PART ONE

Grammatical Blending - Basic Concepts

Chapter 1: Preliminaries

1.0 Introduction and outline

This dissertation studies a particular type of *cognitive operation* that underlies much of language use. The operation discussed is *Conceptual Blending* (Fauconnier & Turner, 1994): the *integration* of two (or more) separate conceptual structures into a new structure (the *blend*) which combines properties from both input structures but also has some novel properties and structural organization of its own. I develop in the thesis an analysis of sentence processing (generation and interpretation) as a case of conceptual and linguistic blending operations, with grammatical structures serving as formal markers for such conceptual operations.

Much research in cognitive science has been conducted on *conceptual representation.* Any system which performs even very simple cognitive tasks requires enormous amounts of background knowledge. Linguistic symbols, in particular, are assumed to be associated with (and therefore also trigger or activate) some form of conceptual representation. However, not much research has been conducted on how different conceptual structures (associated with different symbols) are *combined* together during cognitive activity. This study focuses on conceptual integration operations underlying the combination of linguistic forms, and in particular the combination of *grammatical constructions* (syntactic and morphological) with *lexical items*. It is assumed that the process of *linguistic integration* parallels a process of *conceptual integration* . The process of language *generation* (whereby linguistic symbols are combined together to form a stream of speech) is motivated by an underlying conceptual integration of mental structures. The process of language *interpretation* involves the “unpacking” or “de-integration” of linguistic blends and motivates a process of conceptual "de-integration".

Linguistic integration of symbols and the semantics of linguistic structures is typically assumed to be *compositional* : the meaning of a whole sentence is a regular function of the meaning of its constituents[1]. A semantic operation is conventionally associated with each *grammatical* element, and is applied to the semantic content of the *lexical* constituents of the sentence. Meaning is equated with *truth-values*, and semantic operations with *logical* operations, following the tradition of Montague grammar (and the basic philosophical concepts of Frege and Tarski).

In this study, meaning (or interpretation) is not equated with truth values, but rather with the content that is communicated (or conveyed to the hearer) by the stream of speech produced by the speaker. Moreover, the stand taken in this study is that interpretation of symbolic linguistic structures is very often not a logical combinatorial process. In the process of language generation, *partial* aspects of a conceived complex event are integrated together conceptually, and represented linguistically by following (to some extent) conventions of linguistic integration. The linguistic conventions themselves may be more or less regular, but they generally leave much freedom to the speaker in deciding *which* aspects of an event to represent, what to leave out, and *how* to integrate the chosen aspects of the event *linguistically*. It is therefore often the case that the linguistic form by itself provides only *partial* information and *initial instructions* to the hearer in reconstructing the communicated event (the interpretation of the sentence). In other words, the linguistic form and its grammatical structure provide to the hearer partial cues (rather than logical deterministic instructions) about how to interpret the input sentence, following the general grammatical conventions of the language. Moreover, sentences very often incorporate

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[1] According to Frege (1884/1959), a language is compositional if "the meaning of a complex expression is a function of the meanings of its parts and the syntactic rules by which they are combined". Langacker (1987:449) interprets grammatical compositionality as follows: "the meaning of an expression . . . is a regular compositional function of the meanings of its parts. For every grammatical rule affecting the combination elements, an associated rule of semantic interpretation is normally posited that computes the semantic value of higher-order structure through an operation on the values of its immediate constituents".

novel patterns of linguistic integration which the hearer has to "decode" independently.

In the interpretation process, *prototypical scenarios* memorized and represented in the mind of the hearer play an important role in *imposing structure* on the partial information provided by the linguistic form. The interpretation of the sentence is thus larger than the semantics conventionally associated with its parts (and is not a regular function of its parts). In this respect, the linguistics framework adopted in this thesis incorporates the fundamental insights of the older Gestalt framework: namely, that human recognition or interpretation involves the imposition of mental structures on input patterns from the environment (the text or piece of discourse in the case of language processing), following general cognitive tendencies (procedural and representational "schemas"), that were entrenched during previous interaction with the environment[2].

