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Figure-Ground Reversals in Language

1. Introduction

One of the main questions for this special issue concerns the place and role of meaning in perception. This paper addresses this question directly with respect to the role of meaning in spatial semantics and its figure-ground alignments (cf. Zlatev 2007 on spatial semantics). At focus are congruent linguistic patterns of figure-ground reversals, i.e., cognitive features of salience or reference that can be redistributed from primary to secondary image features. Hence, at focus are participants that are construed as foregrounded (being canonically the figure or trajector) as opposed to rather backgrounded anchorage (the expected ground or landmark) and its reversed patterns. This commonly known aspect in Gestalt psychology is not limited to visual processes only, but also applies to linguistic encoding patterns. This will be shown in this paper in a selected sample of languages (see for an application from cognitive mechanisms to verbal reasoning Krumnack, Bucher, Nejasmic, Nebel, & Knauff 2011). It is argued here that the reversal patterns show the human capacity for constructing and relating objects in space as depending not only on objectively given features, but subjective encoding decisions as well. As such, the phenomenon explored here is known as the *degree of specificity* of the figure's location with respect to the ground (Svorou 1993). This degree of specificity is related to the amount of detailed expressive content with which spatial relations are described in various languages. Svorou 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). The latter specification encodes further partitions of the door into smaller regions. Speakers of the two languages at focus are required through their language, 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.

The hypothesis is that the parallels between language and cognition indicate a bridging element between those levels of human conceptual organization. This

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element can be found in *embodied cognition* or *situated embodiment* assumed as a crucial mediator between the two information levels (Johnson 1987; Lakoff 1987, 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* functioning as abstract structures of images. In other terminologies in cognitive psychology *cognitive maps*, *frames*, *mental models* or *scripts* are invoked each with a different focus of knowledge representation. Johnson further argues that these "are gestalt structures, consisting of parts standing in relations and organized into unified wholes" (Johnson 1987, xix; cf. Miller & Johnson-Laird 1976, 47-57 on the relationship between parts and wholes in object perception).[1] 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 & Green 2007, 46).

In approaching this issue various visually based elicitation tools and some of the results are presented. These results indicate figure-ground reversals in spatial semantics and hence some subjective encoding decisions. This is in line with typological approaches following Croft's work, but differs since Croft addresses syntactic issues primarily (Croft 2001). Moreover, the present work presents only two languages at large, hence it is not a typological approach in a strict sense. Note that it is commonly agreed on in cognitive linguistics that languages reflect conceptual structure and that variation across languages encode different conceptual systems (Evans & Green 2007; Langacker 1987; Levinson 2003; Levinson, Wilkins 2006; Talmy 2000; Thiering 2009b).

Ever since Gestalt psychologists developed theories of perceptual constraints on visual perception the extent to which language and hence symbolic function has an impact upon construing 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

[1] It should be noted here that Johnson explicitly attacks objectivist theories of meaning claiming, e.g., 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).

basis of our brains (and added here the *body*). Hence, perception is a mediator, and mental models are the actual constructing devices or rather abstract mental representation of "the real world" (Johnson-Laird 1983; Krumnack et al. 2011; Minsky 1994).

The cognitive semantic approach following Langacker (1987), and Talmy (1978, 1983, 2000) adopts the figure-ground asymmetry (or Langacker's technical term trajector-landmark[2]) and uses it for cognitive linguistic analysis. Broadly the distinction generally often follows the syntactic division into subject and object of a sentence, but not always (Langacker 1987, 231). This paper presents data from perceptual elicitation tools used on a variety of languages some with a non-written tradition with only the data of the latter presented here. As it turns out so-called figure-ground relations are very often linguistically reversed and do not follow perceptual or objectively given clues (cf. Dokic & Pacherie 2006, 268 on the differences between perceptual and linguistic spatial representations). Hence perception is indeed more than figural grouping, but extends to the formation of shapes and linguistic meaning. This is interesting with respect to the relationship between language, cognition, and perception in general. If linguistic figure-ground reversals are found it may then be claimed that visual perception is only partially reflected in language (and hence in frames of reference; cf. Dokic & Pacheris 2006 with an extensive discussion on the relationship between frames of reference involved in non-linguistic spatial representation with focus on perception). It will also be shown here that the decision to encode a figure or a ground in a particular scene depends on the speaker's choice of what s/he ascribes as being foregrounded or rather backgrounded. Hence, there is a mismatch between the given gestalt and the linguistic encoding pattern. These patterns are of concern here to argue in favor of rather subjective encoding patterns.

This paper is structured as follows: First, brief background information is given on the cognitive semantic adaptation of the figure-ground asymmetry. Then the different elicitation tools are presented followed by a sketch of the grammars of the two languages at focus, and finally some selected examples and concluding remarks follow. The reader may skip the grammatical sketches since the point of argumentation will be obvious without knowing the grammatical structures in detail.

2. Figure-Ground Asymmetry in Cognitive Semantics

The prominent cognitive linguist Leonard Talmy introduces the figure-ground asymmetry stating that a physical object is located or moves with respect to

[2] 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 here 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.

another object which serves as a reference point (Talmy 1978, 627; cf. also Talmy 1983, 2000). This asymmetry is embedded in *schematization*. Schematization is the process involving the profiling of specific aspects of a reference point of a scene representing the whole gestalt (Talmy 2000, 179; Sinha & Kuteva 1995, 170, 196). 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; cf. Talmy 2000, 315-316).

Langacker defines the asymmetry similarly as "a trajector as the figure in a relational profile; other salient entities are identified as landmarks." (Langacker 1987, 231) He argues furthermore that

> "….[w]ith a few if any exceptions, 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 participants 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).

Clearly, the semantic distinction between the two conceptually based categories reflects the fundamental notion in Gestalt psychology of figure and ground (Koffka 1935, 177-210; Rubin 1921). It is believed here though that the Gestalt psychologist's definition is much more complex and broader than the notions adopted in cognitive semantics. Nevertheless the basic idea of a reference object and an object that needs an anchor is similar.

