HANDOUT 4: NAMES AND PREDICATES

To this point, we've only considered the meanings of sentences as wholes. In this handout we will begin the business of predicting the denotations of sentences from the denotations of their parts by positing suitable denotations for names and predicates.

Road map: Where we are and where we are going

- Sentences express propositions. We identified propositions with sets of situations, the sets of possible situations in which they are true.

- We explored the consequences of taking propositions to be sets of possible situations: We were able to define some crucial semantic notions: Consistency, compatibility, tautology, contradiction, logical consequence, relative informativeness.

- We looked at a first account of two simple cases of compositionality. By interpreting **and** as set intersection, and **or** as set union, we could compute the denotations of sentences that are the result of conjoining simpler sentences with the help of **and** and **or**.

- Goal ahead: We will continue to explore how the denotation of a sentence can be computed from the denotations of its parts. This gives us an understanding of the productivity of meaning. Speakers of a language are able to understand the meaning of sentences they have never heard before.

- How to reach the goal: Posit suitable set theoretic entities as denotations for sentence parts. We will start out with sentences whose immediate constituents are a referring NP and a predicate. The predicate may be a simple intransitive verb in its progressive form, or an adjective and the copula "be", or a complex VP. The copula "be" is arguably just a meaningless carrier of verbal inflection. We will neglect the semantic contribution of verbal inflection for the time being.

This approach is a lot like putting together a jigsaw puzzle. We know what the picture on the box looks like; we know that denotation of a sentence is a set of possible situations, the set of possible situations in which the sentence is true. Now we need to find puzzle pieces that when put together give us that picture. We need denotations that when put together give us the right sets.

Names and Predicates

Names

Names pick out unique individuals. For example:

[[**New York**]] = the city of New York in the state New York.
[[**The Golden Gate Bridge**]] = The Golden Gate Bridge in San Francisco.
[[**Amherst**]] = the town of Amherst in Massachusetts.

Since there is more than one town of Amherst, **Amherst** might refer to different towns in different contexts. For instance, you might have said **Amherst** referring not to the town in in Massachusetts, but to the town of the same name in Western New York. We won't worry about this now, but we'll come back to the issue at the end of the handout.

Predicates

The denotation of a predicate is a function that maps possible situations into sets of individuals.

Illustrations:

The denotation of the predicate **is dancing** is the function that maps every possible situation s into the set of individuals that are dancing in s.

The denotation of the predicate **is polluted** is the function that maps every possible situation s into the set of individuals that are polluted in s.

More formally:

[[**is dancing**]] = that function that maps any possible situation s into the set of individuals that are dancing in s. That is, for any possible situation s, [[**is dancing**]](s) = { a : a is dancing in s }.

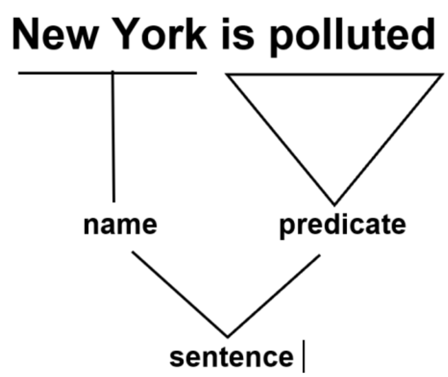
[[**is polluted**]] = that function that maps any possible situation s into the set of entities that are polluted in s. That is, for any possible situation s, [[**is polluted**]] (s) = { a : a is polluted in s }.

Comment:
If S is the universe of possible situations, and E is the universe of possible individuals, then the denotations of predicates are functions that map the members of S into subsets of E. That is, they are functions whose domain is S and whose range is the power set of E.

<u>A note on the notation</u>

Boston	A name, that is, a linguistic expression. Rather than bold face, we ma Also use underlining or quotation marks. "Boston" is a name, and so is <u>Boston.</u> I will use boldface in my handouts, and underlining on the blackboard. I suggest you use underlining in your written work.
Boston	A city, not a name. We say that Boston is a big city, but it is Boston, not Boston that has six letters.
[[**Boston**]]	The denotation of the name **Boston**.
is dancing	A predicate, that is, a linguistic expression.
[[**is dancing**]]	The denotation of the predicate **is dancing**, that is, the function that assigns to every possible situation s the set of individuals that are dancing in s.
[[**is dancing**]](s)	The result of applying the above function to the situation s, that is, the set of all individuals that are dancing in s.

Computing the denotations of simple sentences



The Predication Rule (= PR)
If α is a referring NP and β is a predicate, then

[[α β]] = { s ∈ S : [[α]] ∈ [[β]] (s) }.

Computation of the semantic value of the sentence **New York is polluted**.

1.	[[**New York**]] = New York	Lex.
2.	For all s ∈ S, [[**is polluted**]] (s) = {a ∈ E: a is polluted in s}	Lex.
3.	[[**New York is polluted**]] =	PR
	= { s ∈ S: [[**New York**]] ∈ [[**is polluted**]] (s) }	
	= { s ∈ S: New York ∈ {a ∈ E: a is polluted in s} }	1,2
	= { s ∈ S: New York is polluted in s }	Set Theory
	= the set of all possible situations s such that New York is polluted in s.	

