SPACES, WORLDS, AND GRAMMAR

Edited by GILLES FAUCONNIER AND EVE SWEETSER

Grammar is closely tied to human thought and interaction. It is an essential vehicle for the continuous reshaping of conceptual structure that takes place in conversation, writing, reading, or argument. Poetic imagination and creative reasoning are grounded in the same remarkable mental abilities that allow us to use everyday language effectively.

This book examines the multiple mental spaces set up in discourse and the interconnections between them. Since Fauconnier began to work on mental spaces in the late 1970s, researchers have developed this approach in a variety of directions. We have become aware of the ways in which specific linguistic forms prompt construction of the conceptual structures involved in narrative, analogical reasoning, expression of cultural models, and concepts of self. Language does not build conceptual structure; rather, it guides the building process. Speakers effortlessly set up new mental spaces and revise them according to the cues given in discourse. Grammatical markers, then, are not irrational whims of languages or grammarians: they are the road signs to guide hearers and speakers along common mental paths.

Since language is not a formal representation of conceptual structure, but an interactive guidance system for our conceptual processes, it cannot be structurally unrelated to the processes it guides. It cannot be an autonomous representation system, independent of reasoning and thought in general. The studies in this volume attest to the broad spectrum of aspects of cognitive structure that are illuminated by the study of language. Using data from a wide range of languages, the contributors examine such diverse topics as alternative worlds, reference construction in American Sign Language, viewpoint in journalistic texts, abstract change and motion, underspecification, and contextual interpretation.

Posing challenges to many current paradigms in linguistics, philosophy of mind, and cognitive science, this book addresses readers with an interest in the relationships between language, cognition, and cultural models.

Gilles Fauconnier is professor in the Department of Cognitive Science at the University of California, San Diego. **Eve Sweetser** is associate professor in the Department of Linguistics at the University of California, Berkeley.

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CONTENTS

ACKNOWLEDGMENTS

At cognitive linguistics workshops held in the early 1990s at the University of California, Berkeley, and the University of California, San Diego, a number of us found we were converging on a common theme. We kept turning up cases where a central function of linguistic form was to mark aspects of mental space structure and of the mappings and relations between spaces. We agreed that it would be useful to gather this research in a single volume. And so this collection was born.

We would like to thank all of the contributors for their insightful comments on each other's papers, as well as for their patience and care in revising their own. Thanks are also due to Gene Casad, Aaron Cicourel, John Dinsmore, Ron Langacker, Jeff Lansing, and David Zubin for their ideas, comments, and general support of the workshops. An anonymous reviewer for the University of Chicago Press also gave us extensive, careful, and useful input. Finally, to the cognitive linguistic communities of Berkeley and UCSD, thank you—this book would not have happened without your work to inspire it and your energy to support it.

Gilles Fauconnier and Eve Sweetser

Eve Sweetser and Gilles Fauconnier

1 Cognitive Links and Domains: Basic Aspects of Mental Space Theory

Cognitive Structure and Linguistic Structure

This volume focuses on the interaction between grammar and cognitive structure: in particular, on the principled relationship between mental space structures and syntax and semantics. The various contributors provide much evidence for the systematic, pervasive, and often subtle role played by natural language in expressing and guiding the setup of cognitive constructs. From a linguistic perspective, this provides substantive explanations for the forms and meanings of many grammatical constructions. From a cognitive science perspective, it shows how rich language data, if properly understood, can serve to reveal aspects of higher-level mental representation.

Our goals in this introduction are twofold: to give a general overview of the cognitive and linguistic framework underlying most of the scholarship in the volume, and to give some expression to potential dialogues both among contributors to the volume and between contributors and the rest of the cognitive science and linguistic communities. We begin our overview by examining some systematic aspects of human cognitive structure and move from those to the question of parallels in linguistic structure. This will lead us specifically to the theory of mental spaces and to how such a theory can help us motivate the observed structure of human languages. We then discuss the particular contributions to cognitive and linguistic theory made by individual contributors to the volume and relate them to each other and to the field at large. We see this volume as evidence of the broad utility of the mental spaces framework in analyzing divergent aspects of linguistic and cognitive structure. The result is recognition of real complexity, but also of genuine parallels between these divergent phenomena. The parallels help us to understand how humans find certain kinds of complexity effortless to process and other kinds impossible.

Cognitive Connections

It has long been recognized that humans access and process similar or identical information differently in different contexts; the very existence of psychological "priming effects" is overwhelming evidence of this. While objectivist semantics has focused narrowly on aspects of meaning which seemed to be analyzable as independent of contextual differences (relegating the rest of meaning to pragmatics), more and more evidence has come to light that it is a basic function of linguistic structure to both exploit and depict the differential information accessibility that attends on cognitive viewpoint.

If human cognition is so contextually configured, it is crucial to examine what sorts of connections our minds tend to make, and what sorts of effects are produced by different contexts. The examination of linguistic usage is a powerful tool for such cognitive study. What sorts of connections between domains allow us to use a word or expression from one cognitive domain as a *trigger* to refer to another *target* entity in another cognitive domain, for example? A few of the sorts of connections that are relevant just to referential uses of language are pragmatic functions, metonymy, metaphor, analogy, connections between roles and values, and understanding of identity and counterpart relations.

Pragmatic functions (cf. Nunberg 1978), link domains to one another. For example, authors and books are linked by the function associating each book with its author. With this function in place, a name or description of the author (trigger) can serve to identify books (target), as in *Plato takes up half of the top shelf of that bookcase*. In the example *The ham sandwich wants a second glass of coke,* the pragmatic function linking customers to their orders allows *the ham sandwich* to identify a customer. *Ham sandwich* is a good trigger for reference to the target entity, the customer, because food in restaurants is made precisely so that customers can eat it, and the employee's central task is to get the right food to the right customer. Books and articles exist only because some author writes them, and a reader has multiple important reasons to keep a mental record of the connection (interest in reading more of the same author's work, need to cite correctly in publishing her own work, and so forth). Perhaps even more basic and older is the connection between representation and thing represented (as in Jackendoff's (1975) celebrated example, *In the picture, the girl with the green eyes has blue eyes*). Any concept of representation inherently involves two mental spaces, one primary and the other dependent on it. Entities in the two spaces may be *counterparts* of each other, as is the case with the green-eyed girl and her blue-eyed image in the picture. In such well-established contexts of close

relations between spaces, description of a trigger can exploit existing structure to set up a specific *connector* between the trigger (e.g., ham sandwich) and the target (the relevant customer).

