F. Modalities and Propositional Attitudes: How Alike?

The propositional attitudes may not be alone in violating the rules of exportation and importation, intersubstitution of identicals, and generalization; it might seem the formulas of modal logic do too. Modal logic is that add-on to ordinary logic that decides the validity of propositions expressed with the modal phrases, “it is necessary that . . .” or “it's necessarily the case that . . .,” and similar phrases with “contingent,” “impossible,” and “possible” in place of “necessary.” Like ordinary logic, it has several parts: a part dealing with units no smaller than a complete proposition, which is its propositional part, and a part that looks within propositions to their subjects and the attributes (i.e., properties and relations) predicated of them, which is its quantificational part. For example, this formula is valid in the propositional part of modal logic:

If it's necessary that if \( p \) then \( q \), then, if it's necessary that \( p \), then it's necessary that \( q \).

The next formula is valid in some modal logics' quantificational part.\(^1\)

If it's possible that everything has the property \( F \), then about each thing, it's possible that it has the property \( F \).

In all that follows, my doubts will concern the quantificational part's being analogous to propositional attitudes. I don't doubt that the propositional part provides sufficient analogies so that it's illuminating to interpret some propositional modal systems as “doxastic logics,” that is, systems that present the logic of de dicto belief. The quantificational part, however, is not useful.

§1. The superficial analogy between modal statements and reports of attitudes.

The formulas of quantified modal logic are like propositional attitudes in that they can have about-positions and that-clauses. So they are either de re or de dicto. For example, in the proposition of quantificational modal logic just cited, the antecedent is a de dicto proposition:

it's possible that everything has the property \( F \).

The consequent is de re:

about each thing, it's possible that it has the property \( F \).
In the *de dicto* case a complete proposition follows the “it's possible that.” In the *de re* case, an incomplete proposition follows, containing an anaphoric pronoun referring back to the term in the about-position.

The analogy between modality and propositional attitudes goes further than that their propositions are *de re* or *de dicto*. There's also an analogy in that the failures we noted for propositional attitudes seem to afflict the propositions of modal logic when definite descriptions are taken to be singular terms. For example, suppose

(i) $17 = \text{the number of Jovian moons (i.e., moons of Jupiter)}$

in fact, whether we know it or not. (It seemed true as of the year 2000, when the seventeenth one was found. More were found in 2001. Let's go with 17.) We know that

(ii) It's necessarily the case that $17 > 7$.

That's right. Now consider the substitution of the description, the number of Jovian moons, for the name, 17, in (ii). This is an attributive use of the description. Here's what you get:

(iii) It's necessarily the case that *the number of Jovian moons* > 7.

Of course, the number of Jovian moons doesn't exceed 7 necessarily, if we, ignorant of the count of Jovian moons, mean by “the number of Jovian moons” whichever number it turns out to be. Thus substitutivity of identity seems violated within the that-clauses of quantified modal logic.

The about-positions are well-behaved logically. Substitution of descriptions for names is valid there. For example, this is true:

(iv) About 17 it's necessarily the case that *it* > 7.

The substitution of the description for “17” in the about-position in (iv) preserves truth:

(v) About *the number of Jovian moons*, necessarily *it* > 7,

because which of the two names we use to refer to the number 17 makes no difference there. And this is still the attributive use of the description. The anaphoric pronoun *it* can be read as *that number*. And what number is that, if not 17?

Exportation and importation also seem violated in modal contexts. There's no importation from the true (v) to the false (iii), and it would be easy to concoct an example to show that the converse’ exportation is invalid, not always preserving truth.

Note now failures of generalization. “Santa Claus” is a singular term:

(vi) It's possible that Santa has to be identical to Santa.

This seems true. If we generalized the term's first occurrence, we'd get,

(vii) Someone is such that it's possible that *he* has to be identical to Santa.

This seems false of every actual person in the world; the only person of whom
it's even possible he'd have to be identical to Santa would be Santa himself. So it looks like propositional attitudes are not alone in violating the laws of ordinary logic; part of logic does too!

Many philosophers are beguiled by these similarities between modal statements and propositional attitudes to such an extent as to think they can give a unified treatment of the problems noted in section E and this one, and give a unified solution of them. I hope to convince you that this is hopeless. For the analogy between modal statements and reports of propositional attitudes is superficial. My answer to the question in the title of this section—how alike?—is, not very. I offer three arguments in the remainder of this section. For starters, there's a straightforward solution to modal logic's problems that does not work for propositional attitudes. It turns on Russell's distinction between definite descriptions and logically proper names. My second argument undermines attempts to reinstate the analogy by purging language of proper names, reducing them to definite descriptions. Lastly, I point out what I think is a reductio ad absurdum of the analogy: absurd “principles” for propositional attitudes analogous to modal principles. See table F-1 for a charting of the overall argumentative strategy of this section.

§2. First argument: dissolution of the analogy between modal statements and reports of attitudes.

Let's explore the solution to modal logic's seeming violation of substitution and the other forms of inference. Although I've given counterexamples to the validity in modal contexts of otherwise acceptable inferences with singular terms, broadly understood to include definite descriptions, there remains the possibility that they are valid when the singular terms used are logically proper names. Recall from section A§2 that a logically proper name is just a tag or mark on the thing named and is otherwise without conceptual meaning. Only existing things can have logically proper names, for how could you tag or mark what does not exist? Suppose it were to turn out that all the modal propositions' violations of logical rules depended on the use of definite descriptions, but when logically proper names were used, there were no violations: Logically proper names turned out to be exportable and importable, intersubstitutable and generalizable from within the that-clauses of quantified modal logic. If so, we found the culprit: the definite description and perhaps even our concept of a singular term.

