A PROGRAM FOR FORMAL SEMANTICS AND METAPHORS

Takashi Sugimoto

Abstract: I would like to outline in this paper[1] how certain types of metaphors are to be treated in the semantic frameworks now generally referred to as formal semantics[2]. A natural language typically contains metaphoric expressions; no semantic analysis can even begin to claim to provide a description of a human language unless it deals with them in a precise way. But this is easier said than done. Lakoff earlier pointed out what a logic for natural language (a natural logic) should look like in the following passage.

> Though a natural logic, if one could be constructed, would not make claims about the universe, it would make claims about the way human beings conceive of the universe. And in the gap between the way the universe is and the way people conceive of the universe, there is much philosophy.
>
> ...George Lakoff "Linguistics and Natural Logic", p. 659.

While the need was thus felt for a logic that can reflect the way human beings conceive of the universe, formal semantics has tended to neglect this aspect of the language, resulting in the conspicuous lack of treatment of metaphorical expressions in a natural language, partly due to the obvious lack of interest on the part of the logicians and linguists in these types of expressions, but mostly due to the belief that no known formal mechanism was suitable for such a task. The situation, I believe, has now changed, and that metaphorical expressions can now be fruitfully studied and described within the general framework of formal semantics, given certain changes in what might be called our epistemological attitude toward linguistic expressions in general. The purpose of this paper is thus to indicate how this enterprise is to be carried out.

1. Lakoff and Johnson's theory of truth/human understanding

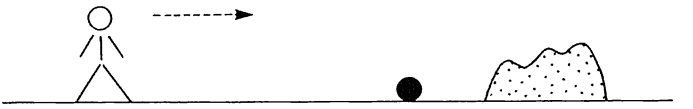
There are a variety of theories of truth, and it is not my purpose to examine these, but Lakoff and Johnson (L&J hereafter) (1980) provide a very interesting version of theory of truth, the gist of which may be appreciated from the following passage:

> *We understand a statement as being true in a given situation when our understanding of the statement* fits our understanding of the situation closely enough for our purposes. ...L&J, p. 179

In other words a statement is regarded as true in a situation when it fits our understanding of the situation. Truth cannot be something that is independent of our understanding. Since our understanding can vary from people to people, or culture to culture, this view of truth paves the way for nonuniversal, or culture-dependent truth. Some statements may be regarded as true by some and not true by some others. All this is possible simply because truth can be a very "human" or "cultural" phenomenon. Such "relativistic" view of truth may indeed be able to capture the heart of the matter where genuinely human factors are involved, and as we will see, metaphorical expressions are a prime example of what is genuinely human.

1.1 Suppose there is a ball between you and a rock, as in the following diagram, and you are standing facing them. You are to answer the question "Where is the ball?" Is it in front of the rock? or behind the rock?

(1) you ball rock



As L&J point out, given the two choices below, a native speaker of English born in America would no doubt say (a). But a Hausa speaker would use (b) in answering the same question.

(2) a. The ball is *in front of* the rock.
b. The ball is *behind* the rock.

For the Hausa speaker the statement (a) simply fails to describe the situation, and hence is false, while the reverse is the case for the American speaker. But how is this to be accounted for? This is surely not a matter of differences in deictic anchoring. According to L&J a Hausa speaker and an American speaker have different ways of understanding the same situation, and these differences are reflected on the actual linguistic expressions they use. For an American the rock is also "facing" him, while for a Hausa speaker the rock has its "back" turned to him. In other words, two different front-back orientations are "automatically" assigned to the rock, depending on the kinds of language (and hence ultimately culture) one is familiar with. While one may get the impression that this is really one of those isolated pet examples a man on the street tends to use in showing the quirks of natural languages, L&J claim that this is not so, and that a similar thing permeates human languages and in fact forms the core of natural language phenomena. Language is nothing but a reflection of how we conceive of the world around, and if our conceptions differ, so do the expressions we employ in describing a situation[3]. L&J present a bewildering number of examples trying to show their point, and below I would like to quote a fairly large number of them with a view to familiarizing the reader with the close affinity between human conceptualizations and linguistic expressions and by so doing prepare for the ensuing discussion as to how formal semantic method is to "capitalize" on L&J's view of language and truth.