In no case is it necessary for us to posit the real existence of entities connected by pragmatic functions. We could look at a painting of a boat, and have no idea whether there was a physical boat such as that represented. A restaurant employee could make up a fictitious customer, ask the kitchen for a ham sandwich to take to this customer, and subsequently request a coke for the same purpose. The point is that the cognitive structures of our domains of customers and orders, or of paintings and objects in the world, are inherently connected by our understanding of the world we live in. We reflect these basic cognitive links by using a linguistic expression for an item in one domain (like *ham sandwich* or *the girl with green eyes*) to refer to a connected item in another domain (like the customer who ordered it, or the blue-eyed painting of the girl).

Another basic cognitive connection which humans cannot usually escape making is the understanding that the same person is very different at different times of his or her life, but is nonetheless "the same," so that five-year-old Mary and fifty-five-year-old Mary are a necessary example of identity (and shared name) between divergent entities in differing worlds. In other words, the understanding of object permanence which we develop in early childhood will naturally incline us to make cognitive connections between entities in quite remote temporal and spatial contexts. Humans also share an understanding of role playing and the ability of people to represent the actions of others, as in theater. We are inevitably aware, too, of the ability of humans to entertain multiple world views and functional world views, and of the difference between any two persons' views of the same aspects of the world. The world as we think it "is" is not the same as the world as we wish it were, or as we fear it might be, or as we think another person sees it. Yet there are crucial links between these different structures: when we say *I wish Joe had come to the meeting,* we mean that we view as preferable a world that is much like ours except that Joe came to the meeting. Crucially, the speaker does not mean that he or she would prefer a world in which Joe came to the meeting only to die of a heart attack on the spot, or in which Joe came to the meeting and World War III was announced over the radio at the same moment. The wish space inherits partial but significant structure from our beliefs about reality.[1]

It should be noted that it is not obvious that links like customer-order or author-book should be cognitively similar to links between represented world and representation or to the relations between beliefs and "reality." Yet all

these cognitive connections have similar linguistic consequences in that they allow transfer of descriptions (and of other grammatically indicated structures such as presupposition and inference) from one domain to another.

Many pragmatic functions overlap with the phenomena discussed in the context of the traditional, or the more recently extended, domain of **metonymy.** Saying *hands* to mean "workers" is based on two essential experiential connections: all, and only, humans have hands as parts of their bodies—and human work is prototypically done with hands, making *hands* a good trigger for ultimate successful reference to a worker. An extended "frame metonymy" analysis might claim that the restaurant customers and foods are both parts of a larger whole (a "restaurant frame"), and that one part of the frame here stands for another; or that authors are part of a frame which includes their works.

Metaphor and analogy reflect the universal human ability to link domains on the basis of experiential connections of many different sorts, certainly not all as evident as the metonymic ones mentioned above. Take, for example, everyday idiomatic metaphoric usages like *Finding that reference was just the icing on the cake* and *Sandy shot down Lou's proposal.* There is no inherent metonymic connection between a reference and icing on a cake; in fact, we are not aware of any pragmatic link at all. But the mapping allows us to see aspects of the paper-writing world (or of a broader world of achievements and activities) in terms of the world of food. A cake is a delicacy, presumably a valued item in the food world. Supposing that icing adds further deliciousness and value to the cake, icing on the cake can be seen as something which is unnecessary but nice—the cake would have been good without it, but is even better with it. A reference which adds an interesting but not essential example to an already well supported scholarly argument could also be seen as unnecessary to the basic achievement, but nice to have. However, there is no need to mention necessity or pleasantness overtly. By metaphoric identification of the reference with the icing, we have evoked an understanding of one domain in terms of the other, which includes and transcends the literal analysis of the metaphor given above.

Similarly, Sandy's criticism of Lou's proposal has little to do with shooting. But as Lakoff and Johnson (1980) have pointed out, the salient metaphorical structuring of argument as combat allows us to see the criticism as an act of violence, albeit perhaps involving no more violent action than scribbling on the margin of a piece of paper. Even when metaphor is based on experiential correlation (this one probably is based on a genuine, if partial, correlation between arguments and possible violent behavior), it need not be based on the kind of close contiguity of domains that generally underlies metonymy.

Analogy, like metaphor, need not be based on a close connection between

the two domains connected. Metaphor, unlike analogy, crucially allows access between the two domains in a way that permits direct transfer of naming conventions. Gentner (1983) has discussed examples such as the atom as analogous to a solar system, and Gentner and Gentner (1983) have shown in some detail that metaphor and analogy have real cognitive consequences for human reasoning. Gibbs (1980) and Gibbs and O'Brien (1990) have also shown that idiomatic metaphorical expressions are genuine parts of cognitive processing. Metaphor and analogy thus allow us to make mental connections, to shape cognitive mappings, in complex and powerful ways which must be taken into account as factors in setting up mental models.