Ever since section A we've acknowledged within the category of name or singular term both definite descriptions and logically proper names. I called your attention there to the controversial nature of this split in the category: According to Russell's technique of analyzing the sentences that contain
definite descriptions, the analysis's product is a sentence that does not contain
definite descriptions. Russell concluded that definite descriptions are not
terms at all in the logical structure of sentences, *ipso facto* not singular terms,
but we decided to stay at the level of superficial structure where they are
singular terms, *pace* Russell, until we found reason not to. We noted one
reason in section A, not finding the King in either the list of bald persons or
in the list of nonbald persons, then another reason in section B§1 concerning

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Table F-1. The argumentative strategy in section F that modal logic (ML) is
not, in the final analysis, analogous to the logic of propositional attitudes
(PA). Stage I was already presented, and we're about to embark on stage II.
the detection of scope ambiguities. It seems that now we're about to find a third reason: All the failures of exportation and importation, intersubstitution, and generalization in modal contexts have involved definite descriptions. If we'd used logically proper names, perhaps the modal propositions would not have succumbed to the failures. If that's true (and it is), then the real trouble would not've been the illogicality of the modalities. The real trouble would seem to have been the treating as a name a kind of phrase that's not a name.

And it is true: Logically proper names cause no rule violations in modal contexts. Consider these pairs of logically proper names—there's nothing to prevent a thing from having more than one proper name:

- Hesper = Phosphor
  (Russell's example of proper names of the planet Venus, Hesper when seen after dusk, Phosphor when seen before dawn. The ancient Greeks used the two names before one of them—was it Pythagoras?—discovered the identity.)
- Cicero = Tully
  (Peirce's names for the ancient Roman, Marcus Tullius Cicero).  
- 1 = 0.99999...(nines forever)
  (You may be skeptical, but the identity is proved without doubt. Numerals are analogous to ordinary proper names; they're Carnap's "individual expressions . . . of standard form" (for short: standard names). Unlike logically proper names, however, they admit of analytic truths relating them. Consequently, if a system assigns one number two standard names, the identity will be provable. In a predicament like the Greek astronomers' above and my new relative's at the end of section A, but involving standard names, it's within your power to get out of it.)

Modal propositions, having in any position one of the names from a pair, allow substitution of the other; they allow exportation and importation, and generalization of the name, *salva veritate*. I leave the testing of cases to you.

Logically proper names are well behaved in modal that-clauses, because individuals continue to be referred to by those names even when we imagine them in possible but counterfactual conditions. John Stuart Mill has us perform this thought experiment with the name of an English city, "Dartmouth":

But it is no part of the signification . . . of the word Dartmouth, to be situated at the mouth of the Dart. If sand should choke up the mouth of the river, or an earthquake change its course, and remove it to a distance from the town, the name of the town would not necessarily be changed. [Mill mentions the name; we'd use it, saying the town would still be Dartmouth; it would not be a different town.] That fact, therefore, can form no part of the signification of the word; for otherwise, when the fact confessedly ceased to be true, no one
would any longer think of applying the name. Proper names are attached to
the things themselves, and are not dependent on the continuance of any
attribute of the object. 6

We might even imagine its name being different! Then it would still be right
for us to refer to it as Dartmouth, even if only to suppose Dartmouth were
called “Fairview.” One might even suppose Dartmouth was never founded,
and in that scenario Dartmouth does not exist. Still, we know which city it is
that would not exist, if it had not been founded. Section A defined logically
proper names so that they either named an existent or were not names. We
now qualify that for modal scenarios in which they may name something that
does not exist in those scenarios, provided it exists in the actual scenario. So,
modal contexts, which include counterfactual ones, don’t affect the reference
of proper names. Kripke calls such names rigid designators. 7 They’re modally
rigid in that the entities they designate, sc., their referents, stay what they
were even as we vary the scenario for their referents from one possible but
counterfactual situation to another. Numerals as names of numbers also have
this trait, and so we’ve been taking them as analogs of proper names. 8 In
contrast, definite descriptions lack this constancy of reference through varia-
tions in counterfactual scenarios. The definite description “the town located
at the mouth of the Dart” does not refer to Dartmouth when it’s used attribu-
tively in the scenarios Mill has us imagine. Although Dartmouth is the town
located at the mouth of the Dart, if the river’s course were different, Dart-
mouth would not be the town located at the mouth of the Dart, although it
would still be Dartmouth. So that’s why proper names are well behaved in
modal contexts, leading to no violations of logic, and attributively used
definite descriptions are not.

A brief digression on names’ meaning: Such attributively used definite
descriptions are not rigid designators, which is why they’re not the meanings
of rigid designators. Yet a description might very well serve a speaker as a reference fixing definite description for the name, Dartmouth, since in actuality the description applies to Dartmouth, England. A definite description, when used attributively in the context of introducing a proper name of the thing, which the description is true of, is said to be a reference fixing description for that name, but not the name's meaning. Why not the meaning? Because the name still names that thing in counterfactual scenarios that would falsify the description, as in the example I gave in the previous paragraph. So the name is modally rigid, but the description is not.

