File Change Semantics

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Indefinites as existential quantifiers (Russell)

I found [a cat].

$\exists x[\text{CAT}(x) \wedge \text{FOUND}(\text{I}, x)]$

I didn't find [a cat].

$\neg\exists x[\text{CAT}(x) \wedge \text{FOUND}(\text{I}, x)]$

Anaphora across sentence boundaries

I found [a cat]$_i$. Then it$_i$ ran away.

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$\exists x[\text{CAT}(x) \wedge \text{FOUND}(\text{I}, x) \wedge \text{RAN\_AWAY}(x)]$ ✓

This analysis was proposed by Geach [1962, 126ff]. It implies as a general moral that the proper unit for the semantic interpretation of natural language is not the individual sentence, but the text. [The formula] provides the truth condition for the bisentential text as a whole, but it fails to specify, and apparently even precludes specifying, a truth condition for the [first] sentence.'

Heim 1982 p. 13

Against assigning truth conditions to whole discourses only

Strawson 1952:

A: A man fell over the edge.
B: He didn't fall; he jumped.

A: A dog came in.
B: What did it do next?

Evans 1980:

John owns some sheep. Harry vaccinated them.
$\Rightarrow$ *Harry vaccinated all, not just some of John's sheep.*

Karttunen's *discourse referents*

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- Karttunen (1976): "the appearance of an indefinite noun phrase establishes a *discourse referent* just in case it justifies the occurrence of a coreferential pronoun or a definite noun phrase later in the text."
- This definition allows the study of coreference to proceed "independently of any general theory of extralinguistic reference" (p. 367).

Discourse referents are mortal

*Bill didn't find [a cat]$_i$ and keep it$_i$. *It$_i$ is black.*

The "life span" of the discourse referent is limited within the scope of negation.

Lifespan differences

A_i dog came in. It$_i$ lay down under the table.

**Every$_i$ dog came in. It$_i$ lay down under the table.*

**No$_i$ dog came in. It$_i$ lay down under the table.*

(From Heim's (1982) dissertation)

Donkey sentences

If [a cat]$_i$ purrs, it$_i$ is happy.

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$[\exists x[\text{CAT}(x) \wedge \text{PURRS}(x)] \rightarrow \text{HAPPY}(x)]$

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$\exists x[[\text{CAT}(x) \wedge \text{PURRS}(x)] \rightarrow \text{HAPPY}(x)]$ ✗

Donkey sentences

If [a cat]$_i$ purrs, it$_i$ is happy.

$\forall x[[\text{CAT}(x) \wedge \text{PURRS}(x)] \rightarrow \text{HAPPY}(x)]$ ✓

More donkey sentences

Donkey sentence: A sentence that contains an indefinite NP inside an if-clause or relative clause, and a pronoun which is outside that if-clause or relative clause, but is anaphorically related to the indefinite NPs.

If someone is in Athens, he is not in Rhodes.

If a man owns a donkey, he beats it.

Every man who owns a donkey beats it.

Aside: indefinites in donkey sentences not "generic"

A donkey is grey. [generic]

Arg. #1: *Someone* never generic, yet licenses donkey anaphora.

Someone is grey. [no generic reading]

Arg. #2: Generic readings are prohibited in pivot of existential constructions and object of *have*:

John has a donkey. [no generic reading]

There is a donkey in the yard. [no generic reading]

Yet indefinites in such positions license donkey anaphora.

Aside, continued

Heim (1982) says, "I admit that these considerations do not prove beyond doubt that donkey sentences contain no generic indefinites, especially not in the absence of an analysis of generic indefinites that would explain, e.g., why they do not appear in there-insertion contexts. For the time being, i.e., for the remainder of this chapter, I will nevertheless assume as is generally assumed that donkey sentences and generic indefinites are distinct phenomena." (p. 37)

So these are not donkey sentences:

Someone who is in Athens is not in Rhodes.

John beats a donkey if it kicks him.

Back to donkey sentences

Generalization: An indefinite that occurs inside an if-clause or relative clause gets interpreted as a universal quantifier whose scope extends beyond this clause.

Geach: Indefinites just get a wide-scope universal interpretation under such circumstances. Nothing special to be said about pronouns.

Problem with Geach's "analysis"

Under what circumstances, exactly? What on earth do relative clauses have to do with *if*-clauses? And it doesn't work with just any relative clause:

A friend of mine who owns a donkey beats it.