Cognitive connections between roles and the values filling those roles are very basic, as Hofstadter (1986), Fauconnier (1985, 1991), and others have pointed out. As with the idea of representation, the idea of roles carries along with it the idea of multiple possible mappings between a role and its filler. Roles include, but are not limited to, human roles such as *Sara's mother* or the *president of the United States,* each of which could be filled by some individual (perhaps the same individual, Janet Smith). Our general human cognitive capacities appear to include the ability (and the need) to set up **frames,** or structured understandings of the way aspects of the world function (Goffman 1974, Fillmore 1985). These frames allow us to make maximal use of the data we are given in crucial respects; for example, if someone talking about a house mentions *the front door, the bathroom,* or *the driveway,* we don't ask *What front door?* We know that there is probably a front door, simply from a complex understanding of the kind of object in question. Or if a wedding is under discussion, speakers can refer not only to *the groom* and *the bride,* but also to *the ushers, the guests, the cake, the dress,* and *the rabbi,* all in the certain knowledge that such references will successfully be understood with respect to the hearer's understanding of a wedding scenario. Frames thus typically include **roles** for participants, such as *bride* and *groom* and *cake,* or the now-classic cases of *customer* and *waiter* and *menu* in a restaurant (Schank and Abelson 1977), or *buyer* and *seller* and *goods* in a commercial event. Roles are created by general social or physical framings of experience; for example, *parent* or *president* or *student* exists against our understanding of family structure, political or corporate hierarchy, or educational institutions. Roles, like individuals, can have properties or attributes. For example, *The president has been commander in chief since 1776* depicts command of the armed forces as a legally defined attribute of the role of president, not of some individual who has filled that role.

It is part of our understanding of roles that certain roles have only one value at a time: there can be only one president of a given country at a time, a person can only have one husband or wife at a time, and so forth. However,

the same individual is almost certain to fill multiple roles–e.g., president, parent, and wife. There are thus at least some roles which are in a one-to-one connector mapping with their values, while most values are in a one-to-many mapping structure with respect to roles. These constraints make it easy to cognitively access information in certain ways. Knowing a role may allow rapid and easy identification of its unique filler, while reference to the filler may saliently fail to identify the role. The structure of frames and roles thus gives us a salient example of differential cognitive accessibility. And this is reflected linguistically: we can readily say things like *The president has blue eyes* (the eyes belong to the individual, not to the role), while it is usually much more difficult to use names of individuals to refer to their roles.[2] Finally, the notion of the role is relative. The same element, with the description *president*, may be a role for the value *Clinton* and a value for the higher role *head of state*, as in *In the United States, the head of state is the president.*

Identity and counterpart relations are another area where unnoticed complexity results from mental space structure. Identity and coreference are crucial aspects of semantics; the use of personal and reflexive pronouns in natural language has proven to be one of the most complex problems faced by linguistic analysis, largely because there appear to be no formal aspects of linguistic structure which will reliably predict the choice of one pronominal form over another. No structural metric will predict the possibility of using a reflexive in examples like *This article was written by Sandy and myself* (Ross 1970) or *He opened the drawer and there was a letter to himself* (Zribi-Hertz 1989). The speaker in Ross's example and the (implicit) observer or subject of perception in Zribi-Hertz's example are available for coreference via reflexive pronouns, despite the complete lack (or the syntactically inaccessible placement) of linguistic antecedents. An understanding of the mental space structure potentially available to linguistic processing shows why the postulation of purely formal constraints on the use of reflexive forms falls short of an explanatorily (or even descriptively) adequate account. As mentioned above, there are hundreds of reasons to identify one entity with another: we may believe that the two entities are the same individual at two different times (as with the five-year-old and her later fifty-five-year-old self), or that one is a theatrical representation of another (Chuck Yaeger and the role *Chuck Yaeger* in *The Right Stuff*), or that one is a photographic representation of the other, and so on through a long list of possible mental space connections.

In other cases, reflexive pronoun use seems to refer to "identity" involving complex and partial mappings between cognitive constructs. Take the case of the "bad daughter" who behaves outrageously toward her uncomplaining father, while if *she* were the mistreated parent, she would be furious. It might be said about such a daughter that *If she had been her father, she would have hated herself* (i.e., she (the father) would have hated herself (the daughter)). This does not involve a typical case of "hating oneself," where the same entity is both the hater and the object of hatred. Instead, we are invited to construct a situation wherein the daughter's subjective viewpoint is somehow attached to her father's body, emotions, parental role, and so forth, while the "rest" of her remains the daughter, and is just as annoying as ever.[3] The "real-world" daughter has no single counterpart in this imaginary situation; and the imaginary father and daughter are "identical" only in that each of them corresponds to a different part of the same "real-world" entity. As Lakoff's paper in this volume reveals in more detail, "identity" is a complex concept, depending on our complex understanding of human personality, psychology, and so forth. Yet it is regularly reflected in contrasts between linguistic forms.

Linguistic Reflections of Cognitive Connections

In principle, there is no reason why human cognitive structures like frames, metaphors, representational worlds, and so forth should be reflected in semantics or in grammatical structure. A very reasonable and convenient theory of meaning might posit that language directly represents the properties and relations of entities in the world. In that case, we would not expect meaning to be structured by human cognition. And even if we imagine that certain aspects of semantics must inevitably describe human categories, the more autonomous from semantics we assume syntax to be, the less reason we have to suppose that syntactic constructions should reflect any of the structure of human experience and understanding. And a syntax, or a grammatical domain, connected to an objectivist meaning system would of course have no reason at all to be affected by such nonobjective phenomena.

However, as is already evident from the examples cited so far, linguistic structure does reflect precisely the aspects of human cognition described above. Far from naming entities purely on the basis of their independent properties or actions in the world, we often name them on the basis of cognitive and experiential connections which we think will enable our interlocutor to access the desired referent. Most interesting of all, there appear to be very general principles which regulate the relationship between an entity and the linguistic expression used to refer to it. Central among these is the **Principle of Access** (also known as the ID Principle),[4] which states that an expression which names or describes one entity (the trigger) can be used to access (and hence refer to) an entity (the target) in another domain only if the second domain is cognitively accessible from the first, and if there is a connection between trigger and target. Thus the domain of restaurant food

orders allows ready cognitive access to a domain of customers placing orders, and there is a specific cognitive connection between a given customer and that customer's chosen dish. A representational painting of a seascape allows ready cognitive access to a hypothesized ocean and shore which is thus represented; and there may be a specific cognitive connection between a depiction of a given boat and a real or imagined model for the depiction.

