How to be a Modal Realist

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Princeton 9-4-10

1 Three puzzles

(1) It is possible that some swans are blue $\leftrightarrow_{\text{df}}$ there is a Lewis-world such that some swans in it are blue.

First puzzle: It seems obvious that there could *contingently* be no blue swans: possibly (no swans are blue and possibly some swans are blue). But by (1), this is true iff possibly (no swans are blue and there is a Lewis-world such that some swans in it are blue), which is inconsistent.

(2) It is possible that no swans are blue $\leftrightarrow_{\text{df}}$ there is a Lewis-world such that no swans in it are blue.

Second puzzle: The S5-inconsistent 'It is possible that some swans are blue, and it is possible that it is not possible that some swans are blue' follows from (1), (2), and the claim that some Lewis-worlds do, and some don't, contain blue swans.

(*) It is possible that Q Fs are Gs $\leftrightarrow_{\text{df}}$ there is a Lewis-world such that Q Fs in it are Gs.

(3) It is possible that at least two things are Lewis-worlds $\leftrightarrow_{\text{df}}$ there is a Lewis-world such that at least two things in it are Lewis-worlds.

Third puzzle: The T-inconsistent 'At least two things are Lewis-worlds, and it is not possible that at least two things are Lewis-worlds' follows from (3), the claim that there are at least two Lewis-worlds, the definition of 'Lewis-world', and classical mereology.

2 Solution: contextually restricted quantification

In instances of (*), the quantifiers on the left are restricted; those on the right are unrestricted.

How to analyse 'Possibly Q Fs are Gs' when Q is unrestricted? Compositionality says we need an answer. The best bet is to say it's just equivalent to 'Q Fs are Gs'.

More generally: 'possibly' and 'necessarily' are redundant when they are applied to closed sentences built up from unrestricted quantifiers and qualitative predicates.

3 Modally variable quantification is *de re* restricted quantification

Claim: When claims built up from quantifiers and qualitative predicates are contingent, it's because quantifiers carry a contextually-supplied *de re* restriction—e.g. to things on Earth, or things in Cosmo, or things that are spatiotemporally related to me.

All contingency is *de re* contingency.

4 Alternative accounts of modally variable quantification

(4) No$_c$ swans are blue.

(5) If no$_c$ swans are blue, the proposition that some$_c$ swans are blue is false.

(6) When Twin says 'some swans are blue', he doesn't say anything false.

(7) When Twin says 'some swans are blue', he doesn't say that some$_c$ swans are blue.

Those who want to resist the conclusion may offer (6′) as a substitute for (6):

(6′) When Twin says 'some swans are blue', he doesn't say anything false *at his Lewis-world*.

But how is that supposed to help?

5 Counterpart theory: the singly *de re*

Where '$\phi(t)$' stands for a sentence in which the singular term (or free variable) t is the only non-qualitative constituent, and '**C**' abbreviates 'is a counterpart of:

(A) Possibly $\phi(t) \leftrightarrow_{\text{df}}$ there is an object x such that $x\,\mathbf{C}\,t$ and $\phi(x)$.

(Different senses of 'possibly' correspond to different senses of 'counterpart'.)

Should we stipulate that only parts of Lewis-worlds can be counterparts? Not if we want T to be valid.

Should we stipulate that only parts of Lewis-worlds can be counterparts of parts of Lewis-worlds? Not if we think some things are lucky to be spatiotemporally connected.

6 Contingent existence

The analysis entails $\forall x \Box \exists y(y = x)$ ('everything necessarily exists'). Is this bad? Perhaps not, given modal realists' many other uncommonsensical claims involving unrestricted quantification.

7 Counterpart theory: the multiply *de re*

Let $\phi(t_1, ..., t_n)$ be any formula in which the free variables and names are $t_1 \ldots t_n$, in order of first occurrence, and all other vocabulary is qualitative.

(B) Possibly $\phi(t_1, \ldots, t_n) \leftrightarrow_{\text{df}} \exists x_1 \ldots \exists x_n(x_1\,\mathbf{C}\,t_1 \wedge \cdots \wedge x_n\,\mathbf{C}\,t_n \wedge \phi(x_1 \ldots x_n))$.
Necessarily $\phi(t_1, \ldots, t_n) \leftrightarrow_{\text{df}} \forall x_1 \ldots \forall x_n((x_1\,\mathbf{C}\,t_1 \wedge \cdots \wedge x_n\,\mathbf{C}\,t_n) \rightarrow \phi(x_1 \ldots x_n))$.

(C) Possibly $\phi(t_1, \ldots, t_n) \leftrightarrow_{\text{df}} \exists x_1 \ldots \exists x_n(x_1, \ldots, x_n$ are all in the same Lewis-world $\wedge x_1\,\mathbf{C}\,t_1 \wedge \cdots \wedge x_n\,\mathbf{C}\,t_n \wedge \phi(x_1 \ldots x_n))$.
Necessarily $\phi(t_1, \ldots, t_n) \leftrightarrow_{\text{df}} \forall x_1 \ldots \forall x_n((x_1, \ldots, x_n$ are all in the same Lewis-world $\wedge x_1\,\mathbf{C}\,t_1 \wedge \cdots \wedge x_n\,\mathbf{C}\,t_n) \rightarrow \phi(x_1 \ldots x_n))$.