No wide-scope universal reading here.

The non-quantificational analysis of indefinites

Heim's idea: Indefinites have no quantificational force of their own, but are like variables, which may get bound by whatever quantifier there is to bind them.

Adaptability of indefinites

In most cases, if a table has lasted for 50 years, it will last for 50 more.
$\Longleftrightarrow$ *Most tables that have lasted for 50 years will last for another 50.*

Sometimes, if a cat falls from the fifth floor, it survives.
$\Longleftrightarrow$ *Some cats that fall from the fifth floor survive.*

If a person falls from the fifth floor, he or she will very rarely survive.
$\Longleftrightarrow$ *Very few people that fall from the fifth floor survive.*

Dynamic interpretation

- As a sentence or text unfolds, we construct a representation of the text using discourse referents.
- A pronoun picks out a discourse referent.
- An indefinite contributes a new referent, but has no quantificational force of its own. The quantificational force arises from the indefinite's environment.

File-card semantics

A woman was bitten by a dog.

1	2
woman bitten by 2	dog bit 1

File-card semantics

A woman was bitten by a dog.
She hit him with a paddle.

1	2	3
woman bitten by 2 hit 2 with 3	dog bit 1 was hit by 1 with 3	paddle used by 1 to hit 2

File-card semantics

A woman was bitten by a dog.
She hit him with a paddle.
It broke in half.

1	2	3
woman bitten by 2 hit 2 with 3	dog bit 1 was hit by 1 with 3	paddle used by 1 to hit 2 broke in half

File-card semantics

A woman was bitten by a dog.
She hit him with a paddle.
It broke in half.
The dog ran away.

1	2	3
woman bitten by 2 hit 2 with 3	dog bit 1 was hit by 1 with 3 ran away	paddle used by 1 to hit 2 broke in half

Novelty-Familiarity-Condition

For every indefinite, start a new card; for every definite, update a suitable old card.

Recall Karttunen's introduction

Consider a device designed to read a text in some natural language, interpret it, and store the content in some manner, say, for the purpose of being able to answer questions about it. To accomplish this task, the machine will have to fulfill at least the following basic requirement. It has to be able to build a file that consists of records of all the individuals, that is, events, objects, etc., mentioned in the text and, for each individual, record whatever is said about it.

Discourse referents and file cards

Heim (1982): Discourse referents = file cards.

"Some people might disagree with this identification and maintain that discourse referents are ... what the file cards describe. But such a distinction gains us nothing and creates puzzling questions: File cards usually describe more than one thing equally well... But... an indefinite NP [introduces] *a* discourse referent, not a *set* of discourse referents."

Satisfaction and truth of files

Heim (1982): In order to establish the truth of a file, we must find a sequence of individuals that satisfies it.

A sequence of individuals satisfies a file (in a possible world) if the first individual in the sequence fits the description on card number 1 in the file (according to what is true in the world), etc.

A file is true (a.k.a. satisfiable) in a possible world iff it has there is a sequence that satisfies it in that world.

Example

$F =$

1	2	3
woman bitten by 2 hit 2 with 3	dog bit 1 was hit by 1 with 3 ran away	paddle used by 1 to hit 2 broke in half

A sequence $\langle a_1, a_2, a_3 \rangle$ satsifies F in world w iff:

- a_1 is a woman in w
- a_2 is a dog in w
- a_3 is a paddle in w
- a_2 bit a_1 in w
- a_1 hit a_2 with a_3 in w
- a_3 broke in half in w
- a_2 ran away in w

Example

1	2	3
woman bitten by 2 hit 2 with 3	dog bit 1 was hit by 1 with 3 ran away	paddle used by 1 to hit 2 broke in half

World 1
Pug bit Joan
Joan hit Pug with Paddle
Paddle broke in half
Pug ran away

World 2
Fido bit Joan
Joan hit Fido with Paddle
Paddle broke in half
Fido ran away

	Sequence 1	**Sequence 2**	**Sequence 3**
1	Joan	Pug	Sue
2	Fido	Pug	Pug
3	Paddle	Paddle	Paddle

Files and common ground

Stalnaker: common ground = context set (possible worlds compatable with what the speaker presupposes)

Heim: common ground = "file" of the context. A file is not a set of possible worlds but it *determines* a set of possible worlds.

File Change Semantics

The meaning of a sentence will be a *file change potential*.

$$F + p = F'$$

means: The result of updating file F with logical form p is F'.