In broader terms, this dissertation discusses one form of interaction between grammar and cognitive structure, following a direction of research set up in Cognitive Linguistics, in particular in work by G. Fauconnier on “mental spaces” and “conceptual mapping” (Fauconnier, 1994, 1997; Fauconnier & Turner, 1994; Fauconnier & Sweetser, 1996), A. Goldberg on “constructions” and schemas (Goldberg, 1995), R. Langacker on construal, profiling and constituency (Langacker, 1987, 1991a, 1991b, 1997), G. Lakoff, M. Johnson, and M. Turner on prototypes, image schemas and idealized models (ICMs), metaphors, and the non-objectivist view of semantics (Lakoff, 1987, 1993; Lakoff & Johnson, 1980; Johnson, 1987; Turner, 1986, 1996), as well as many other studies in the framework of cognitive and functional linguistics which will be discussed in the body of

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[2] Note that strictly compositional accounts of language also presume that background knowledge plays an important role in interpretation. However, in compositional accounts, background ("pragmatic") knowledge is typically *added* to the semantic structure of a sentence. The assumption is that sentences have "core" semantics which is independent of contextual knowledge. World knowledge is treated as a secondary information source which may change or enhance the 'basic' semantic structure. In contrast, in the analysis in this dissertation, background knowledge of prototypical scenarios often provide the very fundamental initial cognitive tools to assign basic interpretation to a sentence. Compositionality of semantics is thus just an (ideal) sub-case of general interpretation processes.

the text.

The linguistic analysis is first of all an analysis of language *use* (generation and interpretation) rather than an analysis of abstract entities of "grammar" and "meaning". The goal is to depict to some extent "what is going on in the mind" - the high-level, complex mental operations that take place when we process language. The study should therefore be read as a proposed framework for analyzing the *conceptual* processing of linguistic structures. At various points throughout the study, attempts are made to show the theoretical advantages of the proposed model over more traditional linguistic analyses. The proposed model is also supported by findings on the role of analogical mapping and blending in a wide array of other cognitive phenomena, such as scientific thought, social interaction, poetry, literature, music, and sign language[3].

The study, as implied by the title, examines both entrenched (*schematic*) instances of language use, and creative instances (e.g., in slang, child speech, and the daily extension of schematic constructions to express novel events). An important assumption in the study is that the *same* underlying operations give rise to both the highly structured (well-defined) aspects of language (as studied, for example, in generative grammar) and to its creative dynamic aspects (as reflected in productive, non-conventional use of the language). In particular, entrenched and novel forms of linguistic blending are assumed to lie on a continuum, where novel blends can become conventionalized over time (if used over and over again). For this reason, conventional linguistic blends and novel (nonstandard) blends are analyzed in the same manner (see also section 1.2.5 in this chapter). While I do not suggest that the processing of entrenched ("dead") blends involves each time the reactivation of the blending operation from scratch, I do suggest that the blending operation

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[3] Cf., Freeman, 1997; Moser and Hofstadter, ms.; Oakley, 1995; Robert, in press; Turner, 1996b; Zbikowski, 1997. Other types of evidence (psychological experimentation, computational modeling, neurobiological studies) will be important for the elaboration of these models (see, for example, ongoing research in Coulson, 1997, and Veale, 1996).

involved in entrenched blends can be accessible for conscious reasoning and could become active when necessary (e.g., for purposes of *translation* into another language, when the conventional blends in the target language do not parallel those in the source language, as will be exemplified in chapter 8).

The treatment of conventional and novel blends in this dissertation can be compared to the treatment of "dead" and "novel" (creative) *metaphors* in Lakoff's and colleagues' cognitive theory of metaphor (e.g., Lakoff & Johnson, 1990; Lakoff, 1993). As these scholars suggest, metaphors involve a conceptual *understanding* of one domain of experience in terms of another very different domain of experience. And although conventional ("dead") metaphors are presumed to be *static* correspondences in our conceptual system, this doesn't rule out the possibility that such static correspondences might be used in language processing that involves orderly conscious steps, as evidenced, for examples, in novel extensions of "dead" metaphors (Lakoff, 1992).

A central part of the dissertation (chapters 4-7) involves a detailed analysis of the blending operations underlying a single limited grammatical system: the system of Hebrew verbal patterns (*binyanim*). The analysis provides on one hand a conceptual motivation for the highly rigorous syntactic and morphological aspects of the system, while at the same time also motivating "creative" usage of the system in slang and child language, as well as the system's partial-productivity. In contrast to traditional accounts of the Hebrew verbal system which are based on formal abstract operators, my account emphasizes conceptual processes underlying the generation and interpretation of verbal clauses and the pragmatic role of morphological and syntactic markers in sentence processing. The analysis provides a *unified* account for the Hebrew *binyanim* system and its various grammatical functions, suggesting that a single central conceptual schema of causation underlies the semantics and use of most *binyanim*. Different aspects of the generic causative schema are *blended* with syntactic constructions, and the role of the various *binyanim* is argued to be the formal

marking of these blending operations.