We have to admit, however, that this argument is not conclusive against descriptions being the meanings of rigid designators. The description with the word “actually” or “in actuality” inserted so that it reads “the town that's actually [i.e., in actuality] located at the mouth of the Dart” does refer to
Dartmouth in all those scenarios, since its reference is not determined by those scenarios, but by what's the case in actuality. So some descriptions of contingent things are rigid designators also.9 Definite descriptions of abstract objects, e.g., numbers, also can be rigid descriptions: “the integer that is the immediate integral successor of zero.” No consistent scenario makes this false of the number one.

Might rigid descriptions be the meanings of proper names, and names not be mere labels? Arguably not, even though there's the correct modal difference between using a contingent description as a reference fixer of a name, and using the same description, with “in actuality” inserted, as the name's meaning.10 Since logically proper names either denote or are not terms at all, a modally rigid description differs from them in that it can fail to denote and still be a meaningful term. For example, the modally rigid description, “the person who in actuality won 25 gold medals at the 2000 Olympic games” denotes no one in actuality and so is rigidly nondenoting though meaningful; there's no name it's the meaning of. Despite the semantic characterization of speakers’ “fixing the reference” of the names they use by applying contingent descriptions, it's plausible that such acts belong to the psychology of speakers, not the semantics of names. End of digression on meaning; the topic returns in the next subsection; for now, back to modality's seeming illogicality.

Since modally rigid definite descriptions cannot be proxies for all the descriptions guilty of illogical behavior in modal logic, the elimination of definite descriptions from the category of singular terms will save modal logic from the charge of illogicality. For then we'd've found no failures of inter-substitution of singular terms within the modal that-clauses, nor of their exportation, importation, and generalization. The reason is that all the purported counterexamples, which use the phrase, “the number of Jovian moons,” evaporate upon being analyzed in the way Russell recommended for definite descriptions. For example, we saw that it's false to put “the number of Jovian moons” for “17” in “it's necessary that 17 > 7,” but it's ok in “about 17, it's necessary that it > 7.” The first of these is,

[#1] it's necessary that 17 > 7.

Supposing we were substituting a singular term for the singular term “17” in it, we'd get,

it's necessary that the number of Jovian moons > 7

The narrow scope Russellian analysis of this is:

It's necessary that something numbers the Jovian moons, nothing else numbers them, and it > 7.

This is false, and as analyzed it's not the result of a substitution in the first. Why? Only singular terms get substituted for singular terms, and the singular term just disappeared. The second one is:

Supposing we were substituting a singular term for the singular term “17” in it, we'd get,

About the number of Jovian moons, it's necessary that it > 7

The Russellian analysis of this is:

About something that numbers the Jovian moons, while nothing else does, it's necessary that it > 7.

This is true; after all, the number we're talking about is 17. (It's worthwhile to do the rest of the analyses of the examples in §1.) These definitive results were published by Arthur Smullyan in 1947 and 1948.11

This defense of the logicality of modal logic has provided another argument that definite descriptions are not singular terms at all, for surely we don't want to say they are singular terms everywhere except inside the that-clauses of modal logic. Preferable to that adhockery is the view that they're not singular terms ever, but they mimic singular terms under the special conditions found in elementary logic.

Let's look further at the modal features of names to explore the disanalogy between singular terms and definite descriptions. The modal rigidity of logically proper names entails the validity (where a names something):

It's necessary that a = a,

since everything is identical with itself. It follows from this and the principle of the substitutivity of identity that:

If a = b, then it's necessary that a = b.

It corresponds to a theorem of modal logic, the principle of the necessity of identity, proved without reference to intuitions of modal rigidity, because only individual variables occur in the proof. A variable is an anaphoric pronoun. When it has an antecedent, it is bound; without an antecedent it is free. To distinguish them from proper names, for which we select letters from the beginning of the alphabet, a, b, c., we use letters from its end, x, y, z. Let's prove the principle thus: Recall: whatever's true of x is true of y, if x = y, or alternatively, whatever attribute x has, y has, if x = y. Suppose its antecedent true, x = y. Since a law of modal logic is that we may assert the necessity of any axiom or theorem of elementary logic, we have

it's necessary that x is identical to x,

(This justification does not allude to modal rigidity.)12 By abstraction, x has the attribute of being necessarily identical to x.

So, by the principle of substitutivity and laws of propositional modal logic, y must have that attribute too. Q.E.D. Ruth Barcan Marcus and Carnap introduced this principle in 1946. The contrapositive of this principle, (using “possible that not p” as equivalent to “not necessary that p”) is:

If it's even possible that x is not y, then they are distinct things.
The derivation made use of an attribute formed from a modal statement by abstraction from a referential position in its that-clause, the one occupied by the first $x$. Recall that in E§3 we disallowed inserting certain attributes into the principle of substitutivity, namely, when the abstraction of them was done on reports of propositional attitudes. Should abstraction also be disallowed from statements of modality, thereby undermining the proof of the principle? Before deciding, let's see if it gets us into any trouble.

Although—and let's ignore the redefinition of “planet” in 2006—
the number of the sun's planets = the number of Jovian moons found before 1938,
the identity is not necessary. (The tenth and eleventh were found in that year, but surely they could've been found before then.) Ah, trouble so soon. Yet this is a counterexample only if we take definite descriptions to be singular terms. We could accept the argument I gave for the principle of the necessity of identity—that, if identical, then necessarily so—and avoid the trouble by knocking definite descriptions out of the category of singular terms. So again no counterexample, and the best explanation of the failure of definite descriptions to fit that principle seems to be that definite descriptions are not singular terms. That's a fourth argument against definite descriptions being singular terms, that in the principle of the necessity of identity, you cannot substitute definite descriptions for the $x$ and $y$, preserving validity.

