

Possible Worlds: From Spinoza to Kripke

Johns Hopkins University, Fall 2014

Course Information

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Office Hours	Melamed: T 11:45am-12:45pm Bledin: Th 2:30pm-4:00pm & by appt
Class Code	AS.150.423
Class Time	T 1:30pm-4:00pm
Class Location	Gilman 217

Course Description

In studying the logic and metaphysics of modality, it has become almost universal practice for philosophers to speak of other *possible worlds*. In this course, we investigate the use of this concept in the philosophical tradition, from the early appearance of possible worlds in the work of Leibniz and Spinoza, to their later rise to prominence in the work of Kripke, Lewis, Stalnaker, and many others.

Schedule

Here is the tentative seminar schedule. It is subject to revision as the semester progresses.

Sep 2 Introduction.

1. Possible Worlds through the Ages

- Sep 9 Simo Kuuttila. Modality. In John Marenborn, editor, *Oxford Handbook of Medieval Philosophy*, pages 312–341. Oxford University Press, 2012.
- Sep 16 Taneli Kukkonen. Possible Worlds in the *Tahafut al-Falasifa*; Al-Ghazali on Creation and Contingency. *Journal of the History of Philosophy*, 38(4):479–502, 2000.
- René Descartes. *Principles of Philosophy*, 1644. [II 22]
- René Descartes. *Discourse of Method*, 1637. [V, AT VI 43]
- Sep 23 Spinoza. *Ethics*, 1677. [Part I E1d1 E1d8 E1p11d E1p16 E1p29 E1p33, Part II Proposition 8, Letters 63–66]

- Sep 30 Robert Adams. *Leibniz: Determinist, Theist, Idealist*. Oxford University Press, Oxford, 1994. [pp. 3–110]
- Gottfried Leibniz. Necessary and Contingent Truths.
- Gottfried Leibniz. Principles of Nature and Grace.
- Oct 7 Leibniz continued.
- Oct 14 Tapio Korte, Ari Maunu, and Tuomo Aho. Modal Logic from Kant to Possible Worlds. In Leila Haaparanta, editor, *The Development of Modern Logic*, pages 516–550. Oxford University Press, 2009.

2. Possible Worlds on the Contemporary Scene

- Oct 21 W. V. O. Quine. Three Grades of Modal Involvement. In *Proceedings of the XIth International Congress of Philosophy*. North Holland, 1953.
- Saul Kripke. *Naming and Necessity*. Harvard University Press, Cambridge, 1980. [Preface, Lecture I]
- Oct 28 Crash Course: Modal Logic and its Applications.
- Nov 4 David Lewis. *On the Plurality of Worlds*. Blackwell, Oxford, 1986.
- Nov 11 Robert Stalnaker. *Inquiry*. MIT Press, Cambridge, 1984. [Chapters 1 and 3]
- Nov 18 David Chalmers. The Nature of Epistemic Space. In Andy Egan and Brian Weatherson, editors, *Epistemic Modality*, pages 60–107. Oxford University Press, 2011.
- Dec 2 Boris Kment. Varieties of Modality. In Edward N. Zalta, editor, *The Stanford Encyclopedia of Philosophy* (Winter 2012 Edition). <http://plato.stanford.edu/archives/win2012/entries/modality-varieties/>.
- Boris Kment. Chance and the Structure of Modal Space. Unpublished manuscript.
- Boris Kment. *Modality and Explanatory Reasoning*. Oxford University Press, Oxford, forthcoming. [Chapter 1]

Requirements

The requirements for this seminar are two 15 – ϵ page double-spaced term papers. The first paper should address the first part of the course and is due on Oct 21. The second paper should address the second part of the course and is due on Dec 9.

In lieu of satisfying these requirements, graduate students can submit a 30 – ϵ page double-spaced paper on a topic of their choice on Dec 9.

Enjoy the seminar!