Conceptually, the cognitive semantic notion is very specific in the distribution of meaning components in a sentence. Talmy shows that arguably 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 naturally. 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 arguing in favor 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, i.e., a non-objectivist approach is favored here (Zlatev, 2003, 332, footnote 3). Hence, the semantic function chosen by the speaker does not correspond to

the world of part-whole partitioning, but language-specific information. This might be due to pragmatics or cultural-specific decisions or biases. This example already reveals that language or rather speakers choose to reverse natural figure-ground asymmetries. The selected empirical evidence presented below supports this observation as well.

Talmy presents a list of various characteristics of the figure-ground asymmetry specifying the relationship such as the figure being of greater concern or relevance (more salient) as opposed to the ground being of lesser concern or relevance (more backgrounded) (Talmy 2000, 316). This semantic distribution is clearly different from the gestalt notion which is rather perceptually based on geometric coordinates (Lewin 1936).

2.1 Frames of Reference

Frames of reference are crucial in the linguistic encoding of spatial orientation and spatial cognition in particular (Eilan, McCarthy & Brewer 1993; Levinson 1996, 126; but see for a critical discussion Dokic & Pacherie 2006). The actual use of the concept refers back to Gestalt theories of perception stating that an organization of units serve to identify a coordinate system with certain properties of objects resulting in a gestalt. With respect to frames of reference, Dokic & Pacherie argue that "perception maybe perspective-free, in the sense that it need not involve any frames of reference" (2006, 259). We shall see in this paper whether this is true for the presented languages as well.

Note that this paper subscribes to the idea that we have to talk about coordinates as construals rather than given objects (Levinson 1996, 126). These coordinates are important for the description of topological spatial relations in Dene and Totonac, as they are for the description of projective relations in general. Thus, human beings instantiate relations between objects relying on various frames of reference which, as the name implies, serve as reference points. A reference point anchors a specific orientation between objects and the viewer (Carlson 1999, 2000, 2003; Carlson & Logan 2001; Carlson-Radvansky & Irwin 1993; Carlson-Radvansky & Carlson-Radvansky 1996; Levinson 2003). These construals are differently encoded in languages, and thus differently grammaticalized or lexicalized, i.e., different grammatical or morphosyntactic components encode the various reference points (see on construals and perspective Verhagen 2007). These linguistic coordinates are as important for the description of topological spatial relations as they are for the description of projective relations in general in the languages presented here (cf. Thiering & Schiefenhövel forthcoming) Those languages are primarily Dene Chipewyan (in short Dene) as an Athapaskan polysynthetic language spoken in Alberta, Western Canada, and Upper Necaxa Totonac which is a Totonacan agglutinative language spoken in Mexico.

Following Malotki (1979), the term linguistic coordinate here means the division of a spatial configuration into a speaker, a hearer, and a third part (a person or a thing the speaker-hearer refer to; cf. Bühler 1934; Ogden & Richards 1923). Hence, a linguistic coordinate system is not a geographical or mathematical abstract concept only, but a means of spatial configuration in the linguistic encoding. The encoding of spatial relations depends on certain spatial (and temporal) parameters that set the linguistic coordinate reference system for the speaker-hearer.

It has been highlighted so far that spatial marking is based on the instantiation of three different reference frames to be selected from. These are assigned to the objects profiled in the situation (Carlson 1999, 2000, 2003; Carlson & Logan 2001, Carlson-Radvansky & Irwin 1993; Coventry & Garrod 2004; Levinson 2003). Dokic & Pacherie highlight that the use of frames of reference "involves different cognitive abilities" (2006, 264). Those distinctions into frames of reference are not absolute or clear-cut. These are highly idealized classifications that can intersect with each other. Nevertheless, frames of reference do have the advantage of spelling out the specific semantic functions and imaging parameters of language and the construer in particular to show the often highly subjectivized construction mechanisms. Grabowski proposes the following situation: a car driver drives along a road seeing at a certain distance a car 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 appearing 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 placed 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, i.e., intrinsic. *In front of the beetle* can therefore also mean something like the location of the car's fore-front which is *behind* the actual 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 here: the intrinsic and the relative.

The three frames of reference divide into (a) a viewer/ego-centered or relative frame as in the English example *he's to the left of the house* (assuming that, for example, from the perspective of the viewer, a person is situated at 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*. (Carlson-Radvansky & Irwin 1993; Carlson-

Radvansky & Carlson-Radvansky 1996; Carlson 1999; Carlson & Logan 2001; Carlson 2003; Dokic & Pacherie 2006; Levinson 1996, 2003; Levinson & Wilkins 2006).[3] 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.[4] Finally, the absolute frame (c) is a fixed direction provided by, e.g., cardinal direction. More specifically, Levinson presents different classifications such as (a) *the ball is in front of me* (the coordinate is the origin of a speaker, i.e., deixis/relative, the speaker is the ground), (b) *the ball is in front of the tree* (the coordinate is again the speaker, i.e., a deictic reference), (c) *the ball is in front of the chair* (the ground is now the chair, i.e., an intrinsic encoding pattern), (d) *the ball is in front of the tree* (the speaker is the origin of spatial anchorage and the ground is the tree), (e) *the ball is to the left of the chair* (relative relation depending on the speaker's origin), and (f) *the ball is north of the chair* (an absolute relationship independent from the viewer) (cf. Levinson 1996, 134-138, 149; note that Levinson proposes some primitives to describe this kind of coordinate system such as figure (trajectory), ground (landmark), viewpoint, anchor point etc.; cf. Levinson 1969, 14).

The following examples in (1) give an idea of the variation in different languages (a-g elicited by the author).[5]

1.

(a) FIG LOC GND POST=STAT[FIG] Dene
k'es gáh yaltikóe ho–?a
poplar close/near/beside church IMPF.3SG.S-SO.stand(exist; to have extension)[6]
'The poplar stands beside the church.'