Generally, applying the Russellian analysis to a modal sentence containing definite descriptions in its that-clause will reveal that it's ambiguous, only one of the meanings being true. That true one will be a $de$ $re$ modal statement where the definite description no longer occurs. In its place is an anaphoric pronoun, referring back to a quantifier in the statement's about-position. Such is the case in this example: The sentence “17 = the number of Jovian moons” can be true without it being necessarily true that 17 = the number of Jovian moons, because the sentence really has this form in which no definite description occurs:

\[
\text{Something numbers the Jovian moons, nothing else does, and 17 = it.}
\]

Alternatively, using our regimentation:

\[
\text{About something that numbers the Jovian moons while nothing else does, 17 = it.}
\]

Applying the theorem of the necessity of identity to this can only mean applying it to its third conjunct: 17 = it:

\[
\text{About something that numbers the Jovian moons while nothing else does, it's necessary that 17 = it.}
\]

True. In fact, the something which just happens to number the moons is the number 17. So all we're saying is that 17 is necessarily itself. We don't take
back or contradict that it just happens to be the number that numbers the moons, and it might have turned out that 10 or 11 did that job instead of 17.

Our results have been favorable to allowing abstraction of attributes from modal propositions, and favorable to the whole project of a quantificational modal logic. (The Russellian way of interpreting these results—his thesis that definite descriptions should not be in the category of singular terms—is not the only way of getting the favorable results. It may be that definite descriptions are singular terms, but that modality has a strange effect on their meanings when they occur in that-clauses. Either singular terms include only the rigid designators, or the principle of the necessity of identity is restricted to rigid designators. We keep definite descriptions from giving us trouble one way or the other, besides Russell’s way.)

Where are we in the argument? I began this section with some examples of failures of inferences within the logic of necessity (modal logic) and drew analogies to the propositional attitudes. I then showed no failures in fact occurred; I’ve shown how segregating definite descriptions from logically proper names solves the problems for modal logic. My next step must then be to convince you of the disanalogies, which I consider more revealing. Propositional attitudes are unlike modal contexts in just the respect of greatest importance to our studies. The illogicality of propositional attitudes persists even when logically proper names are used in that-clauses.

Things can have more than one logically proper name as we noted, and Belia may not be aware of both the names of the thing she has a belief about. Her ignorance suffices to create failures of substitution in that-clauses and of importation into them. (About-positions are fully referential, since Belia does not control them.)

We can use the pairs of proper names listed earlier to construct reports about Belia’s beliefs whose that-clauses violate two of the forms of inference, substitution and importation, that is, the inferences don't preserve truth. In section H we'll also further regiment the about-position to include the more restrictive definition of acquaintance, noted in section C§1, so that exportation of logically proper names and wide-scope generalization from the that-clauses of de dicto reports are also invalid. We leave arguments until then, save for one remark: If the latter two rules don’t seem to lead from truth to falsehood now, since we’ve built into the definition of a logically proper name that it names existent things, the appearance is merely the result of this definitional maneuver, which turns out not to be illuminating about Belia, since it means that, even if Belia thinks she’s using a logically proper name, it must be a definite description in disguise if it names nothing existent. Rep would determine whether Belia uses logically proper names or not.

What are the failures with proper names? First, since it's necessary that
1=1, it's necessary that \(1 = 0.9999\ldots\) (9s forever), although Belia may not have grasped the fact that the decimal system for naming numbers generates redundant names for all the numbers that terminating numerals name. (We understand terminating numerals in decimal notation to be continuable with zeroes forever. We could discard all the numerals that could thus have an unending series of zeroes starting somewhere to the right of the decimal point, and we'd still have names enough for all the numbers which the discarded numerals had named.) So, although Belia believed that 1 = 1, unfortunately she believed that 1 \(> 0.9999\ldots\) (9s forever). This violates the rule of substitution, yet both reports of her mental state are true. Another example is the young Pythagoras's conviction, which he later disproved, that Hesper is distinct from Phosphor. Since he believed that Hesper is Hesper, if substitution for either occurrence of “Hesper” were valid here, he'd have to have believed that Hesper is Phosphor before he discovered the identity.

The reason why these failures should perplex you is that the proper names of things should function simply as labels of the things. They're not descriptions, nor is cognitive content a part of their meaning. Two names of the same thing should therefore be the simplest form of redundancy, and yet in the that-clauses of attitudes they may not be intersubstituted. Why not, especially why not, since they can be intersubstituted in the that-clauses of modal statements?