Quine versus Kripke on Modal Logic

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1 Quine against Modal Logic

It is the 1950s and W. V. O. Quine, in his seat of power at Harvard, is busy keeping modal logic down. In ‘Three Grades of Modal Involvement’ [1953], Quine presents a series of influential arguments against the treatment of necessity as an operator on arbitrary formulae.

He distinguishes between three different levels of modal involvement:

1. Necessity as Predicate: $\text{Nec}('9 > 5')$
2. Necessity as Operator on Closed Formulae: $\Box(9 > 5)$
3. Necessity as Operator on Open/Closed Formulae: $\Box(x > 5)$

Quine thinks 1 is innocuous, so long as necessity is construed as logical necessity, set-theoretic necessity, etc., and not as *analyticity* (he famously rejects the analytic/synthetic divide in [1951]). He thinks 2 is also fine since uses of ‘ \Box ’ on closed formulae are easily converted to uses of the predicate ‘Nec’. But there is a slippery slope from 2 to 3, and if we start applying ‘ \Box ’ to open formulae, Quine thinks that we have become too involved. Given the conversion from 2 to 1, and Quine’s understanding of ‘Nec’, he rejects interesting forms of modal logic (note that if ‘Nec’ is understood as logical necessity, say, then we will not be too concerned with iterations of this predicate).

1.1 Referentiality

To understand some of Quine’s objections to 3, we need some preliminaries:

Def. An occurrence of a singular term t is *purely referential* if the term serves in context simply to refer to its object.

Frege’s criterion for referential occurrence is substitutivity of identity: we can substitute a coextensive singular term t' for t and preserve truth.

Def. A context is *referentially opaque* when, by putting a statement φ into that context, we can render a purely referential occurrence of a singular term t in φ non-referential in the entire context.

Example:

- (1) Yitzhak uttered ‘Yitzhak is hungry’ because he had not eaten breakfast

The first occurrence of ‘Yitzhak’ in (1) is purely referential while the second occurrence is not (substitute ‘Professor Melamed’ for the occurrences of ‘Yitzhak’ and consider whether (1) would still be true). The environment ‘Yitzhak uttered ‘...’ because he hadn’t eaten breakfast’ is thus referentially opaque.

Referential opacity has two ‘marks’. First, as just discussed, we cannot in general substitute coextensive terms inside a referentially opaque context. Second, we cannot in general *quantify into* a referentially opaque context. These criteria rise and fall together. (Intuitively: Quantified formulae are evaluated for truth by assigning *objects* in the domain to the bound variables, so these variables must occupy purely referential positions.)

Another example:

- (2) Giorgione was so-called because of his size
- (3) $\exists x(x \text{ was so-called because of his size})$

The occurrence of ‘Giorgione’ is not purely referential. Thus quantifying into that position is problematic. What is the object that was so-called because of its size?

1.2 First Argument

Let us now discuss a couple of Quine’s arguments. Here is the first one:

- (4) $\Box(9 > 5)$
- (5) The number of planets = 9
- (6) $\Box(\text{The number of planets} > 5)$

According to Quine, (4) and (5) are true (recall that Pluto was a planet back then) but (6) is false. Thus, by Frege’s criterion, the occurrence of ‘9’ in (4) is not purely referential, and since the occurrence of ‘9’ in the embedded ‘ $9 > 5$ ’ *is* purely referential, ‘ \Box ’ creates a referentially opaque context.¹ So we cannot in general quantify through ‘ \Box ’ and we should reject the move to the third grade of modal involvement.

However, there is a quick response due to Smullyan and acknowledged by Quine. On the Russellian account of definite descriptions, there is a scope ambiguity in (6) between:

¹Quine also argues for the referential opacity of ‘ \Box ’ with ‘The Slingshot’, but I will not discuss this here.

$$(7) \quad \Box(\exists x(Nx \wedge \forall y(Ny \supset y = x) \wedge x > 5))$$

$$(8) \quad \exists x(Nx \wedge \forall y(Ny \supset y = x) \wedge \Box(x > 5))$$

where $Nx : x$ numbers the planets. Resolving the scope ambiguity in (6) as (8), the argument doesn't actually show that the occurrence of '9' in (4) is not purely referential.

