Figure and Ground in Conditionals

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Abstract

If Socrates resembled Adonis, they would both be handsome. If Adonis resembled Socrates, neither would be handsome. And if Adonis and Socrates resembled each other, they might both be handsome and they might not. This is a puzzle for theories of conditionals that predict *if A, would C* and *if B, would C* to be equivalent provided *A* and *B* have the same truth conditions. For Socrates resembles Adonis just in case Adonis resembles Socrates, which holds just in case they resemble each other. Moreover, the corresponding facts are plausibly taken to be the same: the state of Socrates resembling Adonis is identical to the state of Adonis resembling Socrates, which is identical to the state of them resembling each other. I offer a solution to the puzzle by developing a semantics of conditionals that is sensitive to what conditional antecedents are about.

The world does not come to us an unstructured blob. We pay attention. We focus on some things rather than others. One of our earliest and most fundamental cognitive acts is to differentiate objects from their environment (Quinn and Bhatt 2018). Edge-detection is one of the first stages of visual processing (Kessen, Salapatek, and Haith 1972; Kelly et al. 2019). We discern faces in our visual field at birth (Johnson and Morton 1991; Valenza et al. 1996), and even before birth (Reid et al. 2017). We distinguish figure from ground, melody from harmony, foreground from background, signal from noise, faces from a vase.

This essay is about figure–ground relations in hypothetical reasoning. We focus specifically on *would*-conditionals, though our points apply broadly to other cases of hypothetical reasoning, such as causal reasoning.

1 Figure and Ground

The figure–ground distinction was first studied in earnest by Edgar Rubin in his doctoral dissertation (Rubin 1915), in which he introduced Rubin's vase (on the right). The distinction was important to Gestalt psychologists such as Max Wertheimer, who argued that structured wholes or *Gestalten*, not pure sensory stimuli, are the primary units of mental life (Wertheimer 1923; Wagemans et al. 2012). Perceiving an object as a *Gestalt* requires distinguishing it from its environment.[1]

Rubin's vase.

Around the same time, Russell realised a sentences exhibit an analogous distinction. In *The Principles of Mathematics* he distinguishes the *subject* and the *assertion* of sentences: "In a relational proposition, say '*A* is greater than *B*,' we may regard *A* as the subject and 'is greater than *B*' as the assertion, or *B* as the subject and '*A* is greater than' as the assertion. There are thus, in the case proposed, two ways of analyzing the proposition into subject and assertion" (Russell 1903, §48). He then proposed that equivalent sentences, by structuring information in different ways, can express distinct propositions.

> The proposition "humanity belongs to Socrates," which is equivalent to "Socrates is human," is an assertion about humanity; but it is a distinct proposition. In "Socrates is human," the notion expressed by *human* occurs in a different way from that in which it occurs when it is called *humanity*, the difference being that in the latter case, but not in the former, the proposition is *about* this notion.
>
> (Russell 1903, §48)

Russell did not apply his observations about comparative statements—such as *A is greater than B*—to conditionals. When we do so we find some stark contrasts.

(1)   *Alice is 20, Bob is 15. One must be over 18 to enter the bar.*

    a.   If Alice were younger than Bob, they could both enter the bar.

    b.   If Bob were older than Alice, they could both enter the bar.

We naturally read the first as false and the second as true. However, Alice is younger than Bob just in case Bob is older than Alice. When we interpret "If Alice were younger than Bob" we have a default tendency to imagine changing Alice's age and leaving Bob's fixed: Alice's age is the figure, Bob's age the ground. Similarly, when we interpret "If Bob were older than Alice" we tend to imagine changing Bob's age and leaving Alice's fixed. Each

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[1] Benjamin Lee Whorf later proposed that the figure–ground distinction is universal, writing that "There is one thing on which all observers of the appearance of a running boy will agree [...]. They will all divide it into (1) a figure or outline having more or less of motion (the boy) and (2) some kind of background or field against which, or in which, the figure is seen" (Whorf 1940, 163).

sentence privileges a particular division of figure and ground, just as we do when we adopt a particular way of interpreting Rubin's vase.

The same contrast appears for comparatives in general. For example:

(2)   *Alice is 1.5m tall, Bob is 1m tall. One must be at least 1.2m tall to ride the Ferris wheel.*
    a.   If Alice were shorter than Bob, they could ride the Ferris wheel together.
    b.   If Bob were taller than Alice, they could ride the Ferris wheel together.

Leonard Talmy (1975, 2000) has significantly extended the discussion of figure–ground relations. He thinks of the distinction as follows.