[3] See Table 4.1 in Levinson summarizing a number of different concepts and definitions with respect to spatial reference (Levinson 1996, 127).

[4] An anonymous referee raised the problem that being *in front of the house* may also imply looking at the house, i.e., the person stands in front of it and not behind it. The referee argues that this is independent of the location of the front door as reference point (which is against an objective-centered frame). See also Dokic & Pacherie arguing in favor of the referee's objection that none of the three kinds of frames are essential perception (2006, 269-274, and the Figure on 277).

[5] The first line presents the concepts in small capitals (as all technical terms). The second line in italic presentation presents the actual elicited response from one or a number of speakers followed by the third line parsing the response into grammatical meaning. The last line is an English translation. Note that an additional line is added for the Totonac data parsing in more detail the grammatical information. The grammatical concepts used are adpositions (ADP), body parts (BP), classifiers (CLS), classificatory verb system (CLV), determiners (DET; e.g., *the*), dynamic or motion (DYN), existential verbs (EXIST, e.g., *to be*), future (FUT), ground (GND), figure (FIG), imperfective (IMPF), locative (LOC), nominalizer (NM), perfective (PERF), possessive (POSS), singular subject (SG.S), stick.like object (SO), support (SUP), and posture verb (POST, e.g., *sit, stand, lie, hang*).

[6] The prefix *ho-* also encodes an area or a place (Cook 2004, 174). As Cook points out this prefix remains ambivalent in its exact meaning.

(b) FIG LOC GND [ʔ]POST=STAT[FIG] Dene
k'es ʔuzi yaltikoe ná–ghí–ʔa
poplar on.the.other.side.of church in.place.of[ʔ]-IMPF.3SG.S-SO.stand(exist; to have extension)
'The poplar stands on the other side of the church.'

(c) GND LOC FIG [ʔ]POST=STAT[FIG] Dene
lamékóe k'edhe k'es ná–ghí–ʔa
church alongside poplar in.place.of[ʔ]:IMPF.3SG.S-SO.stand(exist; to have extension)
'The poplar stands alongside of the church.'

(d) GND LOC FIG [ʔ]POST=STAT[FIG] Dene
yaltikóe ghá k'edhe k'es ná–ghí–ʔa
church close/near/beside(physically)/alongside poplar in.place.of[ʔ]. IMPF.3SG.S-SO.stand(exist; to have extension)
'The tree stands close/near/beside/alongside of 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, p.c.)

(i) POST LOC[CARDINAL] LOC[ADP] LOC[PROJECTIVE] GND FIG Tzeltal
tekel-Ø talum te mexa-e
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[PROJEC] 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 & Verhelst 2006, 507)

The results in (a-c, possibly also d) indicate the speaker's use of a particular kind of contextualized intrinsic frame of reference (Levinson 2003; Levinson, Wilkins 2006). It does not encode an *in front of* (*nadaghe* in Dene) relation of the primary to the secondary object. This is different to English, Norwegian, German, and Dutch (15e-g, j) which use a relative frame of reference (the human body or viewer's location being the anchor for orientation). Dene speakers rather encode a 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 (cf. footnote 5).

An intrinsic frame of reference expresses more specifically the figure's orientation. Such expressions are generally called non-biased geometry as opposed to a biased geometry (Talmy 1983, 240). In expressions based on a 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. The scope is important in Langacker's stage model (Langacker 1987). It implies that the scope of the figure to be localized depends on various different 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, distance etc. This stage enables the speaker to set a coordinate system which helps to construe different asymmetries. As is argued here those different frames conceptually construe different gestalts based on language-dependent features. An interesting example with respect to the variation of frames is the navigational system of some Micronesian seafarers. They clearly 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 here, this cognitive map is a schematization as a gestalt. This gestalt serves as a coordinate system for the respective seafarer. The seafarer construes with only a number of anchor or reference points a cognitive map to travel between islands without any nautical instruments. Beside practical knowledge, they use orally transmitted knowledge of the various qualities of the sea, e.g. riffs, currents, winds, and between 50 to 100 islands which all determine the journey. Understanding those techniques is only possible by assuming cognitive maps to be mental models based on Gestalt principles. Hence, a single information input is needed only to construe a complete gestalt.

2.2 Elicitation Tools

In the following section, three of the elicitation tools are presented. Note that only data from one of the tools will be presented, but summarizing the rationale of the tools gives an idea of the reasoning of the protocols. All of the tools are visually based to elicit the most basic notions of spatial relations such as topological, deictic, or reference frame information.

2.2.1 The Topological Relational Markers Picture Series

The Topological Relational Markers Picture Series (henceforth TRM) by Pederson, Wilkins & Bowerman (1998) consists of a set of 71 simple black and white line drawings. The general idea is to identify how various languages encode the system of spatial topological relations, and to determine the semantics of these spatial relations. This test is developed as a controlled means to elicit language data without resorting to translation equivalents thus enabling a field linguist to begin exploring 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 to encode topological relations cross-linguistically for detailed typological comparison. For elicitation purposes, Pederson et al. (1998) ask for a minimum of 3 speakers. In terms of a valid cross-linguistic comparison, they propose a number of 10 speakers. In my study, 14 speakers of Dene Chipewyan, an Athapaskan language spoken in Western Alberta, Canada, and 4 Upper Necaxa Totonac speakers were interviewed. For purposes of cross-linguistic comparison, I also ran this task with speakers of Indo-European languages, e.g., English (10), German (10), and Norwegian (10). In addition, whenever possible, I have infrequently asked speakers of various other languages to respond to the stimuli such as French (3), Spanish (3), Danish (1), and Swedish (1) (Thiering 2009b). Speakers were asked individually to relate to the displayed objects by answering the question "Where is object X" and hence to relate those objects. The tool thus allows the exploration of how different languages use their linguistic resources to carve up the domain of topological spatial relations. The line drawings are intended to evoke discussion on how the depicted relationships between objects are linguistically represented. Indeed, the elicitation tool enables the extraction of some information on the gestalt restrictions in various languages with respect to topological spatial relations and specific frames of reference.