Food for thought

The principle of set theory used in step 3 is the Comprehension (or Abstraction) Principle. Here are some more instances of the principle:

Mary ∈ { a ∈ E: a is a participant in the show} iff Mary is a participant in the show.
Fred ∈ { a ∈ E: a is a student of zoology} iff Fred is a student of zoology.

The Comprehension Principle seems obvious and innocent, so obvious in fact that you might wonder why we should mention it as a principle at all. The unrestricted (naïve) version of the principle says that for every property P there is a set containing all and only those individuals that have P. If P is the property of being a participant in the show, for example, then the principle says that there is a set A = {a ∈ E: a is a participant in the show} that contains all and only the participants in the show as members. Obvious as it may seem, in its unrestricted form, the Comprehension Principle implies Russell's Paradox. Here is a statement of the Axiom of Comprehension.

For any property P and any a, P(a) if and only if a ∈ { x: P(x) }.

Convince yourself that the axiom implies Russell's paradox, if we don't constrain the properties it can apply to: Take P to be the property of not being a member of oneself, and then start wondering whether the set A = { x: ¬ (x ∈ x) } has P. Suppose it does. Then according to Comprehension, A ∈ { x: ¬(x ∈ x) }. But then A doesn't have P. Suppose now that A doesn't have P. Then according to Comprehension, A ∉ { x: ¬ (x ∈ x) }. But then A has P.

Do we have to worry?

Let's not lose sleep over this. We'll avoid the dangerous properties.

Thinking about what we have achieved

The Predication Rule tells us how we can describe many types of possible situations by putting a referring NP next to a predicate. The referring NP picks out an individual, the predicate picks out a set of individuals in every possible situation. The possible situations described by the NP+ Predicate combination is the set of all possible situations in which the referent of the NP is a member of the set picked out by the predicate. It's that easy. We can combine any referring NP with any predicate to describe a great variety of possibilities. Our semantic machinery looks primitive so far, but it already allows us to convey the content of simple thoughts, dreams, fantasies and lies - merely by putting a name or a pronoun next to a predicate.

Further thoughts about our machinery

<u>A note on context</u>

We began our journey by identifying propositions with sets of situations, the sets of possible situations in which they are true. It doesn't take much for us to see strictly speaking this can't be right. Consider the sentence in (1)

(1) **I am as old as you are**.

Sentence (1) all by itself does not determine a set of possible situations. It determines different sets of possible situations in different utterance situations. If Nina utters it addressing Anna, (1) determines the set of all possible situations in which Nina is as old as Anna is. If Jonas utters (1) addressing Jacob, (1) determines the set of all possible situations in which Jonas is as old as Jacob is. The context dependency of (1) is due to the context dependency of some of the words in (1). Words like "I" and "you" all by itself do not pick out individuals, they only pick out individuals with respect to an utterance situation. The denotations of linguistic expressions, then, depend on a <u>parameter</u>, the utterance situation. Utterance situations are possible situations of the very same kind as the possible situations we have been working with all along, of course.

How do we know what kind of context information we have to rely on when interpreting sentences in context? Often, it is part of the meaning of lexical items to tell us what kind of context information they require. We might formalize this as follows:

For all possible (utterance) situations c:

[[**I**]]^c = the speaker in c.

[[**you**]]^c = the hearer in c.

This helps us out of our problem with **Amherst** as well. In most contexts, when I say **Amherst** I mean

[[**Amherst**]]^c = (The) Amherst (in Western Massachusetts)

Notice that the parameter is carried along as a part of our interpretation function.

[[**I am wearing the same shirt as you are**]]^c =

{s ∈ S: In s, the speaker in c is wearing the same shirt as the hearer in c}.

[[**I am speaking**]]^c =

{ s ∈ S: The speaker in c is speaking in s}.

Think about all of the context dependency in the following sentences

I should not be speaking now.
You might not have made it to class today, if.....

To keep things simple, we won't include the contextual parameter in our computations, but know that strictly speaking sentences denote propositions in contexts. For more on this type of context dependency you can consult the following:

Best theoretical reference

David Kaplan: "Demonstratives". In J. Almog, J. Perry, and H. Wettstein (eds.): Themes from Kaplan. Oxford University Press, Oxford, 1989, 481-614.

Best descriptive reference

Charles J. Fillmore: Santa Cruz Lectures on Deixis. Indiana University Linguistics Club, 1975.

Naming and necessity

We are identifying the denotations of names with individuals and the denotations of predicates with functions from situations to individuals. A predicate like **is polluted** says give me a situation and (once you take my denotation) I'll give you back the set of things that are polluted in that situation. In the semantics we are building, predicates, then, are "situation dependent", but proper names are not. Why is that?

The next four sections of this handout are lifted directly from Chapter 6 of David Papineau's 2012 book *Philosophical Devices: Proofs, Probabilities, and Sets*, published by Oxford University Press. His discussion of naming and necessity will help answer our question. Keep in mind that our notion of a possible situation is essentially the same as a possible world as referred to by Papineau. See also the classic reference Kripke, Saul. 1980. *Naming and Necessity*. Cambridge: Harvard University Press.