The analysis of blending operations in the Hebrew *binyanim* system has a double aim: On the one hand it sets out to develop and test the adequacy and descriptive power of the grammatical blending framework. On the other hand, it also aims to come up with new insights into Hebrew grammar (particularly Hebrew morphology and the morphosyntactic-semantic interface), with possible implications for Semitic grammar in general. The analysis of Hebrew is compared and contrasted with a similar analysis of blending operations underlying the use of a single syntactic construction in English : the Caused-Motion construction (studied by Goldberg, 1995, and analyzed in Fauconnier & Turner, 1996). At a higher level of abstraction, it is revealed that the blending operations underlying the Hebrew verbal morphological system are in fact very similar to the ones underlying the use of the English caused-motion construction. It is therefore suggested that the English and Hebrew grammatical systems differ only in the formal (grammatical) marking of blends (as well as in their conventions of blending), but not in the type of cognitive operations underlying the processing of each system. The blending analysis thus provides a common ground for analyzing grammatical systems which superficially seem very different (such as English syntax and Hebrew morphology) by pointing to common underlying *conceptual schemas and cognitive operations* that give rise to both systems.

In the final part of the thesis (chapters 8-10), implications of the grammatical blending analysis for issues in translation and computational modeling of language are discussed. In chapter 8, I analyze translation examples from English to Hebrew. I suggest that the translation process requires first a conscious operation of “de-integration” of the source sentence into its conceptual and linguistic input structures, and then a “re-blending” operation of these structures into the target language's constructions. The blending analysis, I suggest, provides a useful descriptive framework for the systematic study of translation data - in particular the study of divergent and unstructured data (what is

commonly referred to as "translation mismatches").

In chapter 9, implications of the grammatical blending analysis for computational modeling of language processing are discussed. The analysis of language use in chapters 2-8 suggests that the processing of even very simple basic clauses incorporates extensive operations of blending of partial linguistic structures. I therefore argue in chapter 9 that a computational modeling of these operations must be integrated at least to some extent into future language processing systems. In addition, I argue that the design of current computational systems is generally limited to the processing of *entrenched* blends only, while the prevalence of real novelty in language processing is largely ignored. Creative blends are often mistakenly treated in computational systems by modifying the permanent knowledge structures, rather than by simulating temporary integration processes of linguistic forms as done "on-line" by language speakers**.**

In chapter 10 is an overview of the main findings in the dissertation (section 10.1). The analysis of blending operations in grammar also serves a starting point for reflection on broader cognitive science issues. Grammar, it is assumed, having both evolved as a product of human cognition and being used on a daily basis to communicate cognitive structures, reflects in its own structure and use more general cognitive mechanisms. Fauconnier and Turner (forthcoming) describe a number of on-going research projects on the role of conceptual integration in general cognition. In section 10.2, I suggest some directions for future research on blending and cognition, and briefly describe a recent paper (Mandelblit and Zachar, in press) which links the view of conceptual blending to general epistemological developments currently taking place in cognitive science.

1.1 The data

The linguistic data for this study come from both Hebrew and English. The Hebrew data is used for analyzing blending and integration operations underlying the use of the Hebrew verbal *binyanim* system. In addition, translation data from English to Hebrew is

used to contrast two different grammatical systems and to analyze the conceptual and linguistic integration and de-integration processes involved in translation from one natural language to another.

The examples in English are from Goldberg's (1995) book on English syntactic constructions (in particular her analysis of instances of the English *Caused-Motion* construction) and from the paper by Fauconnier and Turner (1996). Data on verbal forms in Hebrew were collected from Hebrew dictionaries (e.g., Even-Shoshan, 1975; Bolozky, 1996), from various studies on Hebrew grammar (including studies by Berman, Bolozky, Cole, Junger, and Waltke and O'Connor, see chapters 4-7), and from my own intuitions as a native Hebrew speaker, as well as judgments of other native speakers. Translation data from English into Hebrew was collected from eight Israeli native Hebrew speakers (all fluent in English as a second language).

1.2 Theoretical background

In this section I present the main theories and principles that have guided my research, and are therefore strongly reflected in the linguistic analysis in the dissertation. I will also very briefly mention how each of the theories and principles will show up in my own analysis in the coming chapters.

1.2.1 Construction Grammar and Conceptual Schemas

A basic assumption in this study is the doctrine of Construction Grammar (as proposed by Fillmore, Kay & O'Connor, 1988, Fillmore & Kay, 1993, and Lakoff, 1987, and studied in Goldberg, 1995, and others[4]), the basic propositions of which are also shared by Langacker's Cognitive Grammar approach (1987, 1991). The main hypothesis of Construction Grammar is that grammars of languages are made up of *constructions* - pairings of conceptual schemas with grammatical (syntactic and morphological) patterns,

[4] For a review of precedents to the constructional approach, see Goldberg (1995, ch 10).

and that mastery of language consists of mastery of these form-meaning pairs.