2.2.2 The Caused Position Test

The Caused Position test developed by Hellwig & Lüpke (2001) is a follow-up study to the TRM test. It is also designed to elicit locative descriptions. It primarily aims to exhaust the verbal elements used to express location as in *sit*, *stand*, and *lie* and the causation of displacing an object. Hence, the focus is on the

role of an external agent and dynamism in the different usages of positional verbs in locative constructions (Hellwig & Lüpke 2001, 126). It is developed to reveal the inception of positions between figures and grounds in 46 short video clips. The consultant is asked to describe the displayed scene, e.g., someone putting an object such as a ball, rope, or bottle of wine on a table, the ground, or in a tree. These video clips are contrasted with static clips in which objects simply appear without a causer, i.e., an object is shown independently of an event. After each initial description, the researcher may prod the speakers for other possibilities.

2.2.3 The Spatial Categorization Elicitation Test

The Spatial Categorization Elicitation Test developed by the author is based on 95 short video clips (approximately 10 seconds per clip) presented in random order. As a set, they exploit and exhaust only some imaging parameters for a given scene and include the various manipulations of a wider range of 'natural' objects in different situations including varying surfaces, e.g., water, table, ground. The parameters are figures of various shapes, sizes, and material construction. Moreover, the perceiver or conceptualizer, the scope, scale and distances of the figure-ground asymmetries are important coordinates. In addition, deictic, vectorial and general spatial information is covered (based on Langacker 1987, 2000; Talmy 2000). Various visual situations have been developed 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 (birds-, leaves-, boat on water). Three different viewing distances are used to extract the semantics of different deictic perspectives: (a) proximal, (b) medial, and (c) distal. Furthermore, different numbers of objects are manipulated, e.g., by putting one or more objects on or into a vessel or placing it somewhere 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 imposed to reveal insights into the frames of reference used by speakers.

2.3 Notes on the Grammatical Structures

The two languages at focus in this paper are Dene Chipewyan (in short Dene) and Upper Necaxa Totonac (in short Totonac) and will be briefly introduced here with respect to some relevant grammatical structures.

2.3.1 Upper Necaxa Totonac

Totonac is spoken in East Central Mexico by about 3,000 speakers. Like Dene (see the next section), though not polysynthetic, Totonac is a morphologically complex agglutinative language which features particularly rich inflectional marking of the verb (Beck 2004; cf. Levy 1992). Verb stems are inflected for

subject and object agreement. There are four aspects (imperfective, perfective, perfect, and progressive), and three tenses: present (not marked), past (prefix *i[-*) and future (marked by the prefix na-).

Totonac has a wide range of valency-altering affixes which include 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. Body parts are of special interest since they encode spatial relations in addition to posture verbs. The prefixation of body parts resembles noun incorporation, but only special prefixing combining forms of body part roots may be incorporated. When these roots are incorporated, they serve to delimit the verb's locus of affect, that is, they indicate which part of the subject or object is affected by the action.

The next section provides a more detailed description of the Dene verb structure.

2.3.2 Dene Verb Structure

The Dene verb morphology is polysynthetic and fusional with a rich prefix system (cf. Boas 1997; Buschmann 1855; Morice 1890). Subject and object prefixes are fused within the verb construction and specify qualitative features of the figure (Cook 2004; S. Rice 2002, 66ff.). According to traditional accounts, the Dene verb consists of a verb theme (the basic lexical entry made up of a stem and one or more thematic prefixes) and additional prefixes (Li 1946; K. Rice 1989). The general encoding pattern in Dene indicates that the language features a predominant and consistent classificatory verb system including directional prefixes as well as a postpositional inventory (on the general structure of the Athapaskan verb stem system see Cook 2004; Kari 1979; Li 1946; McDonough 2000; K. Rice 1989; S. Rice 2002). Such verbs have different morphological forms depending on the object to be encoded. Hence, their stems change depending on shape, scale, size, animacy, and/or physical features of the object being located or handled (S. Rice 2002, 69).

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

These stems profile existential situations or actions of certain categories of objects (Davidson, Elford, & Hoijer 1963).

Since the Dene verb stem changes according to the quality of the figure, i.e., different shape, size or the animacy of the objects to be encoded determine the choice of verb stem. This is a more specified semantics in comparison to posture verbs such as *sit*, *stand*, and *lie* which do also encode qualities of the objects being encoded. Only certain objects can lie or sit, e.g., a pen lies (horizontally aligned

to the ground) on the table (German: *Der Stift liegt auf dem Tisch*.), but a cup sits/ stands on the table (German: *Die Tasse steht auf dem Tisch*.). The difference depends obviously on the amount of physical contact between the figure and the ground.

The verb construction or verbal complex is conceived of as a so-called bipartite structure, i.e., the verbal complex consists of two zones: one is grammatical, the other lexical. In the Athapaskan literature those zones are called *conjunct zone* (with grammatical prefixes) and the *disjunct zone* (with lexical prefixes) containing a number of positions attached to the verb stem. The positions 1-4 are the satellites, and positions 5-10 are the pre-stem positions (McDonough 2000). Valency classifiers in position 10 indicate the transitivity and voice of the verb, i.e., whether the subject takes a direct object or not. These classifiers mark the valency of the verb. Table 1 presents the different zones and lexical or grammatical slots.

P P	AD V	ITER	INCOR P	PRON 3SUBJ	OBJ	MOD E	ASPEC T	1ST/2ND SUBJ	CLASS	STEM
1	2	3	4	5	6	7	8	9	10	

Table 1: Template of the Dene Verb Prefixes + Stem (Li 1946; McDonough 2000; Rice 2002)

This short introduction into the grammars of Totonac and Dene will suffice to read the following examples. It is not necessary to go any further into the intricacies of the grammatical structures. What is at focus here is the main division into subject and object or figure and ground. Again, these are not synonymous as will be presented in the following section.