1.2 Metaphorical Concepts

According to L&J many derivative concepts are formed from some basic

ones, among which are those that are related to the structure, the orientation, and the ontology of the very basic and familiar objects. And they are reflected on the linguistic expressions used. The concepts so formed they refer to as "metaphorical concepts", "metaphorical" in the sense that they usually have to do with abstract ones.

1.2.1 Structural Metaphors

The abstract notion "time" is conceptualized as something similar to less abstract and more familiar "money"; these two concepts are considered to share a notionally similar structure. Hence the following metaphor, and the expressions having to do with time. (After each set of examples is indicated the page reference to L&J.)

(3) **TIME IS MONEY**

You're *wasting* my time.
This gadget will *save* you hours.
I don't have the time *to give* you.
How do you *spend* your time these days?
That flat tire *cost* me an hour.
I've *invested* a lot of time in her.
I don't have enough time *to spare* for that.
He's living on *borrowed* time.
I *lost* a lot of time when I got sick.
etc. L&J, p. 8.

Obviously in America, money is a limited resource, and limited resources are valuable commodities. Time is similarly conceptualized **(TIME IS MONEY; TIME IS A RESOURCE;** and **TIME IS A LIMITED RESOURCE),** and therefore whatever you can do with money you can do with time to the extent that such is relevant to your daily experience[4].

1.2.2. Orientational Metaphors

We all know what is up and what is down, and this experience is projected onto our emotional, rational and other sorts of "abstract" experiences, and this fact surfaces via the medium of language. Hence we have the following metaphors and expressions.

(4) **HAPPY IS UP; SAD IS DOWN**

I'm feeling *up.* That *boosted* my spirits. My spirits *rose.*
I'm feeling *down.* I'm *depressed.* My spirits *sank.*

CONSCIOUS IS UP; UNCONSCIOUS IS DOWN

Get *up.* Wake *up.* He *rises* early. I'm *up* already.
He *fell* asleep. He *sank* into a coma. He *dropped off* to sleep.

MORE IS UP; LESS IS DOWN

The number of books printed each year keeps *going up.* My income *rose* last year. The number of errors he made is incredibly *low.* His income *fell* last year. If you're too hot, turn the heat *down.*

HIGH STATUS IS UP; LOW STATUS IS DOWN

He has a *lofty* position. She'll *rise* to the *top.* He's at the *peak* of his career. He has little *upward* mobility. He's at the *bottom* of the social hierarchy. She *fell* in status.

VIRTUE IS UP; DEPRAVITY IS DOWN

He is *high-minded.* She has *high* standards. That was a *low* trick. I wouldn't *stoop* to that. That would be *beneath* me. That was a *low-*

down thing to do.

RATIONAL IS UP; EMOTIONAL IS DOWN

The discussion *fell* to the emotional level, but I *raised* it back *up* to the rational plane. We put our feelings aside and had a *high-level* intellectual discussion of the matter. He couldn't *rise above* his emotions.

ETC., ETC. L&J, pp. 15-17.

While each experience involved may be totally different in nature, it is nonetheless correlated to our very basic experience having to do with the up-down orientation, and through this and this only these complex and abstract concepts are formed. And this is only possible with the aid of a language.

1.2.3 Ontological Metaphors

Some abstract notions are considered to have, ontologically speaking, the same form of existence as other basic physical objects; this is amply attested in the examples to follow though the ontology involved may be different in each case.

1.2.3.1 Entity and Substance Metaphors

An elusive notion like "inflation" is more or less grounded in our experience with respect to mundane garden-variety physical objects; it is conceptualized as a simple physical entity, as may be seen from the following examples.

