

Foreword to second edition of *Mental Spaces* by Gilles Fauconnier, in press,  
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### Foreword to Mental Spaces

By George Lakoff and Eve Sweetser

#### An Overview

This book is a major advance in the study of reference, descriptions, and coreference -- topics that have long been at the center of research in linguistics and the philosophy of language. The more traditional theories assume that natural language semantics can be adequately studied with the tools of formal logic. Fauconnier has, however, recognized that the tools of formal logic fail when confronted with the full range of natural language phenomena. He has realized that what is needed instead is a cognitive theory -- a theory that is based on the capacities of the human mind rather than the capacities of the mathematical systems that happen to be used by logicians.

Fauconnier posits a theory in which reference has a dimension of structure all its own, which is simply representable using mental spaces, connectors across the spaces, and a few general principles. The complexity lies largely in the interaction between the principles, and in the contextual structures which feed into the principles for interpretation. With such a simple structure, Fauconnier can handle examples that are beyond the capacities of complex logical theories. Here is a salient class of such examples.

#### The Split Self

There are sentences whose meaning requires splitting the self in two parts:

-If I were you, I'd hate me.

-If I were you, I'd hate myself.

These do not mean the same thing, and the problem is to represent both meanings. The first problem is: "me" and "myself" refer back to two different people. But since they are both first person, they should both refer to the speaker. The second problem is: How can the self be split into two parts, one identified with you and one remaining me? Formal logic has apparatus for indicating coreference, but not for indicating coreference for parts of an entity that has been split up in this way.

As you will read below, the problem is easy in the theory of mental spaces.<sup>1</sup>

### Split Coreference

There are other sentences in which a single referent splits into two:

If Woody Allen had been born twins, they would have been sorry for each other, but he wasn't and so he's only sorry for himself.

The word "twins" here is a nonreferential predicate nominal, which, being non-referential, cannot serve as an antecedent. That leaves "Woody Allen" to serve as the antecedent of both "they" and "he." Again, the logical theories do not have the capacity to deal with split antecedents, while Fauconnier's cognitive theory does.

We will shortly bring up a wide range of phenomena that are dealt with equally simply within the theory of mental spaces. But first, we should say something of the theories using formal logic that Fauconnier's theory is a successor to.

### The Theory of Logical Form

Russell (1905, 1919 [1971, pp.167-80]), in proposing logical forms, separated the representation of descriptions from indications of reference and coreference, which were indicated by variables. His idea was to give a single logical formula containing information about coreference, quantification, predicate-argument structure and logical operators, all in one structure. Fauconnier's innovation was to separate out referential structure as a separate domain of structure that works by principles of its own.

Within cognitive semantics, referential structure is indicated by mental spaces, while conceptual structure is indicated by **Idealized Cognitive Models** (or ICMs) and frames, which structure the mental spaces. The entities in the mental spaces are (1) the roles defined by ICMs and frames and (2) values for those roles. The ICMs themselves are not entities in the mental spaces; rather, they provide relational structure linking the roles, which are entities in the spaces.<sup>2</sup>

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<sup>1</sup> For a fuller description of the complexities of the split self, see Lakoff, in press.

<sup>2</sup> Fauconnier does not explicitly discuss ICMs in *Mental Spaces*, although it is clear that such mechanisms will be needed. For a fuller discussion of how generic structure interacts with specific spaces, and other such issues, see Fauconnier (in press). At a higher level, there is the possibility for ICMs which include mappings between mental spaces structured by ICMs; for example, we might want to say that our understanding of Marriage as a Joint Journey (cf. Lakoff and Johnson, 1980) was a complex ICM of marriage, involving a set of mappings between a space

## Possible Worlds and Situations

A *possible world*, in formal logic, is a state description -- a set of entities and the properties and relations that hold of them in that state. A *situation* is a partial state description -- some entities and some properties and relations that hold of them. A possible world semantics (or, equivalently, a situation semantics) is a formally stated relationship between expressions in some formal language (like predicate calculus) and set-theoretical models of possible worlds or situations.

These are objectivist models, models of the actual world, or a possible world, or an actual or possible situation. Possible worlds and situations are not models of the human mind, but models of the world as is assumed to be or might be.

## Discourse Representation Theory

This theory, developed after Fauconnier's, is similar to situation semantics in that it includes partial state descriptions. It adds one important thing: the ability to augment a state description as one goes through a discourse.<sup>3</sup>

None of these theories are cognitive theories. They attempt to account for the meaning of natural language sentences using only the mechanisms of formal syntax and set theory, without permitting any cognitive mechanisms. As we shall see shortly, each of them handles a certain range of phenomena, and each falls seriously short of handling other important phenomena. What Fauconnier accomplished was to show how the full set of recognized problems of reference could be handled with ideas and principles that make sense from a cognitive perspective: *mental spaces* (separate domains of referential structure), *connectors* between referents (within and across spaces), the distinction between *roles* and *individuals*, the ability to extend spaces in a discourse.

The other major accomplishment of Fauconnier's theory is that it demonstrates that the problem of presupposition inheritance is the same as the problem of reference, and that the same theory works for both.

## The Phenomena

To get an idea of how profound Fauconnier's idea is, let us consider some of the

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structured by a simpler ICM of marriage and one structured by an ICM of a shared journey.

<sup>3</sup> cf. Kamp 1984.

crucial puzzles it solves. Among the phenomena that have posed problems for logicians and researchers on semantics are the following types:

**Apparent contradictions**

-I am taller than I am

is a contradiction, whereas

-John thinks I am taller than I am

has a noncontradictory reading.