> The FIGURE object is a moving or *conceptually* mov*able* point whose path or site is conceived as a variable the particular value of which is the salient issue. [...] The GROUND object is a reference-point, having a stationary setting within a reference-frame, with respect to which the FIGURE's path or site receives characterization.
>
> (Talmy 1975, 419)

Talmy noticed that figure–ground contrasts appear not only for comparatives, such as *A is younger than B*, but for transitive verbs in general, such as *A is near B*. Like Russell, who argued that *humanity belongs to Socrates* and *Socrates is human* express distinct propositions, Talmy proposed that *the bike is near the house* and *the house is near the bike* "in fact do not say the same thing" (Talmy 1975, 420). In the former, the house "has a set location within a framework [...] and is to be used as a reference-point by which to characterize the other object's (the bike's location), understood as a variable," whereas the latter makes all the reverse specifications. Talmy does not discuss reciprocals such as *the bike and house are near each other*, though these also appear to exhibit a different division of figure and ground compared to *the bike is near the house* and *the house is near the bike*, with the figure consisting of both objects.

Conditional antecedents are sensitive to the figure–ground relations in *A is near B*, *B is near A*, and *A and B are near each other*. Suppose that Alice is at home and Bob is outside in the rain.

(3)   a.   If Alice were near Bob, they would both be dry.
    b.   If Bob were near Alice, they would both be dry.
    c.   If Alice and Bob were near each other, they would both be dry.

We naturally judge the first to be false, the second to be true, and the third to be indeterminate. Though Alice is near Bob just in case Bob is near Alice, which holds just in case they are near each other (Dowty 1991, 556; Gleitman et al. 1996).

All sentences whatsoever that express spatial comparisons appear to exhibit figure–ground contrasts: *near*, *above/below*, *to the left/right of*, and so on. To illustrate, suppose that three blocks, A, B, and C, are placed in a grid as in Figure 1, where each block occupies exactly one square. Consider (4).
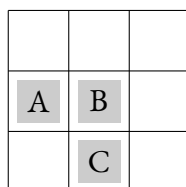

Figure 1

(4) a. If block A were on top of block B, the blocks would form a straight line.
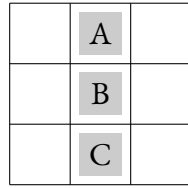   b. If block B were beneath block A, the blocks would form a straight line.

The first is most naturally judged true and the second false. Figure 2 depicts the arrangements we tend to imagine when we interpret each antecedent.

Talmy observes that non-spatial relations also express a figure–ground distinction. Take resemblance: "the sentence 'she resembles him,' which might be thought to derive from something like 'she is near him in appearance, or her appearance is near his appearance,' is not understood in the same sense as 'he resembles her' " (Talmy 1975, 421). In conditionals this contrast gives rise to a difference truth conditions.

(5) a. If Socrates resembled Adonis, they would both be handsome.
     b. If Adonis resembled Socrates, they would both be handsome.
     c. If Adonis and Socrates resembled each other, they would both be handsome.

(6) a. If Bach were similar to Black Sabbath, Bach would be played less at church.
     b. If Black Sabbath were similar to Bach, Bach would be played less at church.
     c. If Bach and Black Sabbath were similar, Bach would be played less at church.

Here is a final, more subtle example. Talmy claims that in a sentence such as $y = 3x^2 + 1$, y appears "figure-like" while x appears "ground-like" (Talmy 1975, 422). While this case is less clear-cut, it arguably gives rise to similar contrasts in conditionals. Let m, n, and k be three numbers. We are told that $m = 5$, $n = 2$, and $k = 3$. Compare (7) in the following two contexts.

(7) *Context 1: $m = n + k$.*
     Context 2: $n = m - k$.
     If n were 4, m would be 7.
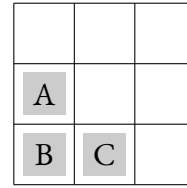
(a) If block A were on top of block B, ...   (b) If block B were beneath block A, ...

Figure 2

In context 1 we have a default preference for changing n but not k, in which case the conditional is true. In context 2 we have are less sure whether to change m, k, or both, leading to more prevalent judgements of indeterminacy. But $m = n + k$ is true just in case $n = m - k$ is.

2   The puzzle

The contrasts we have just observed appear to be counterexamples to the following rule of Substitution.[2]

Substitution. If A and B are logically equivalent, then $A > C$ is true iff $B > C$ is true.

For Socrates resembles Adonis just in case Adonis resembles Socrates, which is true just in case they resemble each other. Alice is younger than Bob just in case Bob is older than Alice. Alice is shorter than Bob just in case Bob is taller than Alice. Alice is near Bob just in case Bob is near Alice, and so on.

Almost all semantics of *would*-conditionals validate Substitution, including those of Stalnaker (1968) and Lewis (1973).[3] Indeed, any theory that only makes use of antecedents' truth conditions will validate Substitution: if A and B have the same truth conditions, such a theory cannot distinguish them. One might therefore propose that the fault lies with the coarse grain of truth conditions, and that by moving to a more fine-grained, hyperintensional notion of meaning, in which logically equivalent sentences can be distinguished, the overall architecture of our theory of conditionals can be maintained.