(5) **INFLATION IS AN ENTITY**

Inflation is lowering our standard of living. If there's *much more*

inflation, we'll never survive. We need to *combat inflation. Inflation is backing* us into a corner. *Inflation is taking its toll* at the checkout counter and the gas pump. Buying land is the best way of *dealing with inflation. Inflation makes me sick.*

Regarding inflation as a kind of entity enables us to talk about it in terms of a variety of its aspects. To use L&J's phraseology, "the kinds of purposes served by ontological metaphors" are:

(6) **Referring**

My *fear of insects* is driving her crazy.
We are working toward *peace.*
The *honor of our country* is at stake in this war.

Quantifying

It will take *a lot of patience* to finis this book.
There is *so much hatred* in the world.
Pete Rose has a *a lot of hustle and baseball know-how.*

Identifying Aspects

The *ugly side of his personality* comes out under pressure.
The *brutality of war* dehumanized us all.
I can't keep up with the *pace of modern life.*

Identifying Causes

He did it out of *anger.*
Internal dissension cost them the pennant.
Our influence in the world has declined because of our *lack of moral fiber.*

Setting Goals and Motivating Actions

He went to New York to *seek fame and fortune.*
Here's what you havt to do to *insure* financial security.
The FBI will act quickly in the face of a *threat to national security.*
L&J, pp. 26–27.

1.2.3.2 Container Metaphors

A further degree of conceptualization will have it that an entity and substance are containers of some sort; hence the following metaphors and expressions.

(7a) **ENTITY AND SUBSTANCE ARE CONTAINERS**

Entity: There is a lot of land *in* Kansas.
Substance: Whey you get into the tub, you get *into* the water

EVENTS AND ACTIONS ARE OBJECTS; HENCE THEY ARE CONTAINERS

Are you *in* the race on Sunday? (race as **CONTAINER**)
Did you *see* the race? (race as **OBJECT**)
Halfway into the race, I ran out of energy. (race as **CONTAINER**)

ACTIVITIES ARE SUBSTANCES; HENCE THEY ARE CONTAINERS

There was *a lot of good running* in the race. (running as **SUBSTANCE**)
I couldn't do *much sprinting* until the end. (sprinting as **SUBSTANCE**)
In washing the window, I splashed water all over the floor. (washing the window as **CONTAINER**)
He's *immersed in* washing the window right now. (ditto)
How did Jerry *get out of* washing the windows? (ditto)

There is a lot of satisfaction in washing the windows.

STATES ARE CONTAINERS

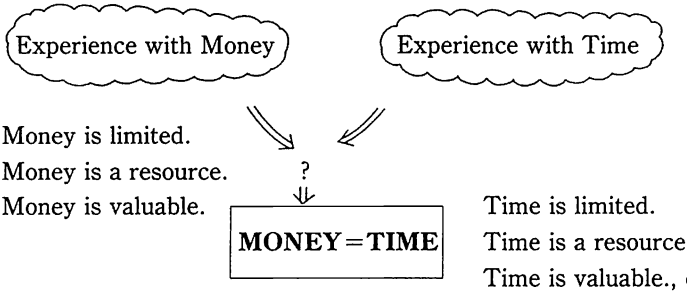
He's *in* love.
We're *out of* trouble.
He *entered* a state of euphoria.
He finally *emerged from* the catatonic state he had been *in* since the end of finals week.

L&J, p. 30-32 (Some data and annotations have been slightly altered. /TS)