This kind of example can be handled by Russell's theory of logical form. It can be assigned a logical form like:

[(The degree x) (John thinks that I am tall to degree x)] is greater than [(The degree y) (I am tall to degree y)]

This can be paraphrased by:

The degree to which John thinks I am tall is greater than the degree to which I am tall.

What makes this analysis work is the occurrence of the propositional attitude verb "think" which has the degree variable "x" bound within its scope, while the degree variable "y" is not bound within its scope. This kind of solution however does not work for cases like Jackendoff's (1975) celebrated example:

-In this painting, the girl with the brown eyes has green eyes.

"In this painting" is neither a logical operator nor a verb of propositional attitude, and thus cannot introduce a similar scope difference. This problem for the Russellian account is handled straightforwardly in mental space theory: "In this painting" is a *space-builder*: it sets up the mental space of the painting, P., which is distinct from the mental space of the real world, R. The girl who has brown eyes in R has a counterpart in P who has green eyes. Fauconnier's Identification Principle (his ID-Principle) permits the description of the girl in R to be used to name the girl's counterpart in P. Thus the description "the girl with the brown eyes", which holds in R, can be applied

to the girl in the painting. Therefore, the clause "The girl with the brown eyes has green eyes" is not contradictory since the two descriptions hold in different mental spaces. Fauconnier shows that this simple kind of solution can be extended to the full range of known problems of reference.

One of the most impressive things about Fauconnier's theory is that it unifies the treatment of reference and the treatment of presupposition. Consider the classical problem of presupposition cancellation:

-John's children are blond.

presupposes that John has children, whereas

-If John has children, John's children are blond.

does not presuppose that John has children. Placing the presupposition in an if-clause has the effect of cancelling it.

In Fauconnier's theory, "if" sets up a conditional mental space C, separate from the reality space, R. "John has children" holds in C, but not necessarily in R. "John's children are blond," as the second clause of the conditional construction, holds in an extension of C, but again not necessarily in R. Thus, the presupposition that John has children holds in C, but not in R. On the other hand, where there is no conditional construction setting up a separate mental space, "John's children are blond" will be taken as holding in R and hence as presupposing that John has children in R.<sup>4</sup>

Fauconnier's solution to this problem also accounts for the classic problem of donkey-sentences, which can be stated as follows:

-A man owns a donkey

can be represented in classical logical form with existential quantifiers: (Ex) (Ey) ((Man x) & (Donkey y) & (x owns y)). The existential quantifiers are seen as representing the meaning of the indefinite article "a." But, in the following sentence,

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<sup>4</sup> This is merely the bare bones of Fauconnier's approach, which naturally has to deal with more complexity in the relevant data than we have treated here; readers are directed to the present volume, and to Fauconnier (in press).

-If a man owns a donkey, he beats it.

the indefinite articles have the same meaning, but cannot be represented in classical logical form by existential quantifiers, since such quantifiers would not bind "he" and "it." What is required instead are universal quantifiers, as in: (ALLx) (ALLY) ((If ((Man x) & (Donkey y) & (x owns y)), then (x beats y)). The problem is how to get a uniform meaning for the indefinite article, while solving the problems in the last three sets of examples.<sup>5</sup>

In Fauconnier's theory, "If" sets up a conditional mental space C, in which "a man owns a donkey" holds. The indefinite article has the function of setting up a referent for the first time in a discourse. Referents "d" for donkey and "m" for man are thus set up in C. When C is extended to include "he beats it", "he" refers back to "m" in C and "it" refers back to "d" in C. Having an anaphoric referent is thus parallel to having a presupposition, and the same principles apply to both. General operations on the relevant spaces will then give you the required inferences in both cases.

Since the publication of the first edition of *Mental Spaces*, a number of new phenomena have been found that support Fauconnier's theory. We will conclude with one example that is indescribable within any of the competing theories based on formal logic: logical form, possible world semantics, and discourse representation theory. Consider the following example:

-If the Ile de la Cité is the heart of Paris, then the Seine is the aorta.

Here, the *if*-clause states a metaphor and the *then*-clause extends it. The problem for the theories based on formal logic is that they cannot deal with metaphor at all, since metaphor is a cognitive phenomenon and the logic-based theories are only suited to talking about objective reality rather than imaginative constructions. Logic-based theories simply treat all metaphors as the same: necessarily false statements from which nothing can follow. That view doesn't differentiate the above sentence where the *then*-clause extends the *if*-clause in a sensible way, from the following sentence, where the *then*-clause is not such an extension of the *if*-clause:

-If the Ile de la Cité is the heart of Paris, then Harry's theory is an apple.

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<sup>5</sup> Fauconnier's more fully developed treatment of these issues, including his concept of generic spaces, can be found in Fauconnier (in press).

Cases like these are straightforward in Fauconnier's theory, since it is fully compatible with contemporary cognitive theories of metaphor (See Sweetser, in press). This is but one example of the many ways in which the theory of mental spaces not only solves classical puzzles, but solves new ones as they arise.

This book goes through the most difficult known problems in reference and presupposition, and solves them all with equal ease. It also meshes with all the research done on conceptual systems with the field of cognitive semantics. Fauconnier's theory is truly elegant. It has become the standard account for these problems within cognitive linguistics. This new edition of Fauconnier's already classic work is most welcome.

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