The schemas associated with syntactic patterns represent basic humanly relevant experience such as bodily movements through space, manipulation of objects, and dynamics of force and enablement. These schemas are conceived of as tools for organizing our comprehension and communication and can structure (indefinitely) many perceptions, images, and events (see discussion on *Image Schemas* in Johnson, 1987, or on *conceptual archetypes* in Langacker, 1991). In recent years, cognitive scientists have found strong evidence for the existence of such schemas. Examples include the role of schemas in metaphorical understanding (Lakoff & Johnson, 1980), and as precursors for language acquisition by children (Mandler, 1992, in press).

Goldberg (1995) analyzes the semantics of several particular constructions in English. One of them is what Goldberg calls the *Caused-Motion construction.* Examples of this construction include:

(1) The audience laughed the poor guy out of the room.

(2) Frank sneezed the napkin off the table.

(3) (In the last Star Trek episode), there was a woman who could think people into a different galaxy.

The form of the construction is:

[SUB V OBJ OBL]

where: - V is a non-stative verb

- OBL is a directional prepositional phrase.

The basic sense of this construction is argued to be: 'X causes Y to move Z'.

As Goldberg suggests (following Fillmore and Kay), the syntactic form [SUB V OBJ OBL] has meaning which is independent of the particular lexical items which instantiate the construction. For example, in sentence (1) above, the semantics associated with the linguistic expression (i.e. 'they caused the poor guy to leave the room by (as a result of) laughing at him') is not compositionally derived from the lexical items. That is, the causal-motion sense is not expressed in any of the lexical items by itself. The same is true for the

other two examples. In each one, there is a caused-motion sense, which is not expressed by any of the individual items. The meaning of each sentence is not a combinatorial computation of the meanings of its parts. This construction is productive (see example 3 for novel usage), and its meaning is claimed to be triggered by the language speakers upon hearing the linguistic structure. It is suggested that the construction itself has been derived from the argument structure of *lexical* caused-motion verbs, such as *push* or *throw*. In time, the argument structure has come to have an independent existence as a construction.

As another example, Goldberg analyzes the *Ditransitive Construction* in English, whose form is [SUB V OBJ_1 OBJ_2]. This syntactic patterns is argued to be associated with a basic *transfer* schema: "X causes Y to receive Z". This sense is best demonstrated in the prototypical ditransitive sentence:

(a) I gave Mary an apple.

But also in metaphorical extensions of this basic sense as in:

(b) Mary taught Bill French. (* transfer of knowledge)

(c) Joe refused Bob a raise in salary. (*negation of transfer).

Goldberg concludes that an entirely lexically based approach to grammar and meaning (as proposed, for example, in LFG, Bresnan, 1982) is inadequate, and that independent constructions (such as the one discussed above) must be recognized as existing independently of the particular lexical items that instantiate them. This view also has direct implications for the structure of the lexicon and understanding of polysemy. By adopting the Construction Grammar assumption, (i.e. directly associating some of the semantics of a sentence with the syntactic pattern), we can avoid the necessity of positing ad hoc new verb senses that occur only with these patterns (or argument structures).

The Construction grammar approach will be adopted in this study in analyzing syntactic and morphological patterns in Hebrew (see also section 1.2.5). Both the syntactic and the morphological patterns of the Hebrew verbal system will be defined as independent constructions, but I will suggest that they *differ in the type of schemas* associated with the

grammatical patterns: while the *syntactic* patterns are associated with *semantic schemas* defining *basic event types*, and thus providing *semantic content* to a sentence (in addition to, and independently from, the semantic content provided by the sentence's lexical items), the *morphological* verbal patterns in Hebrew are associated with dynamic *blending schemas*, defining patterns of *mapping and integration* across conceptual (or semantic) structures provided by the syntax and the lexicon. My analysis of *syntactic* constructions in Hebrew also differs a little bit from the tradition in Construction Grammar which has so far studied mainly the *less-prototypical* syntactic forms (cf., Lakoff's 1987 study of the English *there*-construction, Fillmore *et al*.'s 1988 study of the *Let alone*-construction, and Goldberg's 1995 study of the English Caused-Motion and *way*-constructions). In my study of Hebrew, in contrast, I will focus (for the most part) on the "simplest", most prototypical clause structures in Hebrew, such as the basic Intransitive and Transitive constructions, see chapters 4-6).

1.2.2 Construal and Profiling

The approach to semantics in this study incorporates Langacker's fundamental insight (1978, 1991b) that linguistic coding involves the speaker's *construal* of the objective situation in the world, and that sentence generation commonly involves the *choice* of one particular construal over others.