3. Figure-Ground Asymmetries

The following section presents some empirical evidence showing 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?" asks for an appropriate response. It is hoped here though that a first glimpse into the intricacies of various gestalts as linguistically constructed give some leeway to some general interpretations on the categorization processes involved in the encoding of figure-ground relationships. For the purpose of this paper, only data from the Pederson, Wilkins & Bowerman (1998) elicitation tool are presented. Before giving rather odd examples of figure-ground reversals, canonical asymmetries are presented to show the general structure of spatial semantics in a variety of languages.

3.1 Canonical Figure-Ground Relationships

Following the objects' various alignments as displayed in the TRM study, spatial topological relations are defined as static locations between objects specifying

an objective space. A special case here are topological spatial relations relying on geometrical properties which are supposedly speaker-neutral with respect to perspective. This paper follows Lewin's definition of linguistic spatial topology regarded

> "[…] as the most general science of spatial relations. It is 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 show parallels specifically to Köhler. Especially the part-whole relationship cited here resembles the figure-ground asymmetry as introduced above (cf. Pinna 2010). Using this definition on topological relation on languages it is evident that, in English (and most Germanic and Romance languages) for example, such relations are expressed by prepositions. These markers encode verticality such as *at*, *on*, *in*, *over*, *under*.[7] Horizontal relations such as the projective relations *beside*, *right*, *left* are also encoded, but evoke frames of references that are strictly speaking only partially topological, if at all (cf. Levinson 2003). Moreover, the inner space, e.g., *in*, *inside*, as opposed to the space outside, e.g. *at*, is a spatial parameter encoded via adpositions (Herskovits 1986; Svorou 1993; Thiering 2009b). These relations are assumed to be cross-linguistically universal and neutral regarding, e.g., direction, scale, scope, and orientation.

Pederson et al. (1998: 1) point out that topological relations have certain characteristic features. With respect to the figure-ground asymmetry such features are +/– contact, +/– inclusion, +/– adjacent and functional relations like +/– support and +/– containment (cf. Herskovits 1986; Svorou 1993). In addition to these features: a range of prototypically assumed topological relations is summarized in Table 2 following Miller and Johnson-Laird (1976, 380-391) and Svorou (1994, 128-155).

[7] See Herskovits (1986, 123-201) discussing projective relations such as *left* and *right*, but also geometrical encodings of different coordinate systems (cf. Svorou 1993, 54-85; Vandeloise 1991, 210-234; 2006).

	FIG-GND asymmetry	Description
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)
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 either 1-D (a line) or 2-D (surface)
at	FIG *at* GND = at(FIG, GND): referent FIG is *at* GND: inclusion/coincide(FIG, region(GND))	FIG is near of 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
near	FIG *near* GND	FIG and GND are separate and FIG is located internal to the space z which is contiguous with GND

Table 2 : Various Topological Spatial Relations based on Germanic Languages

The table presents four relational situations between a figure and a ground aligned by a locative marker, i.e., *in*, *on*, *at*, and *near*. Depending on the particular alignment between the figure and ground different locative markers are chosen. Herskovits presents elementary spatial concepts as "ideal meaning" (Herskovits 1986, 55). She discusses five spatial concepts such as (1) topological, (2) geometrical, (3) physical, (4) projective, and (5) metric. Following Herskovits, topological relations are represented in English by prepositions such as *at*, *on*, and *in* (dimensionality), or *across* and *through* (boundedness) (cf. Miller & 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 are *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" (Herskovits 1986, 56). Hence, these are rather idealized formulas that capture the semantics of a locative morpheme only.

The languages under survey differ from such an idealization simply because of the scattered semantic distribution of spatial content across a construction and the various degrees of specificity (as introduced above). Hence, the spatial information cannot be pinpointed to a single morpheme only, but to a cohort of semantic information. As such these can be body part expressions and spatial

affixes, classificatory verb systems, case markers (not in Totonac), posture verbs, etc. This implies that the table above illustrates only the case for, e.g., English and German or Germanic and Romance languages in general. Note that German has additional spatial information using the case system, and posture verbs (cf. Thiering 2009b). A rather canonical data set from different languages using some of the above features are presented below.

The following example (2) presents a static spatial topological relation between a figure and a horizontal ground.

2.

(a) FIG POST[STEHT] LOC[AUF] 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[STEHT] LOC[på] GND Norwegian
Kopp-en er/star på bord-et.
cup-the 3SG.S.be/stand on table-the
'The cup is/stands on the table.'

(c) FIG POST[STAAT] LOC[OP] 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, Verhelst 2006, 487)

(d) FIG EXIST LOC[SUR] GND French
La tasse est sur la table.
the cup is on the table
'The cup is on the table.'

(e) FIG EXIST LOC[SOBRE] 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[*asztalon*] EXIST Hungarian
A csésze az asztalon van.
DET cup DET table-sup 3SG.S.be
'The cup is on the table.'

(g) LOC BP[CROWN] GND POST[SIT] 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[KE] LOC[UP]+FIG Dene
bek'esh'ich'elyi ke tsaɨ̨li da-the-ta̯
table on cup up-IMPF.3SG.S-RO.be.situated
'The cup is up on the table.'