1.3 Conceptualization of metaphors

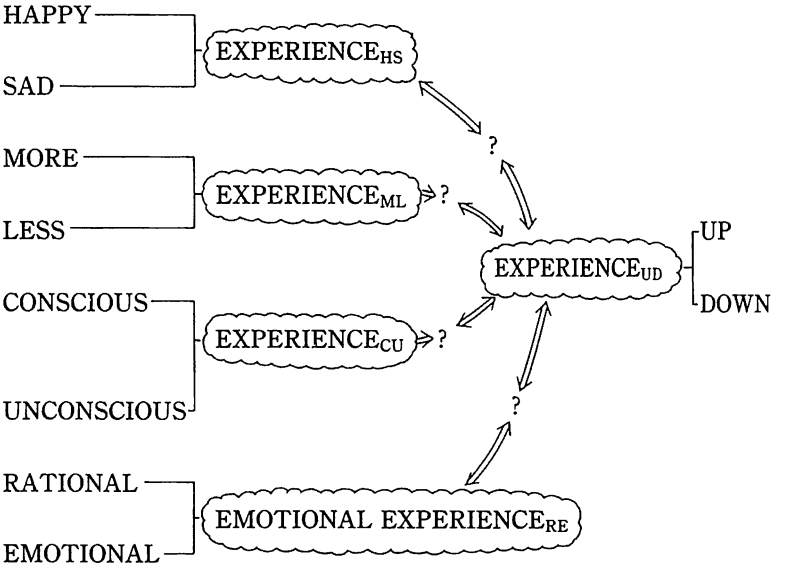
How do the conceptualizations take place? Take for instance "Time is money" metaphor. We conceptualize "time" as something similar to "money". But the experiences we have with respect to money and time are totally different in kind, and yet there is something over and beyond these experiences that somehow acts like a unifying force to enable the equation "Time is money." What is it? The question may not be for a linguist or a semanticist to answer. There is that something (represented below by "?"; call it "our ability to conceptualize" if you like) that enables us all to generalize from different kinds of experience. The following schematic diagram, while far from satisfactory, at least is meant to represent what is probably going on here[5].

(7b)



Similarly our experience with respect to "up" and "down" spatial orientation, while totally different in nature from other kinds of experiences like emotional feelings and rational thinkings, still may be regarded as similar to these in a certain respect. How such "regarding as similar to" process is effected is far from clear, and the answer may not be around for long time to come. As in (7b), the situation is schematically diagrammed below as (8) (This is a slight adaptation from L&J).

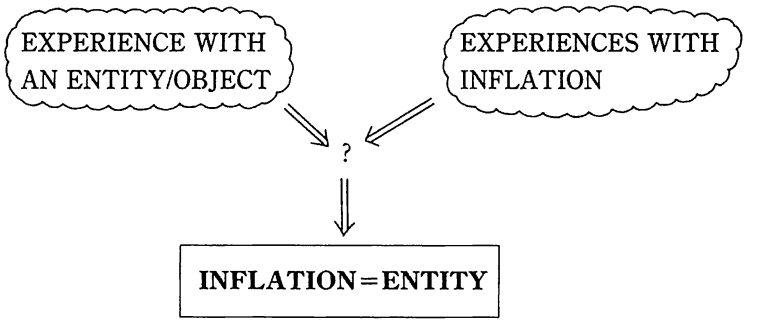
(8)



etc.

The conceptualization that yields an ontological metaphor must also be taking place in a similar fashion as in (9).

(9)



While I have said nothing substantial in this section, it is still obvious that the problem is there, and anyone interested in the human conceptualization process (inclusive of linguists and psychologists) ought to keep it in mind, if not tackle with it head on. This concludes my introduction of L&J's approach to truth, human conceptualization and linguistic expressions.

1.4 A digression: Time flies.

Consider now the problem of semantic appraisal of an innocuous sentence like "Time flies." This sentence has posed a major difficulty to many of the programmers of machine translation. The reason should be obvious. If one is to take a syntactic approach to the analysis of natural language sentences, one is forced to take an analysis by synthesis method. But the lexical entry for "time" does not, and should not as it is usually believed, contain any such information to the effect that "time" is something that flies. Consequently it cannot form any integral part of the over-all structural analysis. Hence the analysis of the sentence in question ought to fail (That is, it ought to be marked as ungrammatical). But the sentence is a completely normal English sentence. Now what if we had L&J type metaphorical concepts at our disposal? We would then have the following metaphorical concept (grounded in our experience), together with the English expressions supporting such conceptualization.