As Langacker (1987, 1991b) suggests, the value of semantic structures reflects not only the content of a conceived situation, but how this content is structured and construed by the speaker. A conceived situation usually comprises many sub-events (or interactions among participants) and only a few of these interactions and participants are made explicit in a sentence (as the speaker constructs a finite clause to describe the conceived event). When we use a particular grammatical structure or morpheme, we select a particular structure for the conceived situation, with respect to such matters as viewpoint, attention, figure/ground organization, and level of schematicity. We are also able to *alternate* between

different construals of the same event (Langacker, 1987:138).

In my analysis of the Hebrew verbal system (chapters 4-7), I will suggest that Hebrew *binyanim* (verbal morphological patterns) are *constructions*, where the morphological pattern is associated with a *construal* function, triggering a particular structuring of the communicated event. When we use different *binyanim* to communicate the same event, we alternate between different construals of the event. The notion of construal will also play an important role in the discussion of translation examples (chapter 8). As I will suggest, because languages differ in their lexicons and inventory of grammatical constructions, they often also differ in the construal structures that speakers conventionally use to linguistically encode the same event. The construal alternation provides one explanation for the fact that translation from one language to another often cannot proceed by direct transfer of lexical forms in the source language into the corresponding lexical forms in the target language.

Another important concept from Langacker (1987) is that of *profiling*. What is profiled is what is actually designated by the semantic structure of the linguistic expression. The part being profiled is normally a sub-structure within a more general conceptual structure that is accessed by the language user when processing the linguistic expression. The profiled entity achieves a special degree of prominence in the whole communicated structure. Differences in profiling correspond to difference in cognitive attention. For example, Langacker discusses the concepts of *hypotenuse* and *right triangle*: while both concepts are defined relative to the same "base" (a 'triangle'), each concept *profiles* another aspect (sub-structure) of the "base" semantic frame.

The notions of construal and profiling, like the notions of *mental spaces*, *conceptual mapping* and *blending* (to be discussed in the next section) suggest that linguistic utterances cannot be linked directly to the world. In between there are complex mental processes that identify a possible link, but also add more content to the linguistic expression. In particular, meaning cannot be defined by truth conditions alone (in contrast to some traditions in

linguistics and philosophy.)

1.2.3: Mental Spaces and conceptual mapping operations

Fauconnier (1985) introduces the concept of "mental spaces": general cognitive constructs built up in discourse according to "instructions" provided by the linguistic expressions. The idea behind “mental spaces” is that when we engage in any form of thought, mental constructs (“spaces”) are set up, structured, and connected, under pressure from grammar, context, and culture. Each space represents a conceptual domain (a temporal event, a location, and so on) which inherits its structure from context and existing mental models (representing prototypical world knowledge). The "mental spaces" concept is very effective in understanding ambiguities and polysemy structures (such as the ones described by Sweetser, 1990, or Langacker, 1991), and in solving “logical” problems involved in linguistic phenomena of reference, presupposition projection, and counterfactuals, by pointing to operations of conceptual mapping across mental spaces that can mentally connect different "counterparts" in different domains which are referred to with the same lexical item in the linguistic expression.

An important point made by Fauconnier is that grammar plays a major role in guiding and triggering the construction of elaborate spaces and conceptual mapping across spaces. However, the mental construction that is going on is much more complex than the explicit “instructions” the grammar provides.

> The complexity of the [mental] constructions is such that the [linguistic] coding, even it were at all possible, would take very large amounts of time and be extremely inefficient. Instead, languages are designed...to prompt us into making the constructions appropriate for a given context with a minimum of grammatical structure...Once these [grammatical] clues are combined with already existing configurations, available cognitive principles, and background framing, the appropriate [mental] construction can take place, and the result far exceeds any overt explicit information. (Fauconnier, 1994, p. xviii)

The analysis in this dissertation similarly discusses mental operations that take place in

language processing, guided by grammatical constructions. The grammatical constructions discussed (the Hebrew morphological *binyanim*) provide minimal cues to guide the reconstruction of conceptual structures representing the "interpretation" of the sentence. The interesting aspect in the analysis of the Hebrew *binyanim* system is that the use of everyday lexical items (with their conventional morphology and syntactic environment) triggers very complex mental operations in sentences whose semantics seems on the surface to be completely straightforward.

The Mental Spaces view suggests in particular that conceptualizations are not static and not permanent. Different projections, category assignments, and space configurations are activated locally in given situations. The framework emphasizes the dynamic building function of the linguistic form: the ability to project and perform analogical mapping turns out to be a central component of the ability to conceive and process language.