(D) Possibly $\phi(t_1, \ldots, t_n) \leftrightarrow_{\text{df}} \exists x_1 \ldots \exists x_n(\langle x_1, \ldots, x_n\rangle\,\mathbf{C}\langle t_1, \ldots, t_n\rangle \wedge \phi(x_1, \ldots, x_n))$.
Necessarily $\phi(t_1, \ldots, t_n) \leftrightarrow_{\text{df}} \forall x_1 \ldots \forall x_n(\langle x_1, \ldots, x_n\rangle\,\mathbf{C}\langle t_1, \ldots, t_n\rangle \rightarrow \phi(x_1, \ldots, x_n))$.

(E) Possibly $\phi(t_1, \ldots, t_n) \leftrightarrow_{\mathrm{df}} \exists R \exists x_1 \ldots \exists x_n(\mathrm{Cp}(R) \wedge Rt_1x_1 \wedge \cdots \wedge Rt_nx_n \wedge \phi(x_1, \ldots, x_n))$.
Necessarily $\phi(t_1, \ldots, t_n) \leftrightarrow_{\mathrm{df}} \forall R \forall x_1 \ldots \forall x_n((\mathrm{Cp}(R) \wedge Rt_1x_1 \wedge \cdots \wedge Rt_nx_n) \rightarrow \phi(x_1, \ldots, x_n))$.

('Cp(R)' abbreviates 'R is a counterpairing'.)

Understand quantification over relations as plural quantification over ordered pairs. Note that analysis E extends naturally to plural terms.

8 Constraints on counterpairings

Schema	*Constraint on counterpairings*
$\Box(\phi \rightarrow \psi) \rightarrow (\Box\phi \rightarrow \Box\psi)$ (K)	Counterpairings have universal domains
$\Box\phi \rightarrow \phi$ (T)	The identity is a counterpairing
$x = y \rightarrow \Box x = y$	Counterpairings are functions
$x \neq y \rightarrow \Box x \neq y$	Counterpairings are one-to-one
$\Box\forall x\phi \rightarrow \forall x\Box\phi$ (CBF)	Automatic
$\forall x\Box\phi \rightarrow \Box\forall x\phi$ (BF)	Counterpairings have universal ranges
$\phi \rightarrow \Box\Diamond\phi$ (B)	When R is a counterpairing, R^{-1} is too
$\Box\phi \rightarrow \Box\Box\phi$ (S4)	When R and S are counterpairings, $R \circ S$ is too

(8) Goliath and Lumpl are identical, but might not have been.

(9) Goliath and Lumpl are identical, but while Lumpl could have survived squashing, Goliath could not.

9 "Possible worlds" and actuality

(10) a. Possibly ϕ iff ϕ at some possible world.
b. Necessarily ϕ iff ϕ at every possible world.

Provided we require counterpairings to be *total functions*, we can accept (10) if we take 'possible world' to mean 'counterpairing' and analyse 'At $R\,\phi(t_1, \ldots, t_n)$' as '$\exists x_1 \ldots \exists x_n(Rt_1x_1 \wedge \cdots \wedge Rt_nx_n \wedge \phi(x_1, \ldots, x_n))$'.

Schema	*Constraint on counterpairings*
$\mathrm{At}\,R\,(\phi \wedge \psi) \leftrightarrow \mathrm{At}\,R\,\phi \wedge \mathrm{At}\,R\,\psi$	Counterpairings are functions
$\mathrm{At}\,R\,({\sim}\phi) \leftrightarrow {\sim}\,\mathrm{At}\,R\,\phi$	Counterpairings are total functions
$\exists x(\mathrm{At}\,R\,\phi) \rightarrow \mathrm{At}\,R\,(\exists x\phi)$	Automatic
$\mathrm{At}\,R\,(\exists x\phi) \rightarrow \exists x(\mathrm{At}\,R\,\phi)$	Counterpairings have universal ranges
$\mathrm{At}\,R\,(\Diamond\phi) \leftrightarrow \exists S(R < S \wedge \mathrm{At}\,S\,\phi)$	Define '$R < S$' as '$S \circ R^{-1}$ is a counterpairing'
$\mathrm{At}\,R\,\phi \rightarrow \Box\,\mathrm{At}\,R\,\phi$	Counterpairings are global permutations, and $R(\langle x, y\rangle) = \langle R(x), y\rangle$ (!).

For a counterpairing to be "actualised" is for it to be the identity relation: truth at the identity relation coincides with truth.

Analyse 'actually ϕ' as 'At I, *phi*', where I names the identity relation.