(10) **TIME IS A MOVING OBJECT**

The time will come when ...
The time has long since gone when ...
The time for action has arrived.
Coming up in the weeks ahead ...
I look forward to the arrival of Christmas.
Before us is a great opportunity, and we don't want it to pass us by.
L&J , p. 42
There will come a time when all of us must leave here. "The art of dying" ... Gerge Harrison

From the metaphorical concept (10) to the successful analysis (here synonymous with "syntactic parsing by machines") of "Time flies." is really a short step. One just follows the logical steps involved in the chain of deduction. Thus if one lets the metaphorical concept occupy a positive role in the overall analysis of natural language sentences, at least some of the difficulties now facing the machine translation begin to disappear. While it is not my intention to go deep into the problems AI people are facing today, this kind of approach indeed seems to shed some further light vis-à-vis machine translation on the nature of natural languages[6].

2.1 The role of metaphors

What we have observed above is basically equivalent to treating metaphorical concepts as some sort of meaning postulates. Treated this way, they help us interpret sentences in a certain manner. Let us this time see the problem of syntactic parsing of (11).

(11) Time flies like an arrow.

The problem is how a parser is going to assign the verb status to "flies" (and the category Prepositional Phrase among others) to "like an arrow".

Again given the following "facts" as some sort of meaning postulates:

(12) Arrows fly (when they are shot).
Time flies. (Time is a flying object)

it ought to be relatively easy to assign the following labeled bracketings.

(13) $[\text{Time}]_{NP}$ $[\text{flies}]_{v}$ $[\text{like an arrow}]_{pp}$

Indeed given (12) the following sentences, which would probably receive wild parsings by various "translation machines", ought to present no problem.[7]

(14) Time flies like Superman.
Time flies like Halley's comet.
Time flies like a U.F.O.
Time flies lika a fly.
Time flies like a pop fly.
etc.

L&J's metaphorical concepts, viewed from these angles, thus seems to be more less equivalent to meaning postulates in formal semantics. Furthermore they are not completely arbitrary postulates, for they are all reflected in the actual language use. In a sense they are "natural logic" meaning postulates. But what are meaning postulates in formal semantics? Indeed they restrict the range of possible interpretations; that is to say, they are conditions on possible interpretations. But the possilbe interpretations must be defined relative to what is possible for humans (This is what I take to be what a more linguistically oriented formal semantics[8] must define). Usually an interpretation is dèfind relative to a model. So the model has to be such that it can reflect the human conceptualization of the world (like L&J's metaphorical concepts). Thus I propose that the following be regarded as more or less synonymous where L&J's metaphorical concepts are concerned[9] although each has its own focus of attention.

(15) a. Meaning Postulates
b. Conditions on models
c. Conditions on possible interpretations
d. Conditions on our conceptualization of the world
e. Metaphorical concepts

In the next section I would like to discuss the role of a model within this kind of formal semantics.

2.2 A Model in Formal Semantics

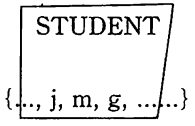
2.2.1 A model is a way of reflecting human conceptualization

The working title of this subsection speaks for itself. A model is of course a set of entities of some kind(s). So a model itself has nothing to do with human conceptualization. But note what we do when we evaluate sentences like:

(16) John is a student.
Mary is a student.
George is a student.

We find out whether each sentence is true or not (or alternatively, whether it corresponds to our understanding of a situation) by checking to see whether John, Mary, George, etc. is a student or not. And this is reflected in formal semantics by assigning a set of individuals to a predicate, say, STUDENT[10].

(17)



Should the individual turn out to be a member of the set, then the sentence is true, otherwise false. But note that, while the parallelism may not be

complete, it is possible here to regard such assignment of a set of individuals to a predicate as indeed a part reflection of our way of conceptualizing the notion "student". Let us pursue the matter further with the following examples.

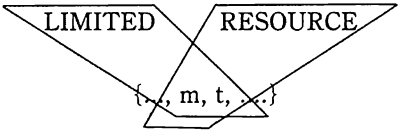
(18) Money is a resource.
Money is a limited resource.
Time is a resource.
Time is a limited resource.