1.2.4: Conceptual Blending

Various studies in Cognitive Science suggest that mapping across cognitive domains plays a central role in language and thought. These include studies on Mental Spaces (discussed above), studies on Metaphorical Mappings (e.g., Lakoff & Johnson, 1980; Lakoff & Turner, 1989; Sweetser, 1990) which suggest that conceptual metaphorical mappings across different domains of experience underlie linguistic metaphorical expressions and phenomena such as polysemy and word sense extensions, and studies on Metonymy (e.g., Nunberg, 1978, 1993) where two aspects of an object are conceptually and linguistically mapped onto one another. In addition, many studies of non-linguistic cognitive activities point to the prevalence of *analogical* mapping operations across conceptual domains, and the existence of a general cognitive pressure to find similarities and correlations across conceptual structures (cf., Gentner, 1983, 1989, Gick & Holyoak 1980, and Holyoak, 1984, on analogical mapping in problem solving; Fauconnier & Turner, 1994, and Lansing, 1992, on the role of conceptual analogies in scientific thought;

and Coulson, 1995, Hofstadter, 1995, and Turner, 1986, 1991, on analogical mappings in special language forms such as poetry, narrative, jokes and rhetoric[5]).

Fauconnier and Turner (1994) suggest that mapping across two conceptual domains (such as metaphorical mapping) often involves, in addition, the creation of a new special construct, the *blend* (Figure 1-1)[6]. The blend inherits partial structure from the input domains: it combines roles, frames, and schemas from both source and target spaces. The blend typically also has an emergent structure which is completely absent from the input spaces, yielding a richer conceptual domain with a unique structure. The structure of the new space is often "impossible" if integrated in our common system of mental models, yet it is coherent in itself and is an indispensable site in which mental "work" is carried on.

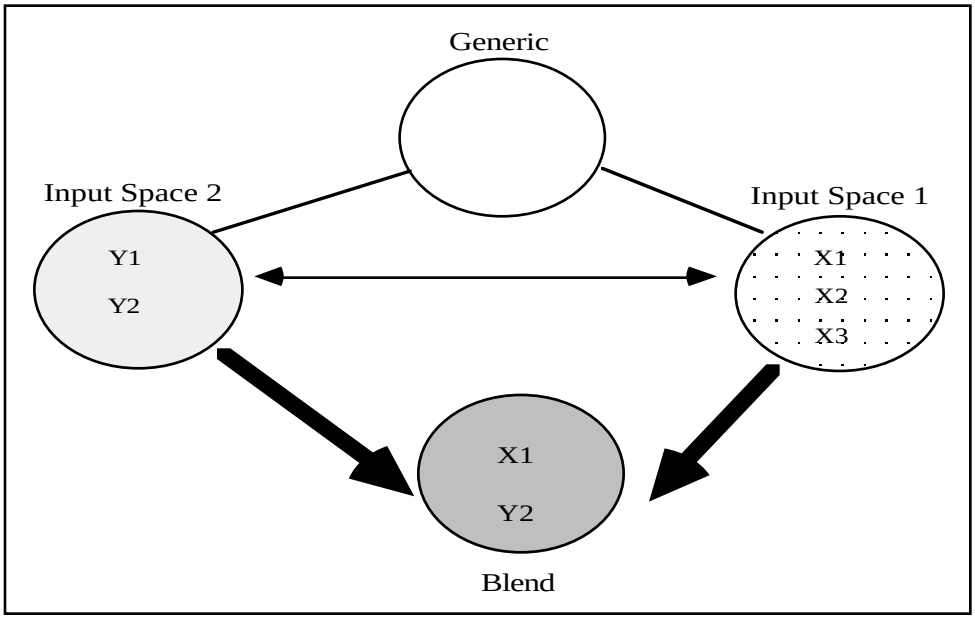

Figure 1-1: Conceptual Blending (Fauconnier & Turner, 1994)

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[5] See also the literature on computational modeling of analogical mapping, e.g., Mitchell & Hofstadter. (1990), Mitchell (1993), Barnden & Holyoak (1994), and Holyoak & Barnden (1994).

[6] I will not discuss in this dissertation the role and structure of the 'generic space', as proposed in Fauconnier and Turner (1994). The 'generic space' is the space which reflects the common structure and organization shared by the two input spaces. It is by virtue of this common abstract structure that correlation can be perceived and mapping performed across the two input spaces.

Consider, for example, a prevalent conceptual (metaphorical) analogy across many cultures and languages: a mapping between the Human domain and the Animal domain. The metaphorical mapping is based on observed similarity between the two domains[7]: for example, there is clear similarity in body shape of humans and some animals (particularly primates). There is also similarity in social behavior (such as relationship between parents and offsprings, life in couples or groups, and so on). This similarities are (probably) the basis for metaphorical expressions applying animal properties to human beings, or human properties to animals.