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[2]Substitution is also known as Left Logical Equivalence, or LLE (Arló-Costa 2007). Chellas (1975) calls it RCEA, which I believe stands for 'the Rule of Classically Equivalent Antecedents'.

[3]Semantics of conditionals that invalidate Substitution include Nute (1980, 32), Fine (2012), Ciardelli, Zhang, and Champollion (2018), and Santorio (2018). Nute and Santorio do so in order to validate Simplification of Disjunctive Antecedents—that $(A \lor B) > C$ implies $A > C$ and $B > C$—without validating Antecedent Strengthening—that $A > C$ implies $(A \land B) > C$. For A is equivalent to $A \lor (A \land B)$. Given Substitution, $A > C$ would imply $(A \lor (A \land B)) > C$, which by Simplification implies $(A \land B) > C$. Nute (1980, 34) claims that apart from this issue there is no evidence against Substitution.

The problem, however, runs deeper than that. One way to see this is to note that Substitution follows from the following two principles.[4]

Weaker than Entailment. If A entails C, then $A > C$ is true.[5]
Reciprocity. If $A > B$ and $B > A$ are true, then $A > C$ is true iff $B > C$ is true.

For if A and B are logically equivalent, they entail one another, so by the Weaker than Entailment, $A > B$ and $B > A$ are true. Then by Reciprocity, $A > C$ is true just in case $B > C$ is. Thus no matter how fine-grained we take meanings to be, provided our theory of conditionals validates Weaker than Entailment and Reciprocity, it will automatically validate Substitution too.

In what follows we show that two of the most well-known theories of conditionals, due to Stalnaker and Lewis, validate Weaker than Entailment and Reciprocity, and therefore Substitution. We will then show that a theory of conditionals of quite a different character—Kit Fine's (2012) truthmaker semantics of conditionals—also validates substitution, given some additional assumptions which Fine himself endorses.

2.1 Stalnaker

Stalnaker introduces a selection function that takes a proposition and a possible world and returns a single world—intuitively, one in which the antecedent is true and which otherwise differs minimally from the world of evaluation.

Stalnaker validates Weaker than Entailment and Reciprocity, due to two constraints he imposes on the selection function f.[6]

(i) A is true at $f(A, w)$.
(ii) If A is true in $f(B, w)$ and B is true in $f(A, w)$, then $f(A, w) = f(B, w)$.

Stalnaker regards these constraints as essential to his theory. He remarks that, "the selection is based on an ordering of possible worlds with respect to their resemblance to the base world. If this is correct, then [(ii)] must be imposed on the s-function [the selection function]. ... These conditions on the selection function are necessary in order that this account be recognizable as an explication of the conditional" (Stalnaker 1968, 36).

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[4]The name Reciprocity comes from Egré and Rott (2021). Nute (1980) calls it CSO, and Starr (2022) calls it Substitution of Subjunctive Equivalents.

[5]Weaker than Entailment in turn follows from plausible principles such as Identity ($A > A$) and Right Weakening (if B entails C then $A > B$ entails $A > C$). For a discussion of semantics that—surprisingly—invalidate Identity, see Mandelkern (2019, 2021).

[6]To see this, suppose A and B are logically equivalent. By (i), A is true at $f(A, w)$. Then given that A and B are logically equivalent, B is true at $f(A, w)$. Vice versa, A is true at $f(B, w)$. Then by (ii), the selected A-world is the selected B-world. A fortiori, C is true at the selected A-world just in case it is true at the selected B-world.

2.2 Lewis

Lewis (1973) proposes that $A > C$ is true at a world w just in case C is true at all of the most similar worlds to w where A is true.[7] Like Stalnaker, Lewis also validates Weaker than Entailment and Reciprocity, from which Substitution follows. No matter how fine-grained we take propositions to be, Substitution is part of the logic of Lewis's semantics.[8]

2.3 Fine

The problem runs deeper than merely arguing against Substitution. For a number of recent proposals that invalidate Substitution in general nonetheless predict that antecedents we have considered are equivalent.

Fine (2012) proposes a semantics of counterfactuals that does not validate Substitution. It is based on the notion of *exact verification*. The guiding idea is that a part of the world, or state, exactly verifies a sentence just in case the state's obtaining is wholly relevant to the truth of the sentence (Fine 2017). Fine also uses a transition relation between states, stating when one state is a possible outcome of another at a world.[9] Fine (2012) offers the following semantics.

> $A > C$ is true at a world w just in case for every exact verifier t of A and possible outcome u of t at w, u contains an exact verifier of C.