What L&J's metaphorical concept

(19) Time is money.

guarantees is that time and money share (some) properties (this is at least part of our conceptual organizations of these notions)(Cf. footnote 4). We Also know that given a property theory like Chierchia (1984), where it is convincingly argued that it is technically possible to treat properties as individuals without any contradiction of the usual sort[11] (I will briefly touch on this work in relation to L&J's metaphorical concepts in sections 3.1.1-3 below), it is now logically possible (not to mention its intuitive appeal) to regard notions like time and money as sometimes corresponding to individuals of some sort in a model (for details see Chierchia (1984)). Drawing a parallel to (16) and (17), we can then diagram the situation (guaranteed by (19)) as follows:

(20)



Thus by assigning a proper set of individuals including money and time, we have "reflected" in our semantics what the metaphorical concept (19) purports to be the conceptualization of the abstract notion "time". The ingredients that have been necessary to achieve this are 1) the metaphorical concept (alias the

meaning postulate) (19) and 2) a property theory like Chierchia (1984). It thus indeed seems a model is a way of reflecting human conceptualization.

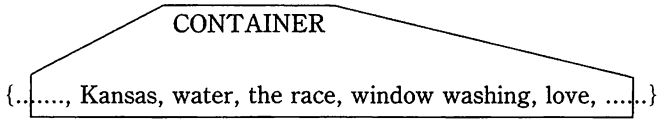
2.2.2 Some metaphors are sortal restrictiions on a model

Some of the metaphors we have seen above, especially ontological metaphors, may be better regarded as sortal restriction on a model[12]. Take for instance the container metaphor, as exemplified in the following combination of the preposition "in" and other nouns (I just repeat some relevant parts from (7a)):

(21) .....in Kansas
.....in water
.....in the race
.....in window washing
.....in love

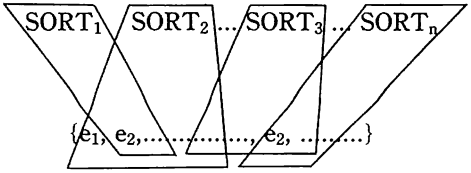
The objects denoted by these nouns (again see Chierchia (1984)) could be classified as belonging to (the metaphorical) sort CONTAINER in a model, enabling us to account for the use of locative "in" with all these nouns.

(22)



Since our conceptualization may assign different ontological "sorts" to the same object, a model in a linguistically oriented formal semantics should allow for crisscrossing of sortal restrictions, much like the following.

(23) The general structure of a model



While one may object to such sortal overlap on technical grounds, I do believe that this is in fact in the nature of human conceptualization. Morevoer it is at least possible to regard "sorts" as being on a par with other indices (of indexical semantics) so that overlapping sorts may not cause any serious technical difficulty (I will touch on the problem of execution in section 3).

2.2.4 Some unanswered questions

There are of course many important questions that are still left unanswered, some of which are:

(24) 1. What kind of metaphors do we live by?
2. Which are the conventional metaphors?
   a. Which metaphors can serve as meaning postulates?
   b. Which metaphors are more like restrictions on contexts of use?
3. Which are the sortally relevant/important metaphors?

All of these questions may ultimately be reducible to the question of relevance. That is, what kind of concepts are of human relevance?[13] These are all difficult questions to answer. But at least it seems, from what I have outlined above, that we now know how to utilize the answers in an integral description of natural languages within the general framework of formal semantics.

3. The execution problem

I would like to now point out that the kind of approach I am suggesting in dealing with L&J kind of metaphorical expressions is not entirely new and "out of the way" and in fact has very much in common with the semantic treatments of other phenomena usually considered to be beyond the "ordinary" semantics once one notices the fact that what is really involved in all these approaches is the incorporation of some sort of metaphorical concepts that reflect a certain ontological commitment into a model. This, albeit indirectly, shows that the problem of execution is solvable. For this purpose I will below take up Carlson (1974) and Chierchia (1984).

3.1 Carlson (1977)

3.1.1 Carlsonian ontology

For Carlson the bare common nouns as appear in (25) have spicial ontological status.