Recall that I introduced this problem in section A§5 with my own two names, Arthur and Sonny, and the beliefs of a new member of the family. She said she believed something complimentary of Uncle Arthur, but disbelieved it of Uncle Sonny. That situation should be impossible! I there listed four premises, any one of which could be rejected to remove the anomaly of the impossible happening. We could accept her self-reporting, but (contra premise iii) allow her to be in a state of self-contradiction, believing and disbelieving the same singular proposition. Alternatively, we could admit her consistency, but then (contra i) deny her beliefs are directed toward propositions, but rather toward sentences. Alternatively, we could (contra iv) reject the disquotation principle; even her sincere self-reporting would not be reliable concerning singular propositions. Alternatively, something I omitted to mention in section A, we could weight her assentings over her dissentings, so that if she assents to a sentence expressing a proposition, we simply don't count her dissentings from other sentences which express the same proposition; dissentings would be less reliable than assentings. These last two alternatives reject features of our regimentation. Recall table C-1: It showed four ways the believer exercises her control over the content of the report's that-clause. The columns showed her control by word or by deed. The rows showed how she confirmed or falsified that-clauses. The two alternative ways of rejecting premise iv, which we just mentioned, demote the table's entries in the “by
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words” column from regimented entailments of the report's truth, or its falsity, back to conversational implicatures that can be canceled. The first of the two is a general demotion; the second only in the special case of Belia's attempted veto of singular terms. I'm not inclined to accept this as a solution.

§3. Second argument: We reject attempts to reinstate the analogy.

Finally, we may maintain that her beliefs are directed toward propositions, but (contra ii) reject the claim that she's using logically proper names in her sentences. This last has been a favorite ploy of those who rely on the analogy between modality and attitudes. Let's examine this last option in order to reject it. (We're now embarking on stage III of the argument in this section, as presented in table F-1.) The philosophers who see a deep similarity between propositional attitudes and modal statements can reinstate the similarity I've debunked by what I hope will look to you like an act of desperation. They declare the terms customarily deemed proper names are not logically proper names, that anything that looks like a proper name is in fact a definite description, and that the only occupants of referential positions in expressions of propositions are pronouns, i.e., variables. So the failures of logic that occur in propositional attitudes with proper names, while conceding none occur in quantified modal logic, are no different from the failures that occurred with definite descriptions. The cure's the same; use Russell's technique of analysis on them all, and the failures of logic disappear. We'll call this way of reinstating the analogy between modality and propositional attitudes the purging of proper names from all of ordinary language.

To see how a proper name could be a definite description, consider the individual Cicero. Something about Cicero makes him uniquely himself; nobody else shares it. Cicero obviously can be uniquely described as “the one with the attribute of being identical-to-Cicero,” but to show the dispensability of the proper name better than this hyphenation gimmick does, describe him as “the one with the attribute of Ciceronizing.” Instead of saying that Cicero was a Roman, say the one who Ciceronizes was a Roman. The definite description replaces the proper name.

To accommodate the greater tolerance of modal contexts for proper names, because of their modal rigidity, the purgers of proper names introduce individual essences; they add that some parts of the attribute uniquely true of Cicero are essential to him, that he could not lack them and still be Cicero. One such, which captures all the rest, is the attribute of being identical to Cicero. Treat the name “Cicero” as a definite description of him in terms of this unique and essential attribute. If Cicero has another proper name, say “Tully,” then “the one who Tullynizes” will pick out the one who Ciceronizes
in terms of a unique and essential attribute also, the attribute of being identical
to Tully. (These are necessarily the same attribute, as I'll explain in the nextsection when we discuss the intensional identity conditions of attributes.) The
two descriptions pick the same person out in all the same counterfactual
situations, including those in which he does not exist, just as the name
“Dartmouth” picked out Dartmouth in all counterfactual situations. Thus these
unique and essential attributes mimic rigid designation of an individual,
although they're not designators of him; they are predicated of him.

The purgers give up two jobs of proper names. One thing that a proper
name does, that this sort of description does not do, is guarantee the actuality
of the thing named, but you can describe the essences of things that don't
exist. This difference is acceptable to the purgers of proper names. So, before
one can say it's necessary that the one who Ciceronizes is identical to the one
who Tullynizes, one must be explicit that the one who Ciceronizes exists.
Then this identity is true, and necessarily so because Ciceronizing picks out
the essence of Cicero, as does Tullynizing. Another thing that a proper name
does, that this sort of description does not do, is contribute to the meaning of
a singular sentence in a way that makes it express a singular proposition.
Names having been purged, ordinary language is left bereft of the means to
express singular propositions, although logicians will supply a technique for
doing so in formal semantics to interpret free variables. The sentences of
ordinary language will express general propositions. When one of a pair of
sentences uses the word “Cicero” just where the other uses “Tully,” the
answer to the question whether they express the same proposition will depend
on whether the words pick out the same unique and essential attribute. Since
the purgers are legislating the purging, they're free to legislate here as well.

I said this purging of proper names from natural language is an act of
desperation, because at least part of the difference between proper names and
definite descriptions has had to be built into the definite description that
replaces a proper name, in order to account for the difference in behavior of
descriptions and proper names in modal that-clauses. That difference does not
occur in propositional attitudes, however. So the trick to reinstate the
similarity of modal propositions with reports of propositional attitudes has
been this: On the one hand, make proper names into descriptions and we can
regularize the logic of the propositional attitudes by Russell's technique of
analysis of descriptions. That brings propositional attitudes back into line with
modal propositions. On the other hand, make sure the descriptions that replace
proper names describe the essences of things, and we can preserve the
difference we observe between modal propositions and propositional attitudes
in the behavior of proper names and ordinary descriptions in their respective
that-clauses. Now we can say all this another way: The result is to make
proper names into descriptions, which is no use whatsoever to modal logic, and we make those descriptions describe essences, which is no use whatsoever to propositional attitudes. Might not one suspect excess cleverness masquerading as real insight? They retrofit modality to make it intentionality.

