every speaker uses a different encoding pattern. Speakers profile various spatial figure-ground alignments as static, but some also as dynamic. Strictly speaking these are not topological relations. Different frames of reference were evoked in Dene as well as Totonac.

One argument is simply that spatial meaning relies on social practices or language games. Speakers encode different scenes with different emphasis, i.e., the choice depends on the speakers' decision of what detail is to be profiled. Hence, the zooming-in of the region depends completely on speakers' choices of semantic detail. This degree of specificity is more fine-grained than results from Germanic and Romance speakers (Thiering 2006, 2007, 2009b). The different social practices, as marked via language, present interesting results in intra- and interlingual language variation. Finally, it also seems that the encoding patterns presented are not perspective-free, as Dokic and Pacherie argue with respect to perception (see above).

This book argues that certain fundamental aspects of spatial cognition and topographical coordinates apply to geographic description of ethnogeography as implicit knowledge structures. Some aspects of spatial cognition are culture-specific, being shaped, for instance, by culture-specific practices of spatial orientation and organization. In this project, language, texts, pictures, monuments perform a dual role as external representation. On the one hand these sources shed light on structures of cognition; on the other they indicate fundamental structures of knowledge (i.e., spatial mental models or frame-system theory) in shaping spatial cognition and influencing its structure. It is assumed that different data points from a broad range of sources lead us to our ethnogeography. This theoretical point of departure attempts to distinguish some basic aspects of spatial cognition in ethnogeography.

We have seen aspects of spatial topography that are truly culture-specific in the sense that different cultures develop different cognitive structures and strategies based on different environmental coordinates, that is, culture-specific spatial mental models. Examples of concern here are deixis and other references to and conceptualizations of space, but also landmarks, wind direction, measurements, spatial data and other reference systems. Moreover, the book presented culture- and language-specific ideas of space in the language users' world conception of spatial, or geographic representations. These spatial concepts are shown to be of crucial importance in describing spatial mental models as cognitive representational systems which entail different forms of implicit and explicit knowledge. We have seen that these systems can be very powerful, as is the case with dead reckoning practices.

People can live in complex environments, travel long distances into sometimes dangerous terrain and usually make their way back safely (as do the Eipo, and Micronesian seafarers using dead reckoning systems). Survival in their habitats depends on evolved capacities typical for human beings in efficiently managing orientation in space via mental models. Moreover, it depends on ontogenetic learning about the geography with its many specific features and on culturally transmitted, linguistically encoded spatial reference systems sufficiently precise to allow the formation of cognitive maps of their lands and seas. These concepts are topography-based and related to environmental landmarks.

People parse up their environment into an important and necessary topography or spatial matrix as a cognitive map which is represented in the language and practices via a vast matrix of mountain, rivers, streets, buildings and place names. The parsing up into degrees of specificity shows this process. Traditional stories, myths and other text forms function as chronological topologies of places, that is, they encode common-sense geography. The description of these components, as Malotki rightfully points out, should include anthropological and cultural aspects of the language (Malotki 1979: 301). These aspects do indeed find their way into the culture-specific mental models.

As a working hypothesis, it is assumed that the environment influences mental concepts which have proven to be functional, and thus on language and action which in turn influence the mental construction of space. This should come as no surprise since every language has language-specific affordances. These affordances are again the semantic content hard-wired into specific morphosyntactic devices and patterns. As such, spatial concepts are linguistically represented and based on the respective written language system.

The goal was to show the influence of culture on language (and vice versa) and cognition. Certain practices, habits and environmental landmarks have an influence on language (as has been shown in the linguistic examples). My insights mirror Humboldt's idea of *Weltansichten* 'world perspectives', i.e., the idea that the structure of language might influence the thought process (Humboldt 1963a,b; Levinson 2003; Thiering 2013; Trabant 2012). Again, in North America, this concept is known as the linguistic relativity principle or Sapir-Whorf theory (cf. Lucy 1992a,b, 2014; Levinson 2003; Levinson and Wilkins 2006; Thiering 2013b). Here I support the idea that languages differ in the way they shape our world perspectives, which is hardly new, but I believe that non-linguistic information, i.e., implicit knowledge structures has an impact on spatial language, and cognitive strategies of spatial categorization. Therefore, the current research aims to show ideas of space as a web of intertwined interaction of language, culture, and cognition.

Hopefully, it has been shown that spatial knowledge is embedded in cultural and linguistic practices. This was outlined above as the guiding principle. Spatial knowledge is not only encoded in mental concepts, but also embodied in the lived histories of human beings. These histories are represented by cultural and linguistic practices. Hence, the notion in the beginning of this book arguing in favor of an influence of non-linguistic information upon spatial language and categorization has been shown. The selected empirical data points indicate indeed the influence and constructive process of environmental landmarks and cultural heritage in the shaping of spatial categorization in the two languages.

Finally, I would like to digress to broach a critical issue involving languages with non-written or rather oral traditions. Foley believes that Papuan societies had no political structures which could enforce moral or legal sanctions for antisocial acts (Foley 1986: 16–17). This is an extreme interpretation of Papuan societies which were not, in fact, entirely without political institutions and leadership. It seems that the power of orally transmitted tradition is highly underestimated, especially from the point of view of the Western, written tradition. Certain traditions and rituals are joint actions, performed over and over again, and it is likely that this transmission of knowledge is as powerful as any written system. This can be seen in Eipo traditions and practices, such as the construction of houses and bridges, and in certain hunting habits, e.g., building complicated traps.

The actual conceptual matrix of a house shows a rather complicated semiotic system of architectural structuring combining posts, floor, wall, fireplace and roof, all carefully bound together to form a stable functional unit. It is remarkable that Eipo culture has maintained this tradition without a written format from one generation to the next, most probably since time immemorial. Building the sacred men's house, the largest and most elaborate example of Eipo architecture, was an act embedded in ritual and a striking proof of this kind of knowledge embodied in action. This book has shown that such embodied actions are seen in crafts, navigational without nautical instruments and other practices. So I will end this book with a quotation from the preface of Janet and Charles Keller's *Cognition and Tool Use*:

> In Cognition and Tool Use, anthropologists Janet and Charles Keller provide an account of human accomplishment based on ethnographic study. Blacksmithing–the transformation of glowing iron into artistic and utilitarian products–is the activity in which they study situated learning [or situated cognition; M.T.]. This domain, permeated by visual imagery and physical virtuosity rather than verbal logic, appears antithetical to the usual realms of cognitive study. For this reason, it pro-

> vides a new entrée to human thought [and hence spatial mental models; M.T.] and an empirical test for an anthropology of knowledge. (Keller 1996)

And Keller and Keller finish their book by arguing that

> [t]he discipline of cognitive science and anthropology today find themselves in the midst of debates that pit one intellectual approach against another and in extreme versions deny the promise of a higher-order intellectual synthesis to be derived from a complementarity of theoretical positions and comparative investigations of empirical settings. […] One form this debate takes in the interdisciplinary field of cognitive science [and cognitive semantics and semiotics specifically, M.T.] is the opposition between symbolic representation and situated activity as accounts of human minds. (Keller and Keller 1996: 171)

My approach is also along these lines. It bridges accounts of spatial encoding strategies with a focus on linguistic semiotic systems and mental models. Hence, there is no opposition between "symbolic representation and situated activity" - and so the stage curtain falls.

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