The theory of mental spaces provides a model of the connection between semantics and cognition which allows us to address these important issues and offers theoretical concepts intended to account for the regularities observed in the cognition-language relationship. As we shall see elsewhere in this volume, mental space theory can thus elucidate a wide range of linguistic and philosophical problems, from the difficulties of indirect reference discussed above (which include classic issues such as referential opacity)[5] to choices of grammatical construction, of tense or aspect, and of pronoun form. Far from being independent of experiential structure, syntax and grammar, as well as lexical choice, are centrally involved in expressing and constructing human understanding of the world.

Mental Spaces

The discovery (or sometimes rediscovery) that cognitive connections of the sort outlined above play a central role in semantics, and more generally in the organization of thought, had important consequences for the research on meaning undertaken after the mid-seventies. Emphasis was shifted from the study of logic-like sentence meaning to that of the cognitive constructions which sentences help to set up—metaphoric projection, frame organization, roles, figure-ground configurations, metonymic pragmatic functions, mental space links, cognitive schemas, and cultural models.

Fauconnier's work on mental spaces provided a general model for studying the rich interplay between cognitive connections and natural language, and it prompted other research in a multitude of areas where this interplay has a major role. The realization that many superficially different kinds of problems were being dealt with by different people within a unified perspective was one of our strong motivations for preparing this book. We hope that the diversity and richness of the phenomena that lend themselves to the approach will bring out the generality, perhaps the universality, of domain connection in human thought and language.

Before moving on to other aspects of the volume, we will go over some basic notions and examples that initially motivated the mental space approach. As already pointed out, language is remarkable in allowing us to talk not just about what is, but also about what might have been, what will

be, what is believed, hoped for, hypothesized, what is visually represented, make-believe, fiction, what happened, what should have happened, and much more. Objectively, none of these are the same. We are referring to very different kinds of things: time periods, possible and impossible worlds, intentional states and propositional attitudes, epistemic and deontic modalities, pictures (i.e., blobs of paint on paper or cloth), and so on. And yet it turns out that there is a level at which similar cognitive constructions are set up for all of them. This is revealed by the fact that they pattern identically in a wide array of cases from a grammatical and logical point of view.

So, for example, as insightfully noted by Jackendoff (1975), one finds the opaque/transparent ambiguities of propositional-attitude sentences like (1) in picture sentences like (2) as well.

(1) Max believes that the man with the gray hair is behind the fence.
(*de re:* the man has gray hair, but Max may believe otherwise)
(*de dicto:* Max believes the person is a man and has gray hair, but may be mistaken)

(2) In Max's painting, the man with gray hair is behind the fence.
(the man has gray hair, but in the painting you can only see his nose and arms sticking out from behind the fence, or again perhaps he is represented with a different color of hair)
or
(what you see in the painting is a man with gray hair, perhaps an incorrect representation of a man with brown hair, or again not a representation of anybody in particular)

In Fauconnier 1979, 1981, 1985, and 1988, these observations are generalized to all cases for which domain connections apply. Examples of other domains which are associated with similar linguistic manifestations include the following.

Time

(3) In 1952, the man with gray hair headed the CIA.
(Did he have gray hair then? Does he have gray hair now?)

Theater

(4) In the movie, the man with gray hair is a spy.
(Who has gray hair? The actor? The character? Both?)

Counterfactuals

(5) If Jack were older, his gray hair would inspire confidence.
(Does Jack already have gray hair, or would he have it only in the counterfactual situation?)

Ambiguities like these are a simple consequence of the Access Principle, as we are about to show in more detail. The more general question they raise, along with analogous generalized patterns for presupposition and for constructions such as comparatives, is this: what are the mental representations that lend themselves to a broad application of operations like the Access Principle? And what is their status with respect to language use and language structure?

Mental space research seeks to provide answers to that double question in the form of a detailed model of the meaning construction that takes place under pressure from language forms, context, structured background knowledge, and other pragmatic factors.

The informal idea is straightforward in the case of simple examples like (1) through (5). When such sentences appear at some point in a discourse, they open a new domain (set up to contain structured information and inferences "about" beliefs or time periods or pictures, etc.). Phrases such as *in 1952* or *in the picture* or *Max believes* are all thus *space builders*—overt mechanisms which speakers can use to induce the hearer to set up a new mental space. They provide in themselves very little explicit information about that new domain, or what it purports to refer to. And for that reason, any additional structure that may be needed in the domain for reasoning purposes will typically be inherited according to default mechanisms from other domains, and ultimately often from background knowledge. In the same fashion, counterparts for elements in existing domains will be created in the new domains. Connectors link domains, and domains may be linked in more than one way. They allow a continuity of reference to hold throughout the discourse, but crucially they also allow a partitioning of information, such that an element and each one of its counterparts can be associated with different frames and properties.

In example (3), for instance, *man with gray hair* may identify an initial element in the base space. A new mental space is set up for the time period 1952 in which the initial element has a counterpart, possibly associated with different properties ("young man with brown hair"). The Access Principle will allow the counterpart to be accessed through a description of the initial element. In other words, we can be talking about the man who now has gray

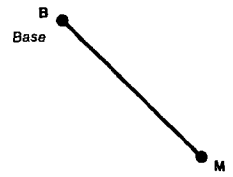

Figure 1.1

hair, and what he was doing back in 1952 (when his hair may have been of a different (and perhaps irrelevant) color).

Example (5) sets up a counterfactual space. The expression *his gray hair* may describe the hair Jack has now (base space) or the hair he would have if he were older (counterfactual space).

Of course, the elements in spaces are not themselves referents in the standard sense, and the descriptions are not descriptions of the mental elements. If a mental space partially fits the world, then an element and its construed descriptions will match reality in certain (complex) ways. In the simplest case, an element will be matched with a real referent, and a description will be matched with that real referent's real properties.

The dynamics of mental space construction and space linking are technically abstract, but conceptually straightforward. The basic idea is that, as we think and talk, mental spaces are set up, structured, and linked under pressure from grammar, context, and culture. The effect is to create a network of spaces through which we move as discourse unfolds. Because each space stems from another space (its "parent"), and because a parent can have many offspring, the space network will be a two-dimensional lattice. Motion through the lattice typically takes the following forms.

Starting from an initial (base) space (B), we generate a new ("child") space (M), and structure it in various ways, as shown in figure 1.1.