One might also, like Quine himself, reject the need for constant singular terms in logic and be suspicious of any argument that relies on them.

1.3 Second Argument

The next argument does not depend on the behavior of singular terms. This is, to my mind, Quine's best argument. It starts from the principle of the *indiscernability of identicals*:

$$(9) \quad \forall x \forall y (x = y \supset \varphi x \equiv \varphi y)$$

where ' φx ' and ' φy ' are open formulae with x and y free respectively. If ' \Box ' operates on open formulae, we have:

$$(10) \quad \forall x \forall y (x = y \supset \Box(x = x) \equiv \Box(x = y))$$

Since $\forall x(\Box(x = x))$:

$$(11) \quad \forall x \forall y (x = y \supset \Box(x = y))$$

So all identities are necessary. But if necessity is understood as logical necessity, etc., and we allow unrestricted use of the *substitutional* quantifier rule Σ Elim, then (11) implies many falsehoods. For instance, neither 'The number of planets is 9' nor 'Hesperus is Phosphorus' are logically valid. We must look at the sky.

Even if we restrict Σ Elim, Quine still worries that quantified modality "leads us back into the metaphysical jungle of Aristotelian essentialism" (p. 174). At the first grade of modal involvement where the predicate 'Nec' applies to names of sentences, necessity resides in language. However, if we traffic in predicates like ' $\Box(x = x)$ ' and ' $\Box(x > 5)$ ', necessity resides in the things talked about—there are *essential* and *accidental* properties. Quine does not like this. Is it a necessary property of the ninth member of the natural number sequence that it is greater than 5? Specified as '9', it is tempting to answer 'Yes'. Picked out as 'The number of planets', it is tempting to answer 'No'.

2 Kripke's Defense

But enter Kripke. In a series of lectures delivered at Princeton in 1970, later published as *Naming and Necessity* [1980], Kripke defends quantified modal logic and helps clarify its foundations.

2.1 A *prioricity* versus Necessity

One of the most important contributions in *Naming and Necessity* is Kripke's comparison of '*a priori*' and 'necessary'. As he understands these expressions, they are not synonymous:

Def. An *a priori* truth is one that can be known independently of all experience.²

Def. A *necessary* truth is one such that, in this respect, the world could not have been otherwise.

Whereas a *prioricity* is an *epistemological* concept having to do with our sources of knowledge, necessity is an intuitive *metaphysical* notion brought out in ordinary modal discourse.³

With necessity conceived in this way, Kripke thinks that (11) is obviously true—identical objects are necessarily identical. Relatedly, objects can have both essential and accidental properties:

I don't know if some philosophers have not realized this; but at any rate it is very far from being true that this idea [that a property can meaningfully be held to be essential or accidental to an object independently of its description] is a notion which has no intuitive content, which means nothing to the ordinary man. Suppose that someone said, pointing to Nixon, 'That's the guy who might have lost'. Someone else says 'Oh no, if you describe him as 'Nixon', then he might have lost; but, of course, describing him as the winner, then it is not true that he might have lost'. Now which one is being the philosopher, here, the unintuitive man? (p. 41)

Whereas Nixon might not have won the election, presumably he could not have been an inanimate object (and he surely could not have been non-identical with Nixon).

²But not one that *must* be known independently of experience.

³Kripke largely ignores *analyticity*, stipulating that an *analytic truth* is true by virtue of its meaning in all possible worlds (so analyticity implies both *a prioricity* and necessity).

Since the *a priori* and the necessary are conceptually distinct, it is a non-trivial philosophical thesis that these concepts extensionally coincide. In fact, Kripke argues that they come apart in both directions. There are necessary *a posteriori* truths:

- (12) Hesperus is Phosphorus.
- (13) The actual U. S. President in 2014 is Barack Obama.

There are also contingent *a priori* truths:

- (14) The length of the standard meter in Paris at t_0 is one meter.
- (15) Jack the Ripper is a murderer.