Two reading of statements of necessity

Consider a statement like

(1) The inventor of the zip necessarily invented the zip.

This can be read two ways

(2) It is necessary that the inventor of the zip invented the zip.

This says that , in any possible world, the person who invented the zip, whoever that might be, invented the zip. (2) is true. It would violate logic for there to be a world within which the person who invented the zip did not invent the zip.

(3) The inventor of the zip necessarily invented the zip.

Now we are focusing on the actual inventor of the zip, the person who happened to invent the zip in the actual world. The question is whether he or she necessarily invented the zip. It is clear that the answer is negative The actual inventor of the zip could well have been dropped on his or her head as a child, say, and so grown up too stupid to invent the zip, or gone off to join the French Foreign Legion. Whoever invented the zip, it was not essential to their nature that they did so. It is quite possible that the actual inventor of the zip should have failed to invent the zip.

(2) It is necessary that the inventor of the zip invented the zip.

In more explicit notation:

(Necessarily)(the inventor of the zip) (invented the zip)

So here we can say that the prefix '(Necessarily)' has wide scope, while the description '(the inventor of the zip)' has narrow scope.

The other reading was

(3) The inventor of the zip necessarily invented the zip.

More explicitly:

(The inventor of the zip)(necessarily) (invented the zip).

Now it is the description '(The inventor of the zip)' that while the prefix '(necessarily)' has narrow scope.

Julius and the Inventor of the Zip

[Earlier in the book, Papineau makes the point that the sentence **Julius invented the zip** is clearly *contingent*, that is, unlike, say a tautology or a contradiction, it is neither true nor false in every possible world. He goes on in this chapter note that (4) is definitely false:]

(4) Julius necessarily invented the zip

But – and this is the puzzle – how come this is definitely false, rather than ambiguous between a true and a false reading? I started this chapter by observing that the statement (1) – **the inventor of the zip necessarily invented the zip** – is ambiguous between a true and false reading. But surely (4) and (1) must mean the same. After all 'Julius' was explicitly defined as the 'inventor of the zip'. So, given that (1) is ambiguous, why isn't (4) similarly ambiguous? But on the face of it, (4) is indeed definitely false, not ambiguous.

However there is a difference between (4) and (1). Even though 'Julius' was defined as the inventor of the zip, so to speak, it remain the case that 'Julius' is a *proper name*, where 'the inventor of the zip' is a *description*.

And this difference explains why (4) is definitely false, while (1) is ambiguous. The fact that 'Julius' is a proper name forces us to read for as about the person who invented the zip in the actual world, and so as akin to the reading of (1) in which 'the inventor of the zip' has wide scope and 'necessarily' has narrow scope. What (1) – **the inventor of the zip necessarily invented the zip** – can be read in two way, depending on whether we ascribe a wide or narrow scope to 'necessarily', (4) – **Julius necessarily invented the zip** – can only be understood one way, as saying (falsely) of Julius that he or she necessarily invented the zip.

Rigid Designators

Proper names are terms for people, places, and other important objects – like 'David Papineau', 'London', 'Titanic', and so on. They are typically written with capital letters, and their function is to pick out some individual, rather than convey descriptive information about it.

This is why in modal statements they always work like descriptions with wide scope. (A *modal* statement is any statement saying something is necessary or possible.) We cannot help but understand modal statements made using proper names as first identifying some object and then saying what is necessary or possible about it. (And this remains the case even when, as with 'Julius', the proper name has explicitly been attached to its bearer with the help of some description.)

Words that always work like this in modal statements are called '*rigid designators.'* Proper names are the most obvious examples of rigid designators. But there are arguably other species of this genus. In particular, many philosophers think that names of scientific categories – like 'hydrogen', 'water', 'tiger', and so on – are also rigid designators.

It is sometimes said that 'rigid designators have their referents necessarily'. But this can be confusing. The idea is not that the *word* 'David Papineau' necessarily names [the author of this text]. That is obviously false – [he] could easily have been given a different name.

Rather the idea is that the name 'David Papineau' (as used in the actual world) picks out a certain actual individual about that same individual and saying what is necessary or possible about it.

Some final thoughts

Papineau notes that some philosophers believe that the names of scientific categories like 'water' are rigid designators. You might consider what role that view has in Putnam's argument outlined in Handout 1.

In Handout 1, we said that definite descriptions like **the tallest mountain in Massachusetts** can be used to refer. If we're right about this, then they must do so in a different way than proper names. Definite descriptions would seem to be world/situation dependent. We won't be able to pursue this topic any further here. There is, however, a long and important philosophical literature on whether definite descriptions refer and if so how. You can find a gentle introduction to it and other topic areas important to semantics in William G. Lycan's book *Philosophy of Language: A Contemporary Introduction.*

We'll move forward working with proper names, basically ignoring the complications that a distinction between proper names and definite descriptions introduces.