(25) Dogs are extinct.
Dogs are barking.
Dogs are lying on the doormat.
Dogs are mammals.

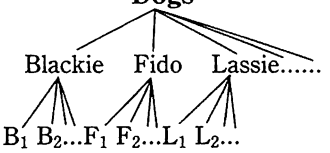
For him they just do not refer to a set of objects that are dogs[14]. Instead:

(26) **Dogs** refers to the kind-level individual.

That is, individuals are divided into two ontologically different entities, object and kind; the former is more or less what we ordinarily mean by "individual", and the latter is an individual one step higher, so to speak, or a species-referring individual that is realized by the object-level individuals.

Furthermore the object-level individual is also an abstract concept, its spatio-temporal realization being called "stages". For instance, the species denoted by the individual "dogs" has the following kind of realization relations.

(27)



KIND-LEVEL INDIVIDUALS
OBJECT-LEVEL INDIVIDUALS
STAGES

3.1.2 Carlsonian model

Based on the above ontological commitment, Carlson defines his semantics with the following kind of sorted model.

(28)

	(SORTS)
{dogs, cats, men, computers, ...,	KIND
Fido, Lassie,....., John, Mary,...	OBJECT
F_1 F_2... L_1 L_2... }	STAGE

N.B. Kind-individuals, object-individuals, stages are three sortally different entities. Here each line corresponds to each sort.

3.1.3 Carlsonian Metaphors

It is obvious then, à la L&J, what sort of "metaphors" Carlson (1977) is meant to capture; to name just a few:

(29) **DOGS ARE AN INDIVIDUAL**
DOGS ARE AN ENTITY
DOGS ARE A KIND-LEVEL INDIVIDUAL
DOGS REFER TO A PARTICULAR KIND-INDIVIDUAL

The model (28) is in a very clear sense a way of reflecting these metaphors, or metaphorical concepts. And I believe the parallelism between this and what we saw in section 2 is obvious enough.

3.2 Chierchia (1984)

3.2.1 Chierchian ontology

It is well-known that letting properties occupy argument positions as in (30) results in an infinite regress of semantic types in an ordinary type theory, creating a source of Russellian paradox.

(30) Johnny is nice.
Being nice is a virtue.
Virtue is .....

What is neat about Chierchia (1984) is that he found a way of doing semantics of natural language with basically three types, individual, property, and functor, and yet avoiding all the uncalled-for multiplication of semantic types. Where arguments and predicates are concerned, the sentnces in (30) would all look like (31) in Chierchia (1984)[15].

(31) P(a)

a ... individual of type e
P ... property of type <e, t>

That is, a property, whenever it occupies an argument position, is treated like an individual. This is even true regardless of the number of arguments involved. Thus (32) would all receive the same treatment (33) so far as the types are concerned.

(32) I want this book.
I want Mary.
I want to go.

(33) want (y) (x)
x, y ... individuals of types e
want ... 2-place function of type <e, <e, t>>

The kind of ontological commitment involved here, which Chierchia says is based on Frege's distinction "concept" & "object", is this: predicates are sometimes individuals.

3.2.2 Chierchian model

Chierchia's model then consists of the following two different kinds of inidividuals.

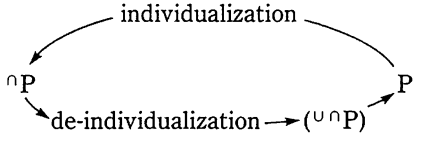
(34)

	(SORTS)
{Johnny, being nice, virtue, to go, Mary,...	BASIC INDIVIDUALS
this book, a book, every book, ... }	NON-BASIC INDIVIDUALS

N. B. Basic individuals and non-basic individuals are two sortally different individuals.

For Chierchia (and of course for Frege) properties can be conceptualized in two ways: 1) as ordinary properties, and 2) as individual images of those properties. The formation of such individual images of properties are called individualization (reflected in syntax by the operator "$^{\cap}$"); the reverse process, appropriately called de-individualization of (individualized) properties, is marked in syntax by the operator "$^{\cup}$". Thus a property P may occupy two different positions in our concept world.