More generally, if a space is current,[6] we can generate a new space (M_j) relative to the current space (M_i), as shown in figure 1.2.

We can also move from higher spaces to lower spaces, or move back from lower to higher spaces.

Structure in any given space is simple in the sense that it is partial and involves no logical operators. But it incorporates frames and schematic conceptualizations. The space elements thus fit into cognitive models that are imported from background knowledge and typically elaborated locally during any particular discourse. Space elements may or may not have external referents. Whether they do or not, spaces are linked to the world by the presumption that "real" situations can be matched with space configurations by humans in systematic ways. The logical properties of thinking, first- and

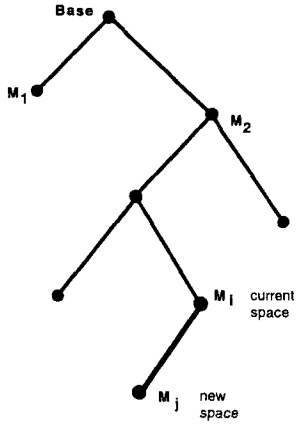

Figure 1.2

higher-order, follow from the ways in which spaces are linked, rather than belonging to an abstract mathematical system independent of thinkers. Elements (including frame-based roles) have counterparts in connected spaces, and structure in one space is related to structure in another.

Because the explicit structure set up in spaces is minimal, and because the default structure is always revisable as discourse unfolds, spaces are very different sorts of things from worlds (such as logicians' possible worlds, or the fictional worlds of narratives). Also, logical operations such as entailment or disjunction do not operate within spaces. Rather, they correspond to links and matching conditions between spaces.[7]

The dynamic and subjective view of meaning construction that emerges includes key concepts which are absent in the more narrow logical tradition. First, at any given point in discourse, one or (usually) several mental spaces have been set up and linked to each other; one of those spaces is singled out as the *viewpoint* (the space from which, at that point in discourse, others can be accessed or created). Second, some particular space (possibly the same one as the viewpoint space, but not necessarily) is in *focus;* it is the space to which structure is being added, and it is accessed from the current viewpoint space. Third, motion through the network of spaces consists in starting from a *base,* which provides the initial viewpoint, and then shifting viewpoint and focus, using the appropriate Space Connectors.

If this is the kind of conceptual organization that underlies the construction of meaning via discourse, then discourse participants must be able to keep track of the discourse dynamics, for purposes of reasoning and of communication. Since language is the direct overt manifestation of the process, we

expect it to highlight some of the mental space structure. In particular, we expect that grammars of natural languages will include the means of giving participants (partial) answers to questions such as the following. What is the starting point (the base space)? What space is currently the viewpoint? How is the viewpoint located with respect to the base? What space is the focus of attention—the space being accessed and receiving additional structure? What are the connections between the spaces? What are the internal configurations within spaces?

Such questions define an important realm of application for grammatical and reasoning processes. An overarching notion that runs through it all is that of *access.* Because of the partitioning and subjectivity inherent in mental space building, some spaces will be used to access others, viewpoints and sometimes even bases will change, and some mental spaces will become inaccessible to others.

Ample evidence is offered in this book that grammar does indeed serve exactly such purposes, and that access is the key to understanding some logically mysterious properties of language.

Here are some simple, classic examples of access. Bear in mind that such examples would normally occur in larger discourses with preexisting mental space configurations. We treat them here essentially as minidiscourses.

(6) Max believes the woman with green eyes has blue eyes. (cf. Jackendoff 1975)

In the Base space, we have "a woman with green eyes," i.e., an element **a** associated with the properties "woman" and "green eyes." What sentence (6) does is open a new space M, in which structure representing something about Max's beliefs is going to be set up. In that new space, there is a counterpart **a′** for the element a initially set up in the base. And that counterpart is associated with the property "blue eyes" via the English expression *has blue eyes,* as shown in figure 1.3.

However, the linguistic expression which identifies **a′** is *the woman with green eyes.* And this description is appropriate for the base element **a,** linked to the property "green eyes."

It is easy to see how the Access Principle works here: spaces B (the base) and M are connected; element **a′** in space M is accessed through its counterpart in the base. The description *the woman with green eyes* picks out **a** and identifies its counterpart by virtue of the general Access Principle.

Notice that now **a′** is linked to a property (blue eyes) different from that of its counterpart (green eyes). There are now two ways of accessing **a′**: either through its counterpart, or directly in terms of the properties linked to

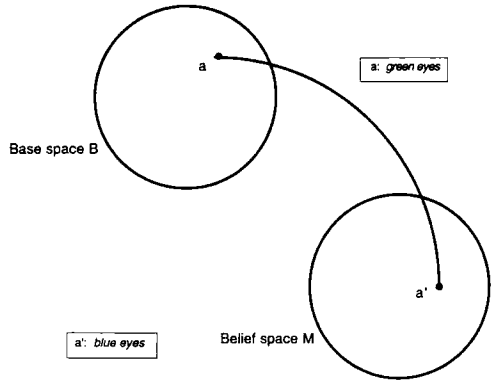

Figure 1.3

it in space M. So if Mary is the woman in question and if Max believes he will marry Mary, there are two ways to say it in the present context.

(7) Max believes he will marry the woman with green eyes. (access from the base)

(8) Max believes he will marry the woman with blue eyes. (access from M directly)

In the first case, although M is in focus, viewpoint is still from the base. In the second case, viewpoint has been shifted to the new space M.

A sentence like (6) might of course occur in a different context where *the woman with green eyes* is an appropriate description in M, rather than B. In that interpretation, **a'** is accessed directly in M, and is linked to the two properties "green eyes" and "blue eyes," yielding a reading closer to a contradiction: Max believes that Mary has blue eyes, and that she has green eyes.