2.2 Rigid Designators

To elaborate on these latter points, let us now turn to some theses about language. Another influential contribution in *Naming and Necessity* is Kripke's distinction between *rigid* and *accidental designators*:

Def. A singular term t is a *rigid designator* just in case it designates the same object in every possible world in which this object exists. If the object is a necessary existent, then t is *strongly rigid*.

Def. A singular term t is an *accidental designator* just in case it designates different objects across possible worlds.

It follows from the necessary identity of identical objects that true identity statements between rigid designators are necessarily true. That is, we can safely substitute rigid designators for the variables in (11). But are there rigid designators in natural language?

Key thesis: Proper names like 'Hesperus', 'Phosphorus', and 'Jack the Ripper' are rigid designators.⁴ Though we cannot know independently of experience that Hesperus is Phosphorus, (12) is necessarily true.

On the other hand, definite descriptions like 'The U. S. President in 2014' and 'The length of the standard meter at t_0 ' are accidental designators (though such designators can be *rigidified* as in (13)). If we fix the referent of 'one meter' to be the length of the standard meter at t_0 , then (14) is *a priori*. But 'one meter' is rigid and 'The length of the standard meter at t_0 ' is accidental, so (14) is only contingently true.

⁴Kripke also thinks that indexicals like 'I' and 'you' and demonstratives like 'this' and 'that' are rigid.

Why does Kripke think that proper names are rigid? Because he thinks this gives the right counterfactual truth conditions for sentences involving names. Consider:

- (16) Aristotle was fond of dogs.

The truth of this sentence in the actual world presumably turns on whether a particular individual, Aristotle (the last great philosopher of antiquity), has the property of being fond of dogs. According to Kripke, the truth condition of (16) in a counterfactual situation is the same—what matters is whether the aforementioned man, Aristotle (who might not be a great philosopher, or even a philosopher at all, in the counterfactual situation), has the property of being fond of dogs. If 'Aristotle' were accidental—as it would be if 'Aristotle' were synonymous with 'The last great philosopher of antiquity'—then we might have to consider whether some other person is fond of dogs.

2.3 Possible Worlds

Note that Kripke does not say, as Lewis [1968] would, that the evaluation of (16) in a counterfactual scenario requires that we consider a *counterpart* of Aristotle. Kripke thinks that counterpart theory, and the very problem of *transworld identification*, rests on a misconception of the possible worlds that underly his conception of necessity and his distinction between rigid and accidental designators.

In the Preface to *Naming and Necessity*, Kripke points out that something like the notion of a possible world is already familiar to us from our early elementary school probability calculations. Two ordinary dice, die A and die B, are thrown. What is the probability that A comes up 6 and B comes up 5? Answer: $1/36$. Why? Because there are 36 possible states of the pair of dice, though only one of these is the state in which A comes up 6 and B comes up 5. But we need not, and probably did not, think of these possible states of the dice as concrete complex particulars in some far-off space.⁵

When we talk in school of thirty-six possibilities, in no way do we need to posit that there are some thirty-five *other* entities, existent in some never-never land, corresponding to the physical object before me. Nor need we ask whether these phantom entities are composed of (phantom) 'counterparts' of the actual individual dice,

⁵These miniature possible worlds/states are the *situations* of situation semantics. See Kratzer [1989].

or are somehow composed of the same individual dice themselves but in ‘another dimension’. The thirty-six possibilities, the one that is actual included, are (abstract) *states* of the dice, not complex physical entities. (p. 17)

The same goes for maximally specific possible worlds:

‘Possible worlds’ are little more than the miniworlds of school probability blown large. (p. 18)

The actual world and the various non-actual possible worlds can still be thought of as members of the same kind. But this kind is abstract. To avoid confusion, we might speak instead of ‘possible states of the world’ or ‘counterfactual scenarios’.