All speakers in the examples in (2a-f) encode the figure (here the cup, the third person singular subject) as being located on the horizontal ground (the table). In all the examples, a posture or existential verb and a preposition mark the location of the figure as being situated on the ground. Linguistically interesting is that the verb itself does not give any additional semantic information about the material or shape of the object and is hence rather neutral with regard to perspective. This is contrasted to speakers of Dene and Totonac describing the displayed static scene of a cup on a table in slightly but significantly different terms. In Dene (example 2h), no physical object or figure can be specified without reference to its inherent qualities like its shape, size, scale or configuration (e.g., round, stick-like, flat object), its material (e.g., flexible), its animacy, or 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 & Hoijer 1963; Li 1946; S. Rice 1997; Thiering 2006, 2009b). In Totonac, the spatial alignment is encoded by the body part system (e.g., *crown*) and posture verbs (e.g., *sit*) in particular. Example (2g) indicates a static topological *on*-relation between the figure (*the cup*) and the ground (*the table*). In addition to the usage of an all-purpose oblique locative marker *nak*, the FIGURE is located with respect to a metaphorical body part extension. The morphosyntactic construction profiles the *upper*-part of the figure by means of the use of *a'k pú:n*—the crown of the human head. The posture verb encodes the figure-specific quality that enables it to *sit on top of the table*, hence, three semantic components profile the specific spatial location taking the human body as the perceptual reference point.

However, (2g-h) also show that the Totonac body part structure and the Dene verb stem in itself express more than just the encoding of a static locative relation. Both encoding patterns profile a higher degree of specificity as opposed to the examples in (2a-f). For a Totonac and 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 non-specified perspective in the examples in (2a-f). Hence, topological parameters are only one aspect in the

encoding process. The figure-ground asymmetry in all cases is an expected one, namely a reference is established (the table) serving as an anchor for the figure, the potentially movable object. Additionally, functional and deictic information is encoded. This can be seen by the usage of the postposition expressing a very generic spatial relation. A spatial relation or rather deictic relation is marked in addition to the classificatory verb stem and its directional prefixes, not by a postposition only. Semantic information about the figure is conflated into the verb stem in Dene, in contrast to the generic encoding the figure samples receive in the European languages above.

This short introduction of some linguistic examples shows that Dene requires postpositions, directional prefixes, and often figure-based classificatory verbs, and 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 rather perspectivized constructions, i.e., deixis, and dynamic motion events as opposed to static topological relations only. Moreover, a certain degree of specificity, e.g., being situated *up* and *on*, can be obtained in the spatial encoding, which is again different from the Germanic or Romance examples (cf. Svorou 1993 for a comprehensive and cross-linguistic overview on the degree of specificity). Note again that this degree of specificity is related to the amount of semantic detail with which spatial relations are described in various languages. Totonac and Dene speakers are required through language-specific affordances 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 indeed encoded as dynamic and therefore in a non-idealized manner. Moreover, many of the "natural" relationships are reversed due to pragmatic purposes, or arguably due to specification to foregrounded vs. backgrounded information of the speaker.

3.2 Figure-Ground Reversals

The section above showed 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 which perception does not prevail language, or rather, that different languages and speakers deploy a situation-dependent encoding pattern in which they arbitrarily chose an anchor as reference point which is not necessarily the natural ground. An important technical term needed is the concept of a region. A spatial region profiles the place of the figure and ground. A formal description is given by Miller & Johnson-Laird: REG (x, y) profiles that y is the region (REG) within which characteristic interactions with x are possible (Miller & 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). Clearly, this

definition goes along with 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. Hence, the ground is primarily responsible for denoting the space for the figure.[8]

Note that the syntactic pattern of Dene and Totonac is Subject-Object-Verb. In all examples below the expected object and ground reference point assignment is reversed. Note too that only the odd examples are presented. In many of the cases speakers also used an expected figure-ground asymmetry. But the figure-ground reversal patterns are not exceptions and they do indicate some interesting consequences with respect to Gestalt strategies in the encoding of spatial relations. The first set (3) shows a relationship in which the question is "where is the hose" (which is placed coiled upon a tree stump). Speakers of 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. Also, the speaker in (2a) uses the word *rope* instead of *hose* (there is simply no word for *hose* in Dene). This does not, however, change the selection of the plural object (PO) classificatory verb.

3.
Dene
(a) GND LOC FIG LOC+FIG[CLV]
echichené k'e tl'ule dethe dathela
stump/tree/wood on rope twisted up.IMPF.3SG.S.PO.laying
'On the stump the rope lays in a twisted way (up).'

Totonac
(b) GND BP+POST[MOUTH+SIT] 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.'

Clearly, in both examples speakers decide to highlight the larger background as being the figure (the canonically smaller element), i.e., the stump. With respect to the spatial scene the stump is at focus as the ground, but is profiled as the figure. Speakers chose the stump as the subject, but not the figure in this

[8] 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 indeed the case for the examples given in this paper, i.e., some of these exceptions are shown. Indeed, Sinha & Kuteva argue that it is the ground or landmark allowing for grouping, and not the figure (Sinha & Kuteva 1995, 170). This paper argues for both possibilities.

situation. This is at odds also with the encoding of the classificatory verb system *dathela* in Dene which also profiles the rope, i.e., a plural object (plural (PO) because it is coiled many times). It is suspected that this is due to the fact that it is highly unnatural to place a hose coiled on top of a tree stump. Surely, speakers can produce the expected response in which the hose/rope is the figure, but this is not the natural or spontaneously occurring pattern here. The same pattern is observed with the Totonac set. The hose as the expected subject should appear first in this construction, but does not.

The next set presents a tree standing on top of a hill. The expected figure should be the tree, but again all speakers chose to reverse this idea (14/14 Dene; 4/4 Totonac).

4.
Dene
(a) GND+LOC FIG POST+LOC+FIG [CLV]
shethlae el naghi?a
hill.on.top.of spruce.tree 3SG.SO.IMPF.stand.upright
'On top of the hill the tree stands.'

(b) 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) LOC+GND FIG FIG+POST+LOC+CLV
hotaghe el?aze naghi?a
on.the.side.of.hill/mountain little.spruce.tree 3SG.SO.IMPF.stand.upright
'On the side of the hill the tree stands.'

Totonac
(d) GND BP[CROWN]+POST[STAND]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) LOC BP[CROWN] GND POST[STAND] 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.'