(35) HUMAN CONCEPTUALIZATION



3.2.3 Chierchian metaphors

It should now be obvious what kind of metaphors (in the sense of L&J) Chierchia (1984) captures and expresses in his version of formal semantics. They are:

(36) **PROPERTIES ARE INDIVIDUALS**
COMMON NOUNS ARE INDIVIDUALS
To-INFINITIVES ARE INDIVIDUALS
GERUNDS ARE INDIVIDUALS
PROPOSITIONS ARE INDIVIDUALS
etc.

These are all said to be part of "English metaphysics". And this should appropriately be so, given our way of conceptualizing abstract concepts in the form of metaphorical concepts that are more often than not unique to the culture and language at once.

Notes

1. Part of this paper was presented in a monthly meeting of *Taiwa Kenkyuukai* on July 4, 1987 held at an ATR conference room. I am grateful to many of those who were present then and there for useful comments and discussion.
2. This name, I believe, refers to all those frameworks of linguistic analyses that are more or less an outgrowth of Montague semantics, and that they contain possible worlds semantics, some form of model theory, and truth conditional semanitcs as their basic ingredients.
3. It may not be totally useless to draw a parallel here, which is originally due to, I believe, Wittgenstein. Suppose all lines AA', BB', CC',... NN', cross at a single point P. There are a number of ways to identify the point. One could say "the point formed by lines AA' and BB'", or "the point formed by lines CC' and NN'", etc., the choice being really arbitrary. They all refer to the same point, and yet each description is different from another.
4. Obviously you cannot deposit time nor withdraw it, but this is because such is not part of our daily experience. In other words the well-established metaphorical

expressions all have to have some sort of experiential basis that can be shared by members in the society where the language is in use.

5. The diagrams below should not be taken seriously. They are at best suggestive of what it means to conceptualize "metaphorical concepts".
6. This is not to say, and I do not wish to be taken that I am saying, that the "metaphorical concept" approach is the only solution to the problem at hand. But it does appear to me that it is a promising one, manageable by both man and machine.
7. Whether the sentences in (14) all serve to form a single coherent "image" of time is a wholly different matter. Thus the first sentence seems different from the rest in the sense that while a flight in line is involved in the latter, such is not necessarily the case with the former. (I owe this observation and some additional discussion on time to Hajime Narita, Yukinori Takubo, Hiroshi Mitoo and others present at the meeting (See foot-note 1). This may indeed be so, but this observation, I believe, is not germane to the point being made in the main text.
8. By this I mean a version of formal semantics that is sincerely devoted to the characterizaition and description of natural language semantics.
9. There are those meaning postualtes that probably have nothing to do with L&J type metaphorical concepts. An entailment from "walk slowly" to "walk" is one such example.
10. I will write in capitals the expressions of formal logic, choosing from English the obvious corresponding expressions.
11. That is Russell paradox does not arise in Chierchian semantics of properties and individuals.
12. I suspect that meaning postulates and sortal restrictions are not two sides of the same coin. They both seem to restrict the range of possible interpretations. Thus what is involved between them may be just a trade-off relationship.
13. In this regard see again the passage quoted from L&J in section 1 above.
14. I cannot possibly do any justice to Carlson (1977) in this limited space. For full details the reader is strongly advised to refer to Carlson (1977).
15. I am not correctly representing all the details in Chierchia (1984) below. This does not affect the point being made in this section. Interested readers should consult Chierchia (1984) for further details.

References

AUTHOR	YEAR	TITLE
Carlson, Gregory N.	1977	*Reference to Kinds in English*, University of Massachusetts (Amherst) Ph. D. dissertation, distributed by IULC.
Chierchia, Gennaro	1984	*Topics in the Syntax and Semantics of Infinitives and Gerunds*, Ph. D dissertation, University of Massachusetts.
Lakoff, George & Mark Johnson	1980	*Metaphors We Live By.* Chicago: The University of Chicago Press.