This concludes my first two arguments to convince you that the analogy between modality and propositional attitudes is superficial. The first one was positive, that in modal that-clauses proper names and definite descriptions behave differently while in the that-clauses of propositional attitudes they're misbehaved equally. Then followed a negative one, rebutting the purgers of proper names from ordinary language. Well, “rebuttal” is too strong a word; “gave cause for suspicion” is perhaps more accurate. So, I had better have another argument against the importance of the analogy between modality and propositional attitudes, and I do:

§4. Third argument: An analogy between modal statements and reports of attitudes is absurd.

Here’s more cause for suspicion about the parallelism between modality and propositional attitudes: a *reductio ad absurdum* of the parallelism. Recall the contrapositive of the principle of the necessity of identity. I’ll derive it from the substitutivity of identity in its contrapositive form, as restated for attributes, repeated here from section E§3, and using names instead of variables:

If \( a = b \), then \( b \) has exactly the same attributes as \( a \) has.

In its contrapositive form,

If \( a \) lacks an attribute that \( b \) has, then it's false that \( a = b \), i.e., they're different.

We insert the attribute of “being such that it's possible that \( a \) is different from (-),” where the blank (-) is filled in by the name of the thing that has the attribute, into the substitutivity principle thus:

(M-viii) If it's not possible that \( a \) is different from \( a \), but it is possible that \( a \) is different from \( b \), then \( a \) is different from \( b \) in fact.

The next is a law of modal logic:

(M-ix) It's not possible that \( a \) is different from \( a \).  

So, by elementary logic, we conclude the contrapositive of the principle of the necessity of identity:

(M-x) If it's possible that \( a \) is different from \( b \), then \( a \) is different from \( b \) in fact.

If the that-clauses of propositional attitudes behave like the that-clauses of modal logic with respect to their subject terms, then we can ape this inference using “Belia believes” in place of “it's possible,” starting with the contrapositive of the principle of the substitutivity of identity, as restated for attri-
butes. We insert the attribute of “being such that Belia believes that $a$ is different from $a$” into it thus:

(B-viii) If Belia fails to believe that $a$ is different from $a$, but she does believe that $a$ is different from $b$, then $a$ is different from $b$ in fact.

Sounds weird, but the advocates of a complete parallelism between propositional attitudes and modal logic should accept it.

(B-ix) Belia doesn’t believe that $a$ is different from $a$, so fails to believe it.

That premise is true because Belia’s no fool. So:

(B-x) If Belia believes that $a$ is different from $b$, then $a$ is different from $b$ in fact.

Truly amazing. Your incredulity at this result completes my *reductio ad absurdum* of the analogizing of propositional attitudes to modal logic.

The eminent logician Alonzo Church noted in the article cited earlier the parallelism between the Modal argument and the Belief argument, that we just stated. He suggested that anyone convinced of the significance of the overall parallelism between modality and propositional attitudes should accept both arguments as sound. Conjoin to this position the purging of proper names from ordinary language, and you eliminate the counterexamples that made you incredulous. For then only variables are involved in the arguments, and no definite descriptions or proper names (which are both analyzed out of the category of singular terms in Russell’s way) are substitutable for the variables, since the proper names along with the descriptions are not genuine singular terms. So you could not deduce that, if Belia believed 1 differs from 0.9999 . . . (9s forever), then 1 differs from 0.9999 . . . (9s forever) in fact.

Nor can you deduce unintuitive statements from reports that use descriptions. My relative’s belief that Sonny and Arthur are two persons does not prove Sonny’s not Arthur. Suppose we treat the names as if they were definite descriptions and analyze them away as singular terms in the manner proposed by Russell. If we do this, we must decide whether to treat the quantifiers that come with the Russellian analysis as having either narrow scope or wide scope. Consider first narrow scope. The analysis of “Belia believes that Sonny and Arthur are different” would be

Belia believes that something Sonnyizes & nothing else does & something Arthurizes & nothing else does & the former is different from the latter.

But you cannot use B-x to deduce from this statement about Belia that

Something Sonnyizes & nothing else does & something Arthurizes & nothing else does & the former is different from the latter.

The reason is that B-x requires the that-clause to be an identity if it’s to match
B-x's antecedent, and in this narrow scope analysis of the descriptions there are five clauses. So let's turn to the wide scope analysis:

Something Sonnyizes & nothing else does & something Arthurizes & nothing else does & Belia believes that the former is different from the latter.

Here the that-clause has the proper form for using B-x, but alas we no longer have B-x! Why not? Recall in the derivation of B-x we had to assure that Belia doesn't believe that \(a\) is different from \(a\). We blithely remarked that Belia's no fool. But a person need not be a fool to believe that. In fact that's exactly what we said she does believe in the wide scope analysis. For the Sonnyizer is the Arthurizer. The predicates are outside the that-clause's scope, and one may substitute for the other \textit{salva veritate}:

Something Sonnyizes & nothing else does & something Sonnyizes & nothing else does & Belia believes that the former is different from the latter.

If that's true, the derivation of B-x is blocked, and you still cannot derive that Sonny differs from Arthur, simply because she believes he does.

Blocking this counterexample damages the parallelism of attitudes and modalities, however, and so is something of a Pyrrhic victory. Further, the coincidence of intuitions of modal rigidity with the principle of the necessity of identity licences replacing variables in theorems of quantified modal logic with logically proper names. Modal logic does not motivate eliminating them.