First and foremost it is interesting to see the amount of spatial information that is encoded, especially in Totonac, but also in Dene. The spatial information profiles the degree of specificity as outlined above, i.e., 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 is different from the Germanic and Romance data sets in which usually the figure is or simply stands *on* or *on top of a hill*. No detailed spatial semantics is encoded. The next set shows an interesting scene where a boat is on water. All Germanic and Romance speakers encode the boat on water in a static relationship (cf. Thiering 2009b). Dene speakers profile a dynamic relationship in which the boat or rather the boat's sail moves by the wind, i.e., the causation of movement is specified.

5.
Dene
(a) FIG CV[FIG]
ts'ighe-shul
boatPERF.3SG.S-SO.float(no control)
'The boat floated.'

(b) FIG LOC GND NEUT[FIG]
ts'itusithe-ta
boat into.water IMPF:3SG.S-SO.situated
'The boat is in the water.'

(c) GND FIG GND CV[FIG]
ts'i nibáli t'a ts'i ghe-shel
boat canvas because boat IMPF:3SG.S-motion.because.of.air/blown.along(causation) [9]
'The boat canvas (sail) moves because of the wind.'

(d) GND FIG LOC CV[FIG]
ts'i nibáli k'e ghe-shel
boat canvas on IMPF:3SG.S-motion.because.of.air
'The canvas (sail) moves because of the wind.'

[9] The stem encodes a flexible object which is moved by the wind as confirmed by the following elicited example: *holaɲibale ghe-shel 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.').

Totonac
(e) LOC+BP[MOUTH] GND LOC[INSIDE] FIG
naixhélhni' xká:n tojomá:lh barco Totonac
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) LOC+BP[MOUTH] GND DYN FIG
naxhélhni' xka:n a'ma:lh pu:takítni' Totonac
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) POST[SIT] BP[MOUTH] GND FIG
wi:lh hélhni' xká:n pu:takítni' Totonac
wi:lh hélh+ni' xka:n pu:takítni'
sit mouth+NM water boat
'A boat is on the water.'

The Dene example in (5a) is interesting with respect to the causation of a possible motion of the figure. The spatial configuration of a figure-ground asymmetry is rather secondary as opposed to the dynamic event. Speakers of Dene were 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 displayed in the black-and-white drawings. Hence, a topological relation encoded via *on* is not sufficient here, and the causation of the motion is profiled. In Totonac (5f) also a motion event is encoded in one of the examples. Moreover, the location is specified using body parts such as mouth and posture verbs. This indicates a high degree of specificity of partitioning the region. In all cases a figure-ground reversal can be obtained. It seems that in Totonac the spatial relation is at focus as opposed to the figure-ground asymmetry. In all three cases the rather specific spatial encoding is profiled followed by the ground and figure.

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

6.
Dene
(a) GND FIG LOC[UNDER] FIG[CLV]
bes tles yaghe he?a
knife greasy.substance/lard under 3SG.SO.PERF.covered.in.grease.it
'The knife is covered/under (by) the butter.'

(b) GND FIG LOC[UNDER] FIG+LOC[CLV]
beschok tles yaghe heltther
sword/knife greasy.substance/lard under 3SG.SO.IMPF.fall.into
'The knife falls in the butter.'

Totonac
(c) BP[LAKA] LOC[be.high] 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) GND BP[LIPS]+LOC[be.high] FIG
kuchilu kilhwaká'lh mantequilla
kuchílu kilh+waká'lh mantequilla
knife lips+be.high butter
'The butter is up on the knife.'

In Dene clearly a reversal is encoded. The actual manner is encoded of how the knife falls into the butter. This is odd given the prompt "Where is the butter"? Speakers actually do a gesture using a virtual knife smearing butter onto something. The actual act is at focus, not the actual spatial relationship. Beside the fact that 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). Hence pointing to a task effect is not sufficient for this coherent pattern. Also an explanation that the grammar governs these patterns is not sufficient. 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 scene. The amount of spatial information is specified and shows two different patterns. One is rather specific as in *up on the flat edge* as opposed to *up on high*. This degree of specificity is interesting in comparison to the Germanic and Romance examples where the butter is simply on the knife in a static relationship (Thiering 2009b). Totonac speakers clearly partition the region into smaller and more detailed parts. The next set is similar to the boat example above, i.e., the causation of the figure's motion is profiled.

7.

Dene

(a) GND LOC[ABOVE/OVER] FIG FIG+DYN[CLV]
ttheshéth daghe yak'odhaz gheshel
hill above/over cloud 3SG.go.IMPF.movement.caused.by.air
'The cloud (located above the mountain) moves as caused by the air.'

Totonac

(b)LOC+BP[CROWN] BP[BACK] LOC[BE.HIGH] 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) 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) LOC+BP BP LOC FIG
naxa'kpú:n sipéj waká'lh po'hlhnú'
nak=ix+a'kpú:+nsipéj waká'lh po'hlhnú'
LOC=3PO+crown+NM back be:high cloud
'The cloud is over the hill'.

(e) 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) 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) BP LOC BP GND
lakatzunajtzá waka'lh 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) 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) 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) 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) FIG LOC BP
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)FIG BP+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.'

Dene speakers encode the cloud's motion or rather the motion's causation. The spatial encoding is rather secondary. Also 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 here is the figure's spatial alignment in particular. The different examples (b-l) show the degree of specificity in Totonac. Speakers encode the particular location of the figure being close to or above the mountain.

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

8.
Dene
(a) GND LOC[UNDER] FIG FIG[CLV]
edachene yaghe dzol the?a
chair under ball 3SG.RO.IMPF.situated
'Under the chair the ball is (located).'

Totonac
(b) GND POST[wí:lh] 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) GND POST[wí:lh] 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) GND LOC[má:lh] FIG Totonac
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) GND POST[wi:lh] FIG Totonac
naixtampín silla wi:lh pelota
na+ix+tampín silla wi:lh pelota
FUT+3POSS+base chair sit ball
'The ball sits under the chair.'