Importantly, possible worlds are not *discovered* but *stipulated* by us:

A possible world isn’t a distant country that we are coming across, or viewing through a telescope. Generally speaking, another possible world is too far away. Even if we travel faster than light, we won’t get to it. A possible world is given *by the descriptive conditions we associate with it*. (p. 44)

‘Possible worlds’ are *stipulated*, not *discovered* by powerful telescopes. There is no reason why we cannot *stipulate* that, in talking about what would have happened to Nixon in a certain counterfactual situation, we are talking about what would have happened to *him*. (p. 44)

The specification of a possible world needn’t be purely qualitative. Indeed, the rigidity of proper names allows us to use these singular terms to specify counterfactual situations involving named individuals. Proper names are useful not because they serve as “pegs on which to hang descriptions” (Searle [1958]), but rather because they allow us to specify alternative possible states of the world involving people and objects we care about.

References

- Angelika Kratzer. An investigation of the lumps of thought. *Linguistics and Philosophy*, 12(5):607–653, 1989.
- Saul Kripke. *Naming and Necessity*. Harvard University Press, Cambridge, 1980.
- David Lewis. Counterpart theory and quantified modal logic. *Journal of Philosophy*, 65(5):113–126, 1968.
- Willard V. Quine. Two dogmas of empiricism. *Philosophical Review*, 60(1):20–43, 1951.
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Stalnaker on Possible Worlds

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1 Particulars versus Properties

In Chapter 3 of *Inquiry* [1984], Stalnaker argues against Lewis' [1973] *extreme realism* about possible worlds and defends his own *moderate realist* position. He focuses on the following four Lewisian theses (p. 45):

1. Possible worlds exist.
2. Other possible worlds are things of the same sort as the actual world.
3. The indexical analysis of the adjective 'actual' is the correct analysis.
4. Possible worlds cannot be reduced to something more basic.

Like Lewis, Stalnaker happily accepts thesis 1. He agrees with Lewis who writes in *Counterfactuals*:

I believe that there are possible worlds other than the one we happen to inhabit. If an argument is wanted, it is this. It is uncontroversially true that things might be otherwise than they are. I believe, and so do you, that things could have been different in countless ways. But what does this mean? Ordinary language permits the paraphrase: there are many ways things could have been besides the way they actually are. On the face of it, this sentence is an existential quantification. It says that there exist many entities of a certain description, to wit 'ways things could have been'. (p. 84)

However, Stalnaker resists thesis 2—at least if 'the actual world' denotes a concrete particular, or some entity made up of concrete particulars and events.¹ For one thing, Lewis' argument establishes only that there are abstract 'ways things might have been'. One can accept 1 and hold that possible worlds are abstract properties, only one of which is instantiated by reality.

For another thing, Stalnaker argues that extreme realism cannot account for the reasonableness of our modal beliefs. If possible worlds are causally disconnected concrete entities, it is not clear how we can know or justifiably

¹Note that Stalnaker differs from Kripke [1980] who claims that the actual world and its alternatives are all abstract states.

believe anything about them. Hence, it is not clear how we can know or justifiably believe that anything is metaphysically possible or necessary:²

As Lewis says in the argument quoted above, 'I believe and so do you, that things could have been different in countless ways'. But we also believe that this belief is a reasonable one, and not a speculation about what is going on in some place so far away that it is not even part of our universe. (p. 49)

Stalnaker also discusses how it is tempting to move from the semantic thesis 3, which he accepts, to the metaphysical thesis 2, which he rejects. The indexical analysis of 'actual' suggests that actuality is a highly contingent matter. That a particular world is actualized is true relative to one world (itself) but false relative to all others. But if possible worlds are abstract properties, then only one of these is special *from the standpoint of any world* in that it is instantiated by reality. Actuality is no longer contingent.

Stalnaker objects to the last part of this. Sure enough, the way things are is a special property instantiated by reality. Nevertheless, if reality had instantiated some other possible world, then *this* possible world would be this special property.