In addition, we find *blends* of these two domains (the Human and the Animal domains). For example, Mickey Mouse is clearly a *blended creature*: it is an imaginary creature - part animal, part human. On the one hand, Mickey Mouse has human-like properties: he wears clothes, he speaks, etc. On the other hand, Mickey is a mouse: he has a tail, he is chased by cats, and so on. Mickey Mouse is an instance of neither the prototypical human domain nor the animal domain. Neither domain can independently provide the necessary information to make all predictions about Mickey's "behavior", since the "life circumstances" of Mickey are not part of either domain. What we actually have here is a *new mental domain* with its own special logic and inferences.

The example of Mickey Mouse is an example of a *highlighted* blend, one which is highly noticed. Highlighted blends are typically found in special types of discourse like cartoons, jokes, riddles, and children stories. But as Fauconnier and Turner (1994) claim, blends (like metaphors) are in fact pervasive in everyday language and thought. Moreover, the cognitive operations involved in the visible blends and in conventional unnoticed ones are essentially the same (just as recent research on metaphor suggests that the cognitive

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[7] I leave aside for the moment the scientific (evolutionary) connection between the two domains, a scientific knowledge which may or may not be part of the conceptual representation of these two domains (especially in young children or ancient cultures).

operation underlying idiomatic and creative metaphorical language is the same, cf. Lakoff, 1993).

At times, a successful blend can become a fixed part of our conceptual system, providing a permanent extension for an existing category. Consider, for example, the term "same-sex marriage" (discussed in Fauconnier & Turner, 1994). The term involves a blending of two conceptual scenarios: the very entrenched scenario of heterosexual marriage, and a scenario of same-sex relationship. The blending operation is based on observed correlation in the two scenarios (a domestic scenario where people are living in the same household, dividing labor for the sake of the domestic unit, etc.). Only partial structure from each input is projected into the blend, since the two scenarios also include a contradictory component: the conventional marriage scenario includes a criterial component of "heterosexual union" which clashes with the non-heterosexuality component of the 'same-sex relationship' scenario. The clash forms a blend which seems, at first, to be an impossible scenario. Through cultural entrenchment, however, the structure of the blend may become prominent and even project back to the input category (that of 'marriage'). In that case, the component that caused the clash disappears, and the category of 'marriage' itself changes (the component of "heterosexuality" is omitted from the default definition of the category). Since the category of 'marriage' has undergone a shift, the blend which began as an impossible clash is no longer impossible and it becomes a new category in itself.

One of the main effects of blending is found in *grammar*. Conceptual and linguistic blending operations allow the expression of novel complex event sequences as single basic event structures by blending the complex sequence of events with a single schematic linguistic pattern. Grammatical blends may also start as fantastic peripheral instances of language, but in time can become entrenched, at which point their semantics would be conceived as a simple union of the semantics of the linguistic components (cf. the

"compositional" view of language, discussed in the introduction section). This type of blending operation will be presented in length in the next chapter (chapter 2), and will play a major role in the rest of the dissertation in analyzing the Hebrew verbal system and translation processes.

1.2.5 Creative and schematic aspects of language processing (or: on linguistic "core" and "periphery")

As Fauconnier points out in the preface to his book (1994), there is a long tradition in linguistics of studying first the “simplest”, most “typical” sentences, then building a theory from this “core” fragment, and only later worrying about extending the analysis to “complex”, “creative” instances of language use. However, linguistic investigations suggest time and time again that the less prototypical, more creative cases, can reveal (often better than the typical, conventional cases) the general nature of the cognitive operations involved in language processing, and that the “typical” cases can then be simply defined as the most “entrenched” instances of the general cognitive and linguistic mechanisms identified for "creative" language instances.

In my study, I incorporate an analysis of both “creative” and “conventional” examples of language use, while suggesting that very similar conceptual and linguistic operations underlie the use of both types of linguistic utterances. I will present on one hand some rather creative examples of “Caused-Motion” sentences in English (reported in Goldberg, 1995), and on the other hand very "simple" prototypical sentence examples in Hebrew.

The analysis in this thesis extends the notion of 'syntactic constructions', studied in the literature mostly for *less-prototypical* syntactic forms (e.g., the *Let alone*-construction studied by Fillmore *et al.*, 1988, or the Caused-Motion and *way*-constructions studied by Goldberg, 1995) to discuss the most prototypical basic syntactic constructions in Hebrew (such as the basic Intransitive and Transitive constructions). While the study of the less typical constructions (as in Fillmore's and Goldberg's work) is required to reveal the

"hidden" complexity of cognitive operations underlying linguistic forms, their findings can then be extended to discuss the "simple" constructions, which form the "core" of linguistic theory. Similarly, I will provide in this study a parallel analysis for morphological "simple" and "complex" predicates (e.g., 'basic' vs. morphological 'causative' verbs; see the discussion of the morphological *binyanim* system in Hebrew, chapters 4-7).