In all cases 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 indeed encodes a round object, i.e., the figure. With respect to the language structure the ball should be at first position followed by a locative and then the ground. This is reversed here. Arguably this inconsistency could simply be a mistake by a speaker due to lack of concentration, the influence from the lingua franca (Spanish in Totonac, English in Dene) or simply a lack of language knowledge, etc. But given the fact that these patterns occur frequently with different speakers this explanation seems to be unlikely. It is also rather premature to state anything definite about the relationship between visual

perception, language, and meaning here, but it seems apparent that universal perceptual patterns in the figure-ground grouping are only partially at work here. Indeed rather subjective construction patterns might be at work adding semantic detail to the given spatial relation. This semantic detail as shown in the degree of specificity is the interesting aspect in the various linguistic encoding patterns. It shows the variability of language and language users encoding patterns and the possibility to set focal points independent from physical properties.

4. Concluding Remarks

This paper started with a general question concerning the place of meaning in perception. The focus has been on spatial relations and their semantics showing various figure-ground asymmetries and degrees of specificity. Hence, the central concern has been on spatial semantics and perception. As it turns out some encodings consistently reverse figure-ground patterns as is known in Gestalt psychology. The hypothesis has been that the different figure-ground reversals are not purely coincidental or ungrammatical, but might show some language-specific patterns that only partially relate to universal Gestalt conceptions. Hence, some other components are at work here coined as *subjective constructions*. In the introduction a bridging element between perception or rather cognition and language has been claimed. *Embodied cognition* or the bodily basis of meaning might be a crucial mediator between the two information levels or modalities (Johnson 1987). This bodily basis acts in favor of Gestalt psychologist approaches arguing for perceptual constraints in visual perception.

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. In addition, these categories are reflected in language as subject and object markers. The perceptual elicitation tools presented here have been used on a variety of languages. For the purpose of this paper the focus has been limited to two unrelated languages with a non-written tradition. Figure-ground relations are very often linguistically reversed. It seems that they do not follow perceptual clues only, i.e., a larger entity serves 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 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 ascribes as being foregrounded or rather backgrounded, i.e., it is a rather subjective construction. Interestingly, the examples presented in this paper show rather subjective (or pragmatic) decision patterns in construing figure-ground relations. This should be of no surprise since the literature claims that speakers ascribe subjective and functional properties to objects (Labov 1973; Rosch 1973, 1978). An *a priori* external world is given as physical relative space, itself encoded and profiled differently by speakers and

coined differently by cultures as seen by the various degrees of specificity and the portioning of regions. These differences are shown in the variations in gestalt configurations, i.e., perceptual relationships or, as shown here, linguistic ones. This indicates an interplay of universal perceptual mechanisms and linguistic specifications that might differ from figure-ground relations. Again, this interplay may be represented on the intermediate level which has been coined embodied cognition.

Summary

This paper addresses the question of 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 commonly known aspect in Gestalt psychology is not limited to visual processes only; it also applies to linguistic encoding patterns as will be shown in this paper for a selected sample of languages. It is argued here that the reversal patterns show 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.

Data is presented from a perceptual-driven elicitation tool used on a small number of languages, some with a non-written tradition. A puzzling result is that figure-ground relations are ever so often linguistically reversed and do not follow perceptual or objectively given clues only. Perception is indeed more than figural grouping and extends to the formation of shapes and linguistic meaning. This is interesting with respect to the relationship between language, cognition, and perception in general. If linguistic figure-ground reversals are found, it may then be claimed that visual perception is only partially reflected in language. It will also be shown here that the decision to encode a figure or a ground in a particular scene depends on the speaker's choice of what s/he ascribes as being foregrounded or rather backgrounded. Hence, there is a mismatch between the given gestalt and the linguistic encoding pattern. These patterns are of concern here to argue in favor of rather subjective encoding patterns.

Keywords: Figure-Ground reversal, spatial semantics, embodied cognition, subjective construction, degree of specificity.

Zusammenfassung

Die Frage nach der Funktion von Bedeutung der Wahrnehmung innerhalb der Raumsemantik steht im Vordergrund dieses Artikels. Hierbei werden vor allem Figur-Grund-Anordnungen bzw. deren Vertauschungen untersucht. Dieses wohlbekannte Phänomen innerhalb der Gestaltpsychologie kann ebenfalls auf linguistische Enkodierungen angewandt werden. Dies wird anhand ausgesuchter Sprachen dargestellt. Die Hypothese ist, dass Figur-Grund-Vertauschungen ein Hinweis darauf sind, dass räumliche Relationen nicht nur objektabhängig, sondern ebenfalls subjektbezogen enkodiert werden. Die Idee dabei ist, dass es ein Verbindungselement gibt, das zwischen Sprache und Kognition agiert, *embodied cognition*. Es werden Daten

eines Erhebungsverfahrens präsentiert, die auf eine kleine Anzahl Sprachen angewendet wurden, die jeweils einen nicht-schriftsprachlichen Hintergrund haben. Ein erstaunliches Ergebnis ist, dass immer wieder linguistische Figur-Grund-Vertauschungen stattfinden. Damit stehen nicht unbedingt objektive Stimuli im Vordergrund der Enkodierung. Wahrnehmung ist in der Tat weiter gefasst als das Zusammenfassen von Teil-Ganzen Einheiten zu einer Gestalt. Die Entscheidung der Figur-Grund-Enkodierung hängt von der Auswahl des Sprechers ab, welche Eigenschaften eher im Vordergrund bzw. im Hintergrund stehen sollen. Damit gibt es ein Ungleichgewicht zwischen der gegebenen Gestalt und der linguistischen Enkodierung. Diese Strukturen sind damit im Fokus dieses Artikels mit Betonung auf subjektiven, sprecherabhängigen Enkodierungsmustern.
Schlüsselwörter: Figur-Grund-Vertauschung, Raumsemantik, Embodied Cognition, Subjektive Konstruktionen, Grad der Spezifität.

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