2 Possible Worlds versus Propositions

As for thesis 4, Stalnaker considers the following proposal by Adams [1974] to reduce possible worlds to propositions:

Let us say that a *world-story* is a maximal consistent set of propositions. That is, it is a set which has as its members one member of every pair of mutually contradictory propositions, and which is such that it is possible for all of its members to be true together. The notion of a possible world can be given a contextual analysis in terms of world-stories. (p. 225)

Adams does not say much about propositions. They are the abstract truth-apt objects of speech acts and propositional attitudes.

Consistency is a primitive property that satisfies the following constraints:

- (W1) The set of all true propositions is consistent.
- (W2) Any subset of a consistent set is consistent.

²Lewis briefly addresses this epistemological worry in his [1986] where he compares modal and mathematical epistemology.

Two propositions are contradictory just in case the set containing them is inconsistent, and we can add one or the other of these propositions to a consistent set and maintain consistency.

Two further constraints:

(W3) Every proposition has a contradictory.

(W4) Every consistent set is a subset of a maximal consistent set.

These conditions give us a minimal theory of propositions.

If we work in the other direction and analyze a proposition as a set of possible worlds, then (W1)-(W4) also hold. So should we analyze possible worlds in terms of propositions or analyze propositions in terms of possible worlds?

Stalnaker, of course, thinks the latter. Why? First, possible worlds are relatively unstructured—relations like entailment and compatibility are essential to the concept of a proposition but not to the concept of a possible world.³ Second, if propositions are sets of possible worlds, then there is no need to posit a primitive notion of consistency—set-theoretic relations will do. Third, the possible worlds analysis imposes additional welcome constraints on propositions:

(W5) For every set of propositions Γ , there is a proposition P such that Γ implies P , and P implies every member of Γ .

(W6) Equivalent propositions are identical.

W5 is plausible so long as we do not restrict ourselves to propositions that are humanly graspable or expressible by natural language sentences. W6 is also warranted by Stalnaker's pragmatic picture developed in the first chapter of *Inquiry*.

The conditions (W1)-(W6) pin down the structure of the possible worlds account of propositions:

Anyone who believes that there are objects of propositional attitudes and who accepts the assumptions about the formal properties of the set of these objects, must accept that there are things which have all the properties that the possible worlds theory attributes to possible worlds, and that propositions can be reduced to those things. (p. 57)

³Interestingly, Stalnaker seems to be flirting with a kind of inferentialism about content.

3 Functional Role

Oddly, Stalnaker ends Chapter 3 on a noncommittal note. Though he suggests towards the beginning of the chapter that possible worlds are abstract properties, he ends by saying that possible worlds are primitive *functional* notions:

The moderate realism I defend need not take possible worlds to be among the ultimate furniture in the world. Possible worlds are primitive notions of the theory, not because of their ontological status, but because it is useful to theorize at a certain level of abstraction, a level that brings out what is common in a certain range of otherwise diverse activities. The concept of possible worlds that I am defending is not a metaphysical conception, although one application of the notion is to provide a framework for metaphysical theorizing. The concept is a formal or functional notion. (p. 57)

Just as the notion of an *individual* in extensional quantification theory is not a particular kind of thing in the world but a particular kind of role that things can occupy—the role of subject of predication—so too is the notion of a possible world simply the kind of thing that can be true or false and that we try to distinguish between in our rational deliberations:

To believe in possible worlds is to believe only that those activities have a certain structure, the structure which possible world theory helps to bring out. (p. 57)

One may choose to put a metaphysical interpretation on the concept of a possible world, assuming that there is one domain of all metaphysically possible worlds from which the restricted domains relevant to interpreting different kinds of possibility and necessity are drawn. But one may also reject that interpretation, and the coherence of the metaphysical questions which it raises, without rejecting a realistic understanding of possible worlds semantics. One may say that in particular contexts of inquiry, deliberation and conversation, participants distinguish between alternative possibilities, and that they should do so is definitive of those activities. It does not follow from this that there is a domain from which all participants in inquiry, deliberation and conversation must take the alternative possibilities that they distinguish between. (p. 58)

References

Robert M. Adams. Theories of actuality. *Noûs*, 5:211–231, 1974.

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