Following Fine (2014, 576), let us call two sentences *exactly equivalent* just in case

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[7]This formulation holds under the limit assumption (for discussion see Kaufmann 2017). As we show in note 8, Lewis validates Weaker than Entailment and Reciprocity with or without the limit assumption.

[8] Let us show this here. For each world w, let $\leq_w$ be a reflexive and transitive binary relation over the set of possible worlds. (Lewis (1981, 220) himself begins with a irreflexive order $<_w$ and constructs a reflexive order $\leq_w$ by taking $w' \leq_w w''$ just in case $w' <_w w''$ or $w' = w''$.) Lewis (1981, 230) takes $A > C$ to be true at w just in case for every A-world x, there is an A-world $y \leq_w x$ such that for every world $z \leq_w y$, if A is true at z, C is true at z. Weaker than Entailment is immediate. We prove that Reciprocity is valid as follows.

Proof. For any world w and sentence A, let $w \models A$ denote that A is true at w. Pick any world w and suppose $A > B$, $B > A$ and $B > C$ are true at w. To show that $A > C$ is true at w, pick any $x \models A$. We have to show that there is a $y \models A$ such that $y \leq_w x$ and for all $z \leq_w y$, $z \models A \rightarrow C$, where $\rightarrow$ is the material conditional.

Since $w \models A > B$ and $x \models A$, there is a $v \models A$ such that $v \leq_w x$ and (i) for all $v' \leq_w v$, $v' \models A \rightarrow B$. Since $\leq_w$ is reflexive, $v \leq_w v$, so $v \models A \rightarrow B$. Thus $v \models B$.

Since $w \models B > A$ and $v \models B$, there is a $u \models B$ such that $u \leq_w v$ and (ii) for all $u' \leq_w u$, $u' \models B \rightarrow A$.

Since $w \models B > C$ and $u \models B$, there is a $y \models B$ such that $y \leq_w u$ and (iii) for all $z \leq_w y$, $z \models B \rightarrow C$. Since $y \leq_w u$, by (ii), $y \models B \rightarrow A$. Then as $y \models B$, $y \models A$. And as $y \leq_w u \leq_w v \leq_w x$, by transitivity of $\leq_w$, $y \leq_w x$.

We show that $z \models A \rightarrow C$ for all $z \leq_w y$. Pick any $z \leq_w y$. Then $z \leq_w y \leq_w u \leq_w v$, so by transitivity of $\leq_w$, $z \leq_w v$. Then by (i), $z \models A \rightarrow B$. And since $z \leq_w y$, by (iii), $z \models B \rightarrow C$. Hence $z \models A \rightarrow C$.

[9]We will not be concerned with the transition relation here since as we will see, our points to come apply regardless of which transition relation is in question.

they have the same exact verifiers and falsifiers. Two sentences may be logically equivalent without being exactly equivalent; for example, A, $A \lor (A \land B)$, and $(A \land B) \lor (A \land \neg B)$ are logically but not exactly equivalent. Fine's semantics therefore does not validate Substitution, but does satisfy an analogous principle.

Exact Substitution. If A and B are exactly equivalent, then $A > C$ is true just in case $B > C$ is true.

Recall from (4) that the "Block A is on top of block B" and "Block B is beneath block A" are not equivalent as conditional antecedents. There is, however, a compelling argument to be made that these statements are exactly equivalent. Fine himself puts it like this.[10]

> Suppose that a given block a is on top of another block b. Then there is a certain state of affairs s_1, may describe as the state of a's being on top of b. There is also a certain state of affairs s_2 that may be described as the state of b's being beneath a. Yet surely the states s_1, and s_2 are the same. There is a single state of affairs s "out there" in reality, consisting of the blocks a and b having the relative positions that they do; and the different descriptions associated with s_1, and s_2 would merely appear to provide two different ways at getting at this single state of affairs.
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> (Fine 2000, 3)

According to Fine, then, *Block a is on top of block b* and *Block b is beneath block a* are exactly equivalent. However, in (4), repeated below, we saw these are not equivalent in conditional antecedents.

(4)   a.   If block A were on top of block B, the blocks would form a straight line.
          b.   If block B were beneath block A, the blocks would form a straight line.

Assuming that their antecedents are exactly equivalent, then, (4) is a counterexample to Exact Substitution.

For a second example, consider the relation of adjacency. Fine writes that, "the state of a's being adjacent to b is surely the same as the state of b's being adjacent to a" (Fine 2000, 17). These, however, are not equivalent in conditional antecedents.

(8)   *Alice doesn't have much money. Her house is in an affordable area and her office is in an expensive area.*

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[10]Geach and Williamson propose a related, though not identical view. Geach states that "a relation neither exists nor can be observed apart from its converse relation" (Geach 1957, 33), and Williamson argues that relations are identical to their converses: " '- - - stabs ...' and '- - - is stabbed by ...' (and '... stabs - - -') stand for the same relation" (Williamson 1985, 249). For discussion see MacBride (2007), Gaskin and Hill (2012), and Liebesman (2013).

a. If Alice's house were adjacent to her office, her rent would be unaffordable.
b. If Alice's office were adjacent to her house, her rent would be unaffordable.
c. If Alice's office and house were adjacent, her rent would be unaffordable.