In a case like (6) in which only two spaces are set up, mental space access explains why we find two readings (the traditional *de re* and *de dicto*, incorrectly viewed as logical properties of propositional-attitude sentences in many philosophical treatments). It is certainly gratifying to see referential opacity fall out as just a special case of Access. Even more important, perhaps, when seen in this light, opacity phenomena are just one case of ambiguity stemming from the availability of complex accessing strategies, combined with access principles. Typically, there will be more than two mental spaces in a discourse configuration, and correspondingly a linguistic description

(such as *the woman with green eyes*) may well have one, two, or more possible identification paths within the structure.

Accessing principles depend on space configurations and the degree of accessibility of such spaces, sometimes marked grammatically or pragmatically. The type of space involved is much less relevant, and so we find ambiguities similar to those of (6) in (9), (10), (11), and many other similar forms where mental spaces are set up to talk about pictures, time, wishes, and so on.

(9) In the picture, the woman with green eyes has blue eyes. (Jackendoff 1975)

(10) When she was born, the woman with green eyes had blue eyes.

(11) I wish the woman with green eyes had blue eyes.

The sentence in (12) is another example that illustrates the same basic principles.

(12) In *Uneasy Rider*, Jane Fonda's brother takes a cross-country motorcycle trip with his sister.

A new space M is set up relative to the base B by the expression *In Uneasy Rider*. This new space serves to structure information, inferences, etc. about the movie (what happens to the characters in the story). Several configurations are compatible with sentence (12). In one, *Jane Fonda* accesses the actress in the base, *Jane Fonda's brother* picks out her brother, Peter Fonda. This in turn gives access to the character he plays, by connection to M. That character, Jack, has a sister, Jill; the corresponding element in M is accessed by *his sister*. Sentence (12) is saying, in effect, that Jack travels with Jill. Notice how the Base provides Viewpoint, with the movie space M in Focus, as shown in figure 1.4.

Another possibility, after Peter Fonda is picked out in the Base, is for the description *his sister* to pick out Peter's sister Jane. That in turn will provide Access from the Base to the movie character played by Jane, say Joy, who is not Jack's sister (we assume now that Jane Fonda is also starring in the movie). Sentence (12) is now accessing both characters from the Base, and its content is that Jack travels with Joy, as shown in figure 1.5.

Suppose now that the movie is actually about the Fonda family. Then the descriptions can be interpreted as applying directly to space M. Sentence (12) tells us that Peter travels with Jane (in the movie, of course!). The actors

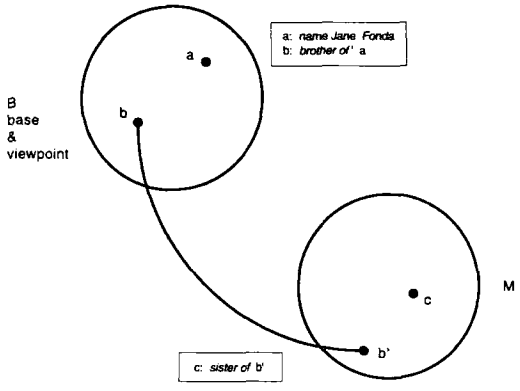

Figure 1.4

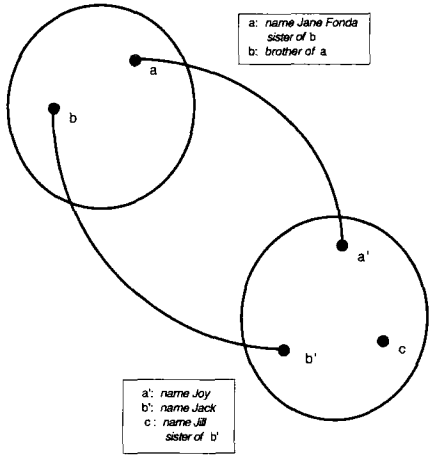

Figure 1.5

playing the parts of Peter and Jane might be Tom Cruise and Meryl Streep, but we do not access the characters via the corresponding actors in the Base. Viewpoint has been shifted to M, as shown in figure 1.6.

But this type of context also allows Access from the Base, because we now have a second link between the spaces: they are connected by the Actor-Character function (Meryl → Jane), and also by the Identity connector ("real" Jane → "movie" Jane). The difference would come out if the movie were a "film a clef": it is still about the Fonda family, but names have been slightly altered—Meryl Streep now plays a character called Fane Jonda.

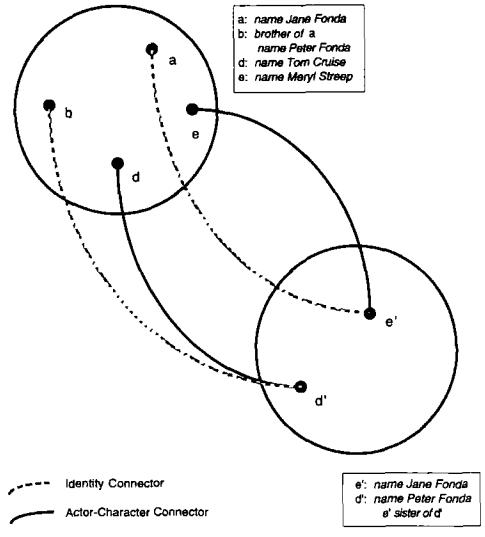

Figure 1.6

Sentence (12) remains applicable, telling us now that Feter travels with Fane. The Access Principle has been applied again, but this time via a different connector, as shown in figure 1.7.

Further intepretations could be devised. They are not a matter of vague or fuzzy pragmatics. To compute an understanding of (12), one must choose among several connecting paths, based on current configurations, background knowledge, and target inferences. Examples involving explicit representations like movies and pictures probably make the ambiguities more apparent, but it is easy to show (Fauconnier 1985) that the access possibilities are the same with other mental spaces (beliefs, time, hypotheticals, counterfactuals, fiction, quantification, etc.). Sentences (13), (14), and (15), have the potential to build up space configurations and connecting paths like those of (12).

(13) Henry believes that Jane Fonda's brother took a cross-country motorcycle trip with his sister.

(14) In 1983, Jane Fonda's brother took a cross-country motorcycle trip with his sister.

(15) I wish Jane Fonda's brother had taken a cross-country motorcycle trip with his sister.

