Contemporary Philosophical Theories of Scientific Naturalism—Week 4

	Definability	*Derivability*
Carnap-Nagel Reducibility:	Strong, type-type	Of Laws
Anomalous Monism:	Weak, token-token coreference	No
Jackson:	No	*A Priori* entailment of Facts
Global Supervenience:	No	No

Propositional *modal* logic is what you get if you add to the propositional calculus (formulated, say, with the conditional C and negation N), two modal operators, one expressing *necessity* (L), and the other *possibility* (M), related by the principle that Lp≈NMNp and (so) Mp≈NLNp, subject to the new rule of *necessitation*: if ⊢—p then ⊢—Lp. This says that if p is logically valid, so is Lp.

Some Axioms:

A0:   LCpq⊢—CLpLq.
A1:   Lp⊢—p.
A2:   p⊢—MLp.
A3:   Lp⊢—LLp.

Some Systems:

K: A0
T: A0 + A1
B: A0 + A1 + A2
S4:   A0 + A1 + A3
S5   A0 + A1 + A2 + A3

Algebraic Conditions:

Reflexivity: $\forall x[xRx]$.
Symmetry: $\forall x,y[xRy \rightarrow yRx]$.
Transitivity: $\forall x,y,z[(xRy \;\&\; yRz) \rightarrow xRz]$.

Kripke Frames:

K is validated by *all* Kripke frames.
T is validated by all *reflexive* Kripke frames.
B is validated by all *reflexive* and *symmetric* Kripke frames.
S4 is validated by all *reflexive* and *transitive* Kripke frames.
S5 is validated by all *reflexive, symmetric*, and *transitive* Kripke frames.

General Semantics:

Syntax:

Basic categories: sentences S and singular terms T.

Derived categories: X→Y (more generally, $X_1…X_n$→Y) takes item of basic or derived syntactic category X and produces from it an item of basic or derived category Y.

Examples: T→S takes a term as input, yields a sentence as output; unary predicates are of this derived syntactic category. (T→S)→S takes a unary predicate as input, yields a sentence as output; quantifiers are of this derived syntactic category.

Semantics:

Basic semantic interpretants: sets of possible worlds for sentences, objects for terms. (Or, sets of assertibility conditions for sentences and recognition conditions for terms; or inferential roles for sentences and substitutional roles for terms; or…). Sentence *p* entails *q* just in case the set of possible worlds associated with *p* (intuitively: the worlds in which it is true) is a subset of the set of possible worlds associated with *q*: all *p*-worlds are *q*-worlds.

Semantic interpretants of derived categories: Semantic interpretant of a unary predicate, f_P(T→S), is a function from objects to sets of possible worlds (intuitively, all the worlds in which the object has the property).

Example: Adverbs take unary predicates (e.g. 'walks') into unary predicates (e.g. 'walks slowly'), so are of derived syntactic category (T➔S)➔(T➔S). So their semantic interpretants should be functions *from*: functions from objects to sets of possible worlds *to*: functions from objects to sets of possible worlds. Adverbs can be divided semantically into *attributive* and *non*-attributive, depending on whether φ-ing A-ly entails φ-ing: anyone who walks slowly walks, but not everyone who walks in their imagination walks. And now we can represent this semantic distinction precisely and algebraically, in terms of the set-theoretic relations between the domains and ranges of the functions-from-functions-to-functions semantically associated with the different classes of adverbs.

Jackson passages on C-intensions (propositions) and A-intensions (propositions) (from late in Chapter Two):

a) [48]: "We can think of the various possible particulars, situations, events, or whatever to which a [descriptive] term applies in two different ways, depending on whether we are considering
   - what the term applies to under various hypotheses about which world is the actual world,
                or
   - whether we are considering what the term applies to under various counterfactual hypotheses.

b) In the first case, we are considering , for each world *w*, what the term applies to in *w*, given or under the supposition that *w* is the actual world, our world. We can call this the A-extension of the T in world *w*—'A' for actual—and call the function assigning to each world the A-extension of T in that world, the A-intension of T.

c) In the second case, we are considering, for each world *w*, what T applies to in *w* given whatever world is in fact the actual world, and so we are, for all worlds except the actual world, considering the extension of T in a counterfactual world. We can call this the C-extension of T in *w*—'C' for counterfactual.

d) There is no ambiguity about the extension of the term at the actual world, as the A and C-extensions at the actual world must, of course, be the same."

e) [49]: " 'Water' is a rigid designator for the kind common to the watery exemplars we are, or the appropriate baptizers in our language community were, acquainted with. This is what we grasp when we come to understand the word."

f) [49]: "In sum, the A-extension of the term 'water' in a world is the watery stuff of our acquaintance in that world [which may be XYZ], and the C-extension is H_2O."

g) [50]: "When a term's A-extension and C-extension differ at some worlds—when it is a two-dimensional term, as we might say in honour of the role of two-dimensional modal logic in making all this explicit—there is a crucial difference between the epistemic status of a term's A-extension and C-extension. To know a term's C-extension we need to know something about the actual world…By contrast, we did know the A-extension of 'water' at every world, for it's a-extension does not depend on the nature of the actual world. Ignorance about the actual world does not matter for knowledge about the A-extensions of words. For the A-extension of T at a world *w* is the extension of T at *w* *given* that *w* is the actual world, and so does not depend on whether or not *w* is in fact the actual world….[K]nowledge of the A-*intension* of T does not require knowledge of the nature of the actual world."

h) [51]: "What we can know independently of knowing what the actual world is like can properly be called '*a priori*'. The sense in which conceptual analysis involves the *a priori* is that it concerns A-extensions at worlds, and so A-intensions, and accordingly concerns something that does, or does not, obtain independently of how things actually are."