Intuitively, the first is true, the second false, and the third indeterminate.

Here we will not attempt to settle the complex question of whether we ought to regard the states in question as identical or distinct. Nonetheless, it is clearly desirable to have a theory of conditionals that makes the right predictions for sentences like (4) and (8) without controversial commitments regarding the ontology of relations. To predict the contrasts in (4) and (8) on Fine's approach to conditionals, we must assume that the state of *a* being on top of *b* is distinct from the state of *b* being below *a*, and that the state of *a* being adjacent to *b* is distinct from the state of *b* being adjacent to *a*, which is in turn distinct from the state of *a* and *b* being adjacent. However, it seems one can consistently maintain that these states are identical while nonetheless acknowledging a contrast in (4) and (8). Yet Fine's semantics of conditionals rules out this position as inconsistent.

The same point applies to the other contrasts we have observed. It is plausible to maintain that the state of Socrates resembling Adonis is identical to the state of Adonis resembling Socrates, which is in turn identical to the state of them resembling each other. The state of Alice being younger than Bob is just the state of Bob being older than Alice, and so on. Given these identities, each of the contrasts we observed in conditionals above are counterexamples not only to Substitution, but also to Exact Substitution.

2.4 Reciprocals

Quite apart from ontological considerations, there are arguments of a purely linguistic character that, augmented with some assumptions about the relationship between meanings and state spaces, speak in favour of treating these states—such as the state of Alice being similar to Bob and Bob being similar to Alice—as identical. The argument comes from reciprocals.

Reciprocals are constructions that express a shared relationship, such as *A and B are similar*, *A and B are close*, *A and B are near each other*, and *A and B resemble each other*. Each reciprocal has binary forms; for example, the binary forms of *A and B are similar* are *A is similar to B* and *B is similar to A*. In general there are two approaches to the relation between reciprocals and their binary forms. We may treat the binary form as primary and derive the reciprocal from it (Gleitman 1965; Dimitriadis 2008; Rubinstein 2009; Siloni 2012), what we will call a *relation-first approach*, or we may treat the reciprocal as primary and derive the binary form from it (Lakoff and Peters 1969; Lasersohn 1995; Winter 2018), what we will call a *reciprocal-first approach*. The relation-first approach takes the relations *A is similar to B* and *B is similar to A* as primitive and defines that *A* and *B* are similar just in

case A is similar to B and B to A. The reciprocal-first approach goes the other way, positing a primitive predicate *similar* that applies to pluralities, and defines that A is similar to B, and B to A, just in case A and B—understood as a plural individual—are similar.

Lasersohn (1995) offers the following argument for the reciprocal-first approach. As Goodman (1951, 108) observes, some things can be pairwise similar without the group as a whole counting as similar. Consider (9).[11]

(9)   a.   John, Mary, and Bill are similar.
       b.   John is similar to Mary, Mary is similar to Bill, and Bill is similar to John.

The first intuitively requires John, Mary, and Bill to be similar in the same respect. The second does not: it is true, say, "if John is similar to Mary in having red hair, but similar to Bill in being seven feet tall, and Mary is similar to Bill in liking peach ice cream" (Lasersohn 1995, 29). The same observations hold for other predicates, such as *agreed* (Winter 2018) and *close*.

(10)   a.   John, Mary, and Bill agreed.
       b.   John agreed with Mary, Mary agreed with Bill, and Bill agreed with John.

(11)   a.   John, Mary, and Bill are close.
       b.   John is close to Mary, Mary is close to Bill, and Bill is close to John.

This challenges the relation-first approach, since it is not at all clear how to derive the shared-feature interpretation via compositions of binary relations between individuals. No such difficulties arise on the reciprocal-first approach. We assume a primitive meaning of *similar* that applies to pluralities; say, a plurality P is similar just in case there is a relevant feature that all members of P share; P agree just in case there is a statement that they all believe; P are close just in case there is some respect in which the group collectively exhibits sufficient companionship. Using this collective predicate, we define that A is similar to B just in case the plurality consisting of A and B is similar. This accounts for the fact that A is similar to B just in case A and B are similar, while also accounting for Goodman's observation that A, B and C can be pairwise similar without being collectively so.