Do you accept the first premise of the Belief argument, (B-viii) (and so its conclusion)? I don't. Consider the analogy between the Modal and Belief arguments: In M-viii, the substitution involves the attribute of being such that it's possible that \(a\) is different from (-). In B-viii, the substitution involves the attribute of being such that Belia believes that \(a\) is different from (-).

I rejected the validity of inserting the latter attribute in the principle of substitutivity in section E§3. In that way I blocked the inferences from true premise to false conclusion that plagued us in E. And here I block the conclusion (B-x), which is intolerably paradoxical for someone who accepts relational beliefs.

However well motivated my rejection of the attribute's insertion is, however, you'd be right to feel my reasons for the rejection leave one thirsting for more. That's because I've only given you a \textit{reason that} its insertability should be rejected. I've not given you a \textit{reason why}. Reasons for believing that something is so seem to be merely provisional, until we find reasons for its being so and reasons why it must be so. In the case before us, the violation of rules of inference is only an indication that we'd better not insert this attribute into the principle of substitutivity. What's wrong with this attribute
that makes it uninsertable? Perhaps it's not a real attribute; I suggested as much in E§3. But the process of abstraction (D§2) yields the singular term. How must we amend the process to prevent that? We'll turn in the next section to the nature of attributes.

As for the modal attribute, it's not my concern here, but I could preserve a parallelism with modal logic by rejecting its insertion in the principle of substitutivity too. That would block the derivation of the principle of the necessity of identity. And some modal logics do without it. But we don't even have a reason for believing modal attributes are not insertable into the principle of substitution. Modal logic has no paradoxes, once descriptions are analyzed out of the category of singular terms. I do agree with Church that those who believe in the parallelism between possibility and belief should treat identically the insertion of modal attributes and propositional attitude attributes into the principle of substitutivity, either both allowed or both disallowed. The second of these alternatives is preferable to the first, but most preferable is to deny the point of any parallelism. As much parallelism as there happens to be is coincidence.

The moral of the reflections in this section is that, contrary to the trickery of the last proposals, the propositional attitudes are much more recalcitrant to being made logically respectable than are the idioms of modal logic. While Quine has been a critic of modal logic as well as of the propositional attitudes, and at a certain level of generality his criticism of each is the same, in the more than half a century since Smullyan's defense of modal logic, the debates over the two have diverged. As far as the solution of modal logic's difficulties goes, definite descriptions may not fit in positions appropriate for singular terms in modal statements, either because they're not singular terms or because of the meanings associated with statements in the language of modal logic. Proper names, on the other hand, fit fine there. But the difference between definite descriptions and logically proper names makes no difference to the problem of logicality facing propositional attitudes. The problem with singular terms remains, since we aren't purging them. (In section W we quarantine them for reasons having nothing to do with any parallelism between attitudes and modality.) So, since it makes no difference to our project, we'll continue to use definite descriptions as singular terms also.

§5. The divide between proper names and descriptions narrowed.

I've given four arguments, collectively close to conclusive, for Russell's eliminative analysis of descriptions, and you justifiably might wonder at my continuing to treat them as singular terms. The reason is twofold. First, once we know how to eliminate them, we also know the conditions for reintroduc-
ing descriptions into nonmodal logic by definition, namely, with proofs of the existence and uniqueness of their reference and with explicit indications of their scope, all of which guarantees their good behavior in intersubstitutions in nonmodal contexts. Function notation falls into the category of definite descriptions, and it's hard to imagine mathematics proceeding without such functions as \(2 + 3\) and \(x^2\) appearing in positions reserved for singular terms. Modally rigid descriptions are also well behaved in the principles of the necessity of identity and of substitutivity with modal attributes. As for the misbehavior in attitude contexts of descriptions, Russell's analysis is no cure; it posits in their place general terms, which are just as misbehaved as the descriptions, as we learn in section G, when we explore “hyperintensionality.”

As I just said, Russell introduced scope indicators for descriptions to ensure their good behavior. We must do the same for all singular terms. Introducing a name with wide scope requires existence and uniqueness proofs. Not so for narrow scopes, such as confinement to that-clauses of \textit{de dicto} reports of singular beliefs. Otherwise Rep, whose stance is noncommittal toward the contents of his that-clauses, may be entrapped into partial concurrence with them.\(^{16}\) Rep should be able to say Belia believes that Santa was good to her, without implying he too believes in Santa. And when an irate Belia demands he report her \textit{de dicto} belief that the scurrilous Rep's a liar, he should be able to say Belia believes the scurrilous Rep's a liar, without concurring in his scurrility. I take the concurrences to be conversational implicatures only; so we can regiment them away. We do it by requiring all singular terms in that-clauses have scope narrowed to the clause, indicated as Russell did, with the singular terms replicated at the beginning of their scopes and enclosed in brackets thus:

\[
\text{Belia thinks that [the scurrilous Rep] the scurrilous Rep's a liar.}
\]

(This is the operator's wink, wink position. Rep winks there.\(^{17}\) We noted in section E§5 how the Davidsonian regimentation deals with this problem by using smiley force. Rep's use of the term, Santa, occurs within the force. In the standard regimentation it would have its narrow scope indicated thus:

\[
\text{Belia thinks that [Santa] Santa was good to her.}
\]

This shows both the name's scope and also the scope of generalizability, in this case narrow scope only.