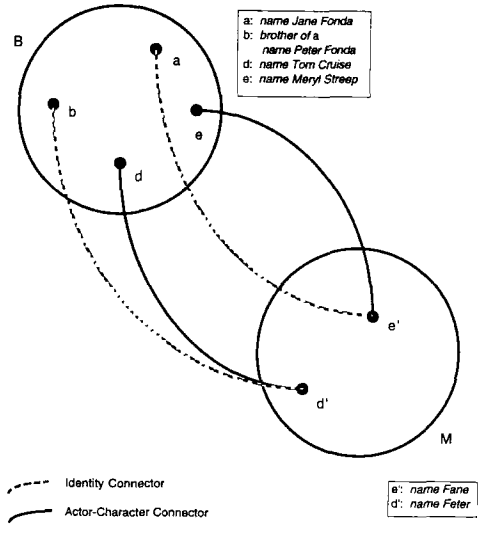

Figure 1.7

As in examples (1) through (5) above, multiple access strategies are available. Henry may or may not believe that Jane has a brother, or that the brother is the traveler, and so forth.

The above examples are meant to give a flavor of the initial motivation for the mental space framework. Later research has explored many other aspects and areas of application. This volume presents some of the most recent work bringing mental space theory together with analysis of the structure of language. Like other research in cognitive semantics, the work is based on, and motivated by, the following powerful idea: complex, high-level cognitive constructions lie behind our everyday reasoning, our social behavior, and our use of language, and such constructions can be uncovered and scientifically investigated by using the evidence provided by grammar, i.e., grammatical markings and grammatical organization. Typically, the cognitive construction process is driven by much more than language alone, so that the link to grammatical structure is anything but direct. The contributions to this book reveal the subtle yet systematic role played by natural language grammar in setting up the kinds of connections evoked informally above (e.g., for time, belief, images, etc.).

Access and Viewpoint

Assuming, then, that we construct mental spaces by some of the mechanisms outlined above, how does that help us understand the relationship between

linguistic structure and viewpoint? As mentioned above, it is an inherent property of human cognition to contextualize, to access information differentially in different contexts. Much recent linguistic work has analyzed the ways in which semantic and pragmatic structure reflects and makes use of differential accessibility. Langacker (1987, 1991, 1993) and Talmy (1978, 1988) have both argued at some length that everyday syntax and semantics are constantly and centrally creating viewpoint in ways that are inextricably intertwined with their other functions. Fauconnier (1985) has argued that the French subjunctive in a relative clause marks that clause's content as being part of the irrealis world depicted by a higher subjunctive clause, and prevents the information contained in the relative clause from being taken as a description of a real-world situation. This choice of mood could thus be said to both mark the speaker's viewpoint and prevent direct access to the information in the relative clause from a base "reality" mental space. The technical notion of focus space has been developed by Dinsmore (1991), who develops a general theory of discourse management, subsuming Reichenbach's (1947) temporal reference system as a subcase of a general mental space partitioning framework. He shows that not only differing temporal spaces, but differing access to and focus on those temporal spaces, are essential components of the semantics of tense and aspect categories in English. Banfield (1982), Fleischman (1990), Silva-Corvalan (1983), and others have laid out ways in which tense, aspect, deixis, choice of referential description, and other formal linguistic markings structure the presentation of viewpoint in literary texts. Chun, Li, and Zubin (n.d.) have further demonstrated the relationship of other grammatical markings (such as reflexive morphemes) to the subjectivity structure of oral and written narrative. Much of this work seems highly compatible with a mental space framework. Subjectivity structure, for example, involves the multiple clues indicating what mental space we are in at a given point in the text. Even more recent work by Michelle Cutrer (1994) has developed these ideas extensively using the mental space framework to show the fundamental unity and elegance of the disourse-construction principles in narrative and in everyday talk.

Many of the papers in this volume are thus centrally focused on the issue of how grammar structures cognitive access and viewpoint. Deixis and tense being inherently viewpoint phenomena, it is not surprising that these show pervasive interaction with mental space structure. Rubba's paper demonstrates the use of spatial deictics (*this, that, here,* and *there*) to refer not only directly and literally to the physical space of the speech environment, but indirectly (via metaphor and metonymy) to the social space and social relations associated with that environment. Our evidently differential access to space, depending on location, is thus used to mark differential access to

and connection with social and cultural domains. Van Hoek uses data from American Sign Language (ASL), a language which uses physical space as the medium of its "phonology," to show that in this different modality, and despite superficially dissimilar systems of reference in ASL and spoken languages, very general accessing principles nonetheless apply in ASL as they do in spoken languages. For example, ASL reference systems demand the initial establishment of a location as connected with a referent; subsequent reference to that entity will be accessible only via this established location, unless another reference location is established by appropriate mechanisms.

Matsumoto provides an example of the way viewpoint of a static situation can be changed by mapping it onto a space involving dynamic change processes. Whether or not this mapping is viewed as metaphorical, it clearly changes subjective viewpoint by setting up contact between mental spaces. When a border is described as "running from point X to point Y," although the viewer does not see the border as physically in motion (shifting its location), the mapping of a line onto a directional vector path creates the effect of viewpoint: the speaker is accessing the border from the vantage of X.

Familiar examples of "transparent" and "opaque" reference of definite descriptions show the opposite effect. The same linguistic material can serve as an access point to evoke more than one cognitive entity. Uses of subjunctive forms to show mental space subordination to an irrealis space is one way of limiting this potential for accessing extra, irrelevant readings. Mejías-Bikandi's paper shows that the Spanish subjunctive is used as a way of limiting access to referents and presuppositions which would be accessible using indicative clauses. Sweetser similarly demonstrates that English "backshifted" counterfactual verb forms can be used to mark the application of a definite description inside a conditional space, rather than in a base mental space.

Another way in which one linguistic expression can access multiple referents is via basic structural connections such as that present between roles and their values. Sakahara shows that the distribution of the Japanese particles *wa* and *ga* and other aspects of copula-sentence structure in Japanese follow from an understanding of semantic predication and identification as involving roles and values. The difference between predicating a role of a value (*Homer is the author of the Iliad*) and identifying the value of a known role (*The author of the Iliad is Homer*) is crucially marked in the grammar, thus showing the important role of information access in the syntax and morphology of the copula construction.