Under some additional assumptions, this purely linguistic argument provides evidence for a particular view concerning the identity and distinctness of the states assumed by truthmaker semantics. There are various perspectives one may take on the ontological status of the state space. A legitimate possibility—though by no means the only one—is cognitive: the states represent the way our minds carve up the world. This gets us to cognition, though not yet to natural language ontology. Moving one step further, an

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[11]Amos Tversky presents a related example, based on one due to William James: "Jamaica is similar to Cuba (because of geographical proximity); Cuba is similar to Russia (because of their political affinity); but Jamaica and Russia are not similar at all" (Tversky 1977, 329).

plausible but controversial view is that the ontology of natural language serves as a guide to the structure of our conceptual life (Fodor 1987; Pietroski 2018; Moltmann 2019), a key tenant of cognitive linguistics (Fodor 1975; Lakoff 1987; Croft and Cruse 2004).

I do not wish to advocate for these views here, but merely point out that they are intelligible and legitimate positions one may adopt. For those who hold such views, arguments concerning which relations to adopt as primitive serve as evidence in favour of a which relations are represented in the state space assumed by truthmaker semantics. In this case, the above argument for the reciprocal-first theory is evidence that the state space contains the symmetric state of John and Mary being similar, rather than the asymmetric states of John being similar to Mary and Mary being similar to John. Given the absence of these asymmetric states in the state space, *A is similar to B* and *A is similar to B* are exactly equivalent, and therefore equivalent as antecedents according to Fine's semantics of conditionals.

3   An aboutness approach to conditionals

[*To be completed.*]

1. Pick a time at which to imagine the change. This is the *intervention time*.
2. Allow the part of the world the antecedent is about at intervention time time to vary.
3. Play forward the laws.
4. Stick on the actual past.
5. Restrict to worlds where the antecedent holds.
6. Check if the consequent holds at all of/the selected resulting world(s).

4   The *de re* reply

In this section we develop, and ultimately argue against, an alternative response to the contrasts we have seen in this essay. We call this response the *de re* reply.

In 'On Denoting' Russell recalls the following anecdote.

> I have heard of a touchy owner of a yacht to whom a guest, on first seeing it, remarked, "I thought your yacht was larger than it is"; and the owner replied, "No, my yacht is not larger than it is". What the guest meant was, "The size that I thought your yacht was is greater than the size your yacht is"; the meaning attributed to him is, "I thought the size of your yacht was greater than the size of your yacht".
>
> (Russell 1905, 489)

The same ambiguity appears in conditional antecedents (Lewis 1973, 37).

(12)   If your yacht were larger than it is, you would boast about it more.

This has a consistent reading, in which we imagine the yacht being larger in the hypothetical worlds than it is in the actual world.

This behaviour is not limited to comparatives. It also appears, for example, in quantifier restrictors (Percus 2000).

(13)   a.   Alice thinks that everyone inside the room is outside the room.
        b.   If everyone inside the room were outside the room, it would be empty.

The belief claim and antecedent have a consistent reading, saying that everyone who is inside the room in the actual world is outside the room in the worlds, respectively, compatible with Alice's beliefs and raised by the conditional antecedent.

Lewis (1973, 37) represents the different readings via quantifier scope. For example, he represents *If your yacht were larger than it is, …* as *The size of your yacht is an x such that, if the size of your yacht exceeded x, ….* This produces the right reading for Russell's example but not for (13b). This sentence does not mean that *Everyone in the room is an x such that, if x were outside the room, it would be empty.* On this reading we remove one person at a time and the sentence is false, whereas when we interpret (13b) we remove them all at once and the sentence is true.

We can instead represent the two readings using world indices (Percus 2000; Keshet 2010). Assuming a simple, Hintikka (1962) style semantics of belief for expository purposes, we can represent the two readings as follows, where w_0 is the world of evaluation.

(14)   I thought your yacht was larger than it is.
        a.   **De dicto.** For every world w compatible with my beliefs at w_0, the size of the yacht at w is greater than the size of the yacht <u>at w</u>.
        b.   **De re.** For every world w compatible with my beliefs at w_0, the size of the yacht at w is greater than the size of the yacht <u>at w_0</u>.

(15)   Alice thinks that everyone inside the room is outside the room.
        a.   **De dicto.** For every world w compatible with Alice's beliefs at w_0 and for all x such that x is inside the room <u>at w</u>, x is outside the room at w.
        b.   **De re.** For every world w compatible with Alice's beliefs at w_0 and for all x such that x is inside the room <u>at w_0</u>, x is outside the room at w.

One may argue that the sentences we have considered here exhibit a similar ambiguity. For example, "Socrates resembles Adonis" means that Socrates' appearance at w is sufficiently close to Adonis' appearance at w (*de dicto*) / w_0 (*de re*), that "Alice is younger than

Bob" means that Alice's age at w is less than Bob's age at w (*de dicto*) / w_0 (*de re*), that "Alice is near Bob" means that Alice's location at w is sufficiently close to Bob's location at w (*de dicto*) / w_0 (*de re*), and so on.