1.2.6 Translation Studies

Translation, though a fascinating field of study for cognition, has been neglected in Cognitive Science and Linguistics research. In this thesis, I hope to point to some of the rich insights that translation studies can provide into language processing. In particular, I will suggest that translation examples can provide excellent data for studying the “hidden” cognitive processes involved in language usage. When dealing with only one language, it is easy to overlook the complexity of the “back-stage” processes taking place in language interpretation and generation (Fauconnier, 1994). This is particularly true in the case of conventional, “entrenched” expressions, where the complexity of cognitive operation is not consciously perceived. However, as will be suggested by the discussion of translation examples in chapter 8, the hidden processes behind even the most conventional sentences are often highlighted by the requirements of the translation process: differences in constructions and grammatical constraints in the source and target languages (when word to word transfer does not produce a correct translation) bring to conscious consideration the conceptual blending and construal operations that these grammatical constructions trigger.

Theories of translation have often influenced (and been influenced by) the philosophy and linguistics theories of the time: in particular with regard to the perceived relationship between language and the world. For example, the Sapir-Whorf hypothesis of “linguistic relativity” (Whorf, 1956), which maintains that our ways of thinking and conceptualizing are determined by the language we speak, has had far reaching implications for translation

theory. Taken to its extreme, it means that ultimately translation is impossible.

In the 1970's and early 1980's, an opposite view on translation emerged based on the concepts of the Chomskyan linguistics school (for a review, and criticism of this view of translation, see Snell-Hornby, 1988, and Melby, 1995). The Chomskyan concept of syntactic language universals, the conception of language as a code, and the notion of a sentence as a "string" of items motivated a view of translation as almost a "transcoding" process. The underlying assumption is the belief in the existence of universally valid concepts, which are simply given differing labels in the various languages. According to Chomsky "the notion of 'lexical entry' itself presupposes some sort of fixed, universal vocabulary in terms of which objects are characterized" (Chomsky, 1965:160). In its most simplified account, language is an arbitrary system of signs, independent of the cognition and experience of its users. The translation process is viewed as one of selecting translation units and finding their "optimal" equivalents from a dictionary of potential counterparts.

The above simplistic view of language and translation has been undermined within the disciplines of linguistics and translation studies, but it is still quite dominant in computational linguistics, and in the field of machine translation. In this view of language and translation, the translation of polysemous lexical items and the prevalence of "translation divergences" (where the form of the target sentence differs greatly form the source, see discussion in chapter 8) are seen as arbitrary, unprincipled phenomena; the translator (human or machine) must know in advance all the different translations of each linguistic expression in the source language, and invoke the right one (based on context) in the process of translation. Translation divergences in this view should be addressed by enhancing the bilingual dictionaries or by pre-calculating cross-linguistic transfer rules (see, for example, the MiMo Machine Translation project, Arnold & Sadler, 1990).

In contrast to the above approach to language and translation, the dynamic view of language processing, propagated by cognitive linguistics (and described in the previous

sections) - whereby language users incorporate subjective, on line operations of construal and profiling in processing language - suggests that translation *cannot* proceed solely as a function of predetermined dictionary translations of lexical units. This issue will be addressed and exemplified in the discussion of translation examples in chapter 8, and the discussion of implications for computational modeling of translation in chapter 9**.**

It is important to note here that the translation examples I will discuss in this study stay clear of the problem of *cultural and discourse context* in translation. The problem of cultural and discourse context as adding different "shades" of meaning to a "basic" concept (conventionally represented by a lexical form) has been analyzed extensively in the literature, both in translation theory and computational translation literature (cf. Snell-Hornby's, 1988 discussion of translation as a *cross-cultural event*, Kay et al., 1994 discussion of language and translation as *situated*, and Melby's 1995 argument for a *fundamental* (non-deterministic) *ambiguity* of lexical items in varying contextual domains). The translation examples I will discuss in chapter 8 will be translation of *isolated* sentences (not in context) with reference to everyday simple physical objects and activities. The novelty of the discussion of these translation examples (in contrast to much of the literature cited above) is that the difficulty in translation in these examples will stem *only* from *their internal grammatical structure* and the blending and construal operations licensed by the source and target grammar, and *not* from additional shades of meaning imposed by context.

The translation examples discussed in this dissertation have important implications for translation theory and the development of computational models of translation. The goal of many developers of computational translation systems is to first develop a model for translation of *isolated* sentences, and later worry about the added complexity of context. The analysis in this thesis suggests that even the processing (interpretation and translation) of isolated basic sentence structures requires the incorporation of extensive computational operations to construct the minimal semantic representation necessary for translation .