One loose end: I reminded you of my relative who believes contradictorily of me, but has only one proposition her beliefs can be directed toward (see section A§5). I refused to resolve the anomaly by purging proper names. Purging proper names could have given her two propositions to believe, neatly dispelling the anomaly, if I only had an Arthur-essence and a different Sonny-essence. But do I buy this solution? No; why should I! So the anomaly persists. Eventually we must face whether beliefs are directed toward
sentences, which can differ even though they express the same proposition, or whether believers may have contradictory attitudes toward a singular proposition. We face the issue in Part III.

Notes

1. For the curious: G. E. Hughes and M. J. Cresswell, *A New Introduction to Modal Logic*, 2nd or later printing (1996). The formula is on p. 246. It's valid in those logics that satisfy the inclusion requirement (p. 275). The reason for not recommending the book's 1st printing is that typographical errors occur, and one of the worst from our perspective occurs on p. 250 in the discussion of *de re* and *de dicto*, in effect reversing their meaning! Subsequent printings correct this.


4. The simplest proof: $1/3 = 0.3333...$ (threes forever). Multiply both sides of the equation by 3: $3/3 = 0.9999...$ (nines forever). Of course $3/3 = 1$. Some people don't connect the fact that there are infinitely many nines with the fact that there is no last nine. If there were a last nine, then the decimal would be less than 1. An antidote is reflection on Hilbert's hotel: It has infinitely many rooms and all are occupied. A man comes in and asks for a room. The clerk says, “No problem.” He presses a button, and a few minutes later he tells the man he has room 1. How is it possible? By pressing the button, he activated a message to each room that the occupant was to vacate it and proceed to the room with the next higher number. All occupants were accommodated, since there was no last room, but the first room was left empty. If you remain skeptical of the identity, you're guilty of the use-mention confusion: Two numerals, so two numbers. (Oh?) Some numeration systems create redundancy, that is, more than one name for the same number. For more on infinity, see note 13 to section G.

5. Rudolf Carnap, *Meaning and Necessity*, §18. The numeration system for naming real numbers provides more than one name for each number that has a terminating decimal name, as the equation in the text shows. It may be that Carnap intended his category of expressions of standard form to exclude naming systems that have more than one name for a thing. In that case, 1 is standard, but 0.999... is not; see §19, note 5. Carnap's nonredundancy condition may not be part of the definition of expressions of standard form, but a condition for defining a discrete coordinate language. He waives the condition in §19 for continuous coordinate languages. In that case all the expressions yielded by the numeration system for real numbers are in standard form.


7. Saul Kripke, “Naming and Necessity,” in Donald Davidson and Gilbert Harman, eds., *Semantics of Natural Language*, 2nd ed. (1972) 253-355; “Addenda” 763-769. The term is introduced on p. 269: “Let's call something a *rigid designator* if in any possible world it designates the same object, . . .” Kripke is careful to note that he is not saying the thing designated exists in every possible world. Although the name designates it when it does not exist there, what is the truth value of sentences about it in that situation, either true or false, or neither true nor false? Either way is
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feasible. See Hughes and Cresswell, the first two sections of chapter 15 for the alternative ways of treating this situation. Kripke cites Mill's modal argument for the rigidity of proper names near the beginning of his first lecture. In his own restatements of it, he tends to use the formulation I put into the quotation in square brackets.

8. Consider the natural numbers, 0, 1, 2, etc. Strictly only 0 is a proper name. The rest of the numerals are defined by descriptions that use that proper name, “0's immediate successor,” “the immediate successor of the immediate successor of 0,” etc. These descriptions are modally rigid. That and the hiding of the descriptions behind the numerals help the illusion that numerals are proper names.

9. Consider: “The town actually at the mouth of the Dart might not've been the town actually at the mouth of the Dart.” Taking the descriptions that begin and end the sentence to be identical in meaning, the sentence is necessarily false. If you think the sentence true, your intuitions do not support my claim about “actually.” In the face of such intuitions, I simply regiment in the adverb’s rigidifying effect! Keith Donnellan notes the inconclusiveness of this argument from the modal rigidity of names to the conclusion that their meaning cannot be descriptions in his “The Contingent A Priori and Rigid Designators” in P. French, T. Uehling, and H. Wettstein, Contemporary Perspectives in the Philosophy of Language (1979) 45-60. He does not make the case in terms of the operator, “actually,” however. It would be wrong to infer from his discussion that a description with sentence-wide scope is a rigid designator. For rigid designators are rigid even in sentences with insufficient complexity to force a distinction between wide and narrow scope of the descriptions in them.

10. For a defense of logically proper names against challenges like this one, see Scott Soames, Beyond Rigidity (Oxford, 2002), ch. 2.


12. John Burgess stresses the independence of modal rigidity and this theorem in his Philosophical Logic (Princeton, 2009), p. 35 and p. 69.

13. Belia corrected her mistake when she tried to find the difference by subtracting the latter from the former. She set out the subtraction problem by writing on the top line: 1.0000 (0s forever). Then she prepared this number for the subtraction by borrowing a 1 from the leftmost digit, and then continued the borrowing until her top number turned into 0.9999... (9s forever), the very number she was going to subtract! Belia's now on the right track, but her error, however momentary, showed that the distinction between proper names and definite descriptions does not help eliminate the logical deviancy of propositional attitudes.


15. Hughes and Cresswell, 334ff.


17. If Rep concurs, he can give a singular term wide scope, even in a de dicto report, by placing the operator at the beginning, no winks. Section 8§3 provides for fake de re reportage, which this wide-scope placement is, in another way.