This *de re* reading appears to be available. Suppose Alice believes that Bob resembles the actor Remi Malek. Alice isn't aware that Remi has an identical twin brother Sami Malek—she has no idea that Sami exists.

(16)   Alice believes that Bob resembles Sami Malek.

I submit that, in the right context, this may have a true reading.

For a second example, suppose Suzy can see the cat but not the dog (Figure 3). She has no idea that the dog is there. Actually, the cat is near the dog. Consider:

(17)   Suzy believes that the cat it near the dog.
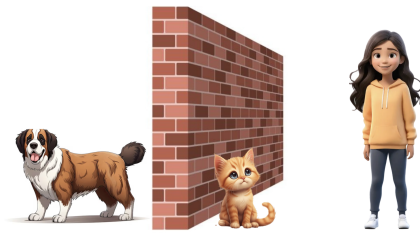
Figure 3: Suzy sees the cat, but is not aware of the dog.

This is most naturally read as false—after all, Suzy has no beliefs whatsoever about the dog. But I submit that it may also have a true reading in this context, saying that Suzy believes that the cat is near the location where the dog actually happens to be. On this *de re* reading, (17) is true.

The *de re* reply asserts that *de re* readings are responsible for the contrasts we have observed. Recall, for example, (1).

(1)   *Alice is 20, Bob is 15. One must be over 18 to enter the bar.*
        a.   If Alice were younger than Bob, they could both enter the bar.
        b.   If Bob were older than Alice, they could both enter the bar.

On the *de re* reading these are equivalent, respectively, to (18).

(18)   a.   If Alice were younger than 15, they could both enter the bar.
         b.   If Bob were older than 20, they could both enter the bar.

These antecedents are equivalent on the *de dicto* reading but not on the *de re* reading. Read *de re*, they are not counterexamples to Substitution and can easily be handled by existing semantics of conditionals, such as Lewis's or Stalnaker's semantics.

In what follows I explain why I believe the *de re* reply to be implausible, and cannot account for the full range of data under consideration.

4.1 Against the *de re* reply

It is generally assumed that *de dicto* and *de re* readings are always in principle available (Percus 2000). We use pragmatic reasoning, contextual features and our general world knowledge to disambiguate. This has the attractive feature of making the resolution of *de re–de dicto* ambiguity of a kind with the resolution of any other ambiguity, such as referential ambiguity (for instance, determining who 'they' refers to in a given context) and polysemy (disambiguating riverbanks from financial banks).

A general feature of ambiguity resolution is that, jokes aside, we prefer resolutions on which the sentence is true to those on which it is false. In Russell's yacht example, "I thought your yacht was larger than it is," we opt for the *de re* reading. It is easy to understand why: the *de dicto* reading is clearly false. We can account for this behaviour by a principle of interpretative charity.

Principle of Charity. When multiple readings of a sentence are available, some of which are true, we opt for one of the true readings.

To illustrate, suppose you see someone you know searching through a crowd. When you ask what they are doing here they reply, "I'm looking for a friend." Here we easily interpret them as saying that there is a particular person who is their friend and whom they are looking for. This is the *de re* reading.

Now suppose you meet someone at a bar who tells you they are new to the neighbourhood. When you ask what they are doing here they reply, "I'm looking for a friend." Now we naturally interpret them as saying that they are looking to have a friend. There is no particular person they are looking for. For all we know they might not even have any friends. This is the *de dicto* reading.

We easily manage to pick the reading that makes the sentence true. If a *de re–de dicto* ambiguity were at play in the counterexamples to Substitution we have considered, we would likewise expect each reading to be available, and that when the sentence is true on one reading and false on the other, we opt for the true reading.

To test this, consider the following scenario. Suzy is playing a game in which she is given two cards, A and B, at random. Each card shows either 1, 2, or 3. The cards are independent (for example, we may imagine that they are drawn from separate decks). Suzy wins just in case card A is 3 and card B is 2. On this particular occasion, card A is 2 and card B is 2, so Suzy lost (see Figure 4). Consider (19).

(19)   If card B were lower than card A, there is a 50% chance that Suzy would have won.

(19) is clearly false on the *de re* reading. On this reading "B is lower than A" means that B is lower than the actual value of A, which is 2. And if card B were lower than 2, there is a 0% chance that Suzy would have won.

Figure 4

What about the *de dicto* reading? The predictions here depend on one's semantics of conditionals. Let us test this on Lewis's semantics. It is plausible to assume that changing one card requires less of a departure from reality than changing two. Evidence for this comes from sentences such as (20).

(20)   If card A were 3, Suzy would have won.