Sanders and Redeker continue the tradition of examining viewpoint in narrative structure. They explore the ways in which access between mental spaces, as marked by linguistic structure, provides narrative viewpoint and

they show how the interpretation of narratives is influenced by the choice of implicit and explicit markers of viewpoint. The relevant markers include the choice of description from one subject's belief space rather than from the narrator's space, and implicit rather than explicit attribution of information to some particular subject's mental state.

The impression left by this body of work is that the dependence of interpretation on viewpoint is a ubiquitous phenomenon, which is exactly what we would expect, given the psychological evidence that human information processing is strongly context-influenced. Deixis, for example, is a norm, not an oddity, in language. But forms once thought to have much more "straightforward" meanings—past tense is a salient example—can be seen to fit into a network of linguistic functions having to do with creating, maintaining, and interpreting information from particular points of access.

Semantic Freeloading

Natural language has a striking potential for making rich and extensive meaning available on the basis of very little overt linguistic structure. Consider, for instance, the comment made about one 1992 U.S. presidential candidate (George Bush) by another (Tom Harkin).

> He was born on third base and he thinks he hit a triple.

What would it take for someone who knows about baseball, politics, and American society to automatically set up an appropriate domain mapping, find the right counterparts, and derive the rich set of inferences intended by the speaker? It might seem like improbable mental acrobatics, and yet it is the stuff of our everyday thinking and talking. One salient feature of such processes is that they make extensive use of preexisting structure derived from our culture, experience, and local background knowledge. This preexisting structure comes with its built-in inferences, which do not require reprocessing each time they are used anew; and, perhaps even more remarkably, the mappings allow them to be projected wholesale on domains of different content.[8] In Rubba's paper, for example, the inherited knowledge of the cultural map of San Diego is shown to be present for exploitation in the nonliteral use of distal deictics such as *that part of the city*, referring to a part that is culturally alien to the speaker rather than physically distant.

This is just one of the ways in which significant and rich meaning is obtained at very little cost. Grammar combines with mental space construction to provide several others, and many of the contributions to this book provide striking examples of this natural-language capacity.

Claudia Brugman examines the interaction between mental space phenomena and the basic constructions linked to English HAVE: Causative, Resultant State, Affecting Event, and Attributive. Analyzing examples like (16) and (17), Brugman shows that superficially different senses linked to such constructions actually fall out from the interplay of grammatical properties with the higher level of conceptual semantic organization reflected in mental space construction.

(16) Chandler had Marlowe give up Brigid without a shred of remorse.

(17) *The Chronicle* has the Giants winning the pennant next season.

Cross-domain mappings of this type are a very general source of creative context-bound polysemy. Laura Michaelis finds that they generate multiple (and productive) senses of *still* and *already,* as in examples (18), (19), and (20).

(18) I was still there when he arrived.

(19) He may have apologized, but he still shouldn't have done that.

(20) Macy's is still within Joe's price range, though Saks is too expensive.

The mapping theory accounts for the multitude of senses that can emerge when operators corresponding to words like *still* are applied to new domains. Semantics is generative not by virtue of grammar, but by virtue of the building principles for cognitive constructions.

Sweetser, in her paper, employs the same general strategy to reduce the systematic but idiosyncratic properties of English conditionals described by Fillmore (1990a, 1990b). It turns out once more that the relevant grammatical markers are faithful indicators of conditional mental space constructions, from which the observed semantic properties are easily derivable. Thus, for example, conditional structures mark the setting up of several different kinds of mental spaces, and the choice of verb form within a conditional structure reflects both relative tense and embedded status within mental space constructions.[9]

Another very general discourse mechanism which provides the partitioned spaces with the required structure for proper inferencing and local elaboration is the phenomenon of *Spreading*. Pragmatic and grammatical conditions allow structure from one space to be automatically (but sometimes conditionally) transferred to one or many other spaces simultaneously.

The case of Spreading that has perhaps received the most attention in the literature is Presupposition Float. In mental space terminology, the dynamics of Float can be expressed straightforwardly: if a substructure is introduced into a space by means of a grammatically presuppositional construction, it will float up into higher spaces until it meets itself or a contradiction of itself. For example, *Laura's husband* is a grammatically definite description presupposing that Laura is married. This presupposition spreads differently in the following examples:

(21) Bill says that Joe wants to meet Laura's husband.

(22) Bill says that Laura is single but that Joe wants to meet Laura's husband.

(23) Bill says that Laura is married and that Joe wants to meet Laura's husband.

All three examples involve a minimum of three spaces (the base space, and those evoked by *say* and *want*). In example (21), the presupposition that Laura is married is satisfied by default in all three spaces (in the absence of further discourse structure). In (22), the presupposition is satisfied only at the level of *want;* it gets blocked at the higher level of *say* by an explicitly incompatible structure (*Laura is single*). In (23), the presupposition does make it up to the *say* space, where it meets an explicit copy of itself (*Laura is married*), which blocks it from floating all the way up to the base. The speaker of (23) does not indicate whether Laura is actually married.

Presupposition Float is another phenomenon for which grammatical information will often provide decisive clues. Mejías-Bikandi's paper provides a very clear case of subtle meaning differences produced by the interaction of Spreading with grammar. Mood in this study of Spanish linguistic contexts is analyzed as a grammatical marker that indicates whether a particular space is *accessible* to another. An important consequence of this type of analysis is that grammatical devices are available not only to mark certain space structures as presuppositional and hence floatable, but also to control spreading within configurations.

Other instances of Spreading (structure propagation) show up in the analogical counterfactual phenomena displayed in Fauconnier's contribution. Default structuring occurs in a "nonrealistic" way to yield intended inferences, but the structures remain cancelable in later discourse, and if cancellation does occur, the entire configuration is liable to shift radically (through a sort of instantaneous reverse spreading) and yield a sharply different interpretation. This effect is apparent, for example, in the punch lines of jokes, when