This is intuitively true, showing that when we change A we leave B as is. (We can construct similar sentences under other winning conditions to show this for all possible values of cards A and B.) This generates the following similarity order: the closest world to the actual world is the actual world itself—(2, 2)—the next closest worlds, all equally close to the actual world, are those where one card changes and the other is still 2—(1, 2), (3, 2), (2, 1), (2, 3)—and the next closest worlds, again all equally close to the actual world, are those where both cards change—(1, 1), (1, 3), (3, 1), (3, 3). Given this similarity order, the most similar worlds the actual world where card B is lower than card A are (3, 2) and (2, 1), given in bold.

$$(2, 2) \quad <_w \quad (1, 2), (\mathbf{3, 2}), (\mathbf{2, 1}), (2, 3) \quad <_w \quad (1, 1), (1, 3), (3, 1), (3, 3)$$

One of these, (3, 2), is the winning hand. Since the cards were given randomly, each outcome has an equal chance of occurring, so among these possibilities there is a 50% chance that Suzy would have won. Thus on Lewis's semantics (19) is true on its *de dicto* reading.

Similarly, consider (21).

(21)   If card A were higher than card B, there's a 50% chance that Suzy would have won.

This is also false on the *de re* reading, on which "A is higher than B" means that A is higher than 2. Intuitively, if A were higher than 2, there is a 100% chance that Suzy would have won.[12]

On the *de dicto* reading, (21) is equivalent to (19). Lewis therefore also predicts (21) to be true on its *de dicto* reading.

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[12]One might also consider the possibility that we vary B simultaneously here. In that case, if A were higher than 2 and B were allowed to vary, there would be three possibilities—(3, 1), (3, 2), and (3, 3)—and therefore a 1 in 3 chance that Suzy would have won. On this reading (21) still comes out false.

The trouble for Lewis is that (19) and (21) are clearly false. They do not have any true reading. Furthermore, there is clearly no reading on which they are equivalent.

No such difficulties arise on the aboutness approach. It predicts that (19) and (21) are false on both their *de re* and *de dicto* readings (see Table 1).

Predictions for (19) and (21)	*De re*	*De dicto*
Similarity approach	✗	✓
Aboutness approach	✗	✗

Table 1

Let's first derive these predictions on the *de re* readings. The antecedent of (19) on its *de re* reading is "if card B were lower than 2." This is about card B and not about card A, so we vary the value of card B and fix the value of card A. When we restrict to those cases where B is lower than 2, we have that A is 2 and B is 1, in which case Suzy has no chance of winning. Similarly, the antecedent of (21) on its *de re* reading is "if card A were higher than 2," which is about A and not B. When we allow A to vary but fix B, and restrict to worlds where A is higher than 2, we find that A is 3 and B is 2, in which case Suzy certainly wins.

The aboutness approach makes the same predictions for the *de dicto* readings. The antecedent "if card B were lower than card A" is about its subject, card B, and not about its object, card A. So we allow the value of card B to vary and fix the value of card A. When we restrict to the resulting worlds where card B is lower than card A (read *de dicto*), we find that A is 2 and B is 1, in which Suzy has zero chance of winning. Similarly, the antecedent "if card A were higher than card B" is about card A and not about card B, so we allow A to vary and fix B. When we restrict to the resulting worlds where A is higher than B (read *de dicto*), we find that A is 3 and B is 2, in which case Suzy certainly wins.

To summarise this section, the received view of the *de re–de dicto* ambiguity is that, just as with any ambiguity, both readings are in principle available. By a principle of interpretative charity, when one reading is false and the other true, we opt for the true reading. As we have seen the similarity approach predicts that (19) and (21) are true on their *de dicto* reading. Intuitively, however, they do not have any true reading.

The similarity approach has a possible response: assert that the *de re* reading is obligatory. If we rule out the *de dicto* reading, we account for the intuitive falsity of (19) and (21). This response goes against what we know in general about the availability of *de dicto* readings. However, let us be charitable and entertain it. In what follows we show that the *de dicto* readings are in fact available. Thus the similarity approach faces a kind of paradox. On the one hand, to account for (19) and (21) the *de dicto* readings must not be available, while in other contexts they must.

4.2   The availability of *de dicto* readings

In this section we present three environments which clearly show that the *de dicto* readings are available for the antecedents we have considered.

Conjunctive antecedents.   Conjunctive antecedents show that the *de dicto* reading is clearly available. Consider (22).

(22)   If Adonis resembled Socrates and Socrates were handsome, they would both be handsome.

This is most naturally judged true. It is true on the *de dicto* reading of "Adonis resembles Socrates" but false on its *de re* reading. Read *de dicto*, the antecedent is true at a world w just in case Adonis' appearance at w is sufficiently like Socrates' appearance at w and Socrates is handsome at w. In this case we imagine both handsome and therefore judge the conditional true. Read *de re*, the antecedent is true at a world w just in case Adonis' appearance at w is sufficiently like Socrates' appearance at the actual world—in which Socrates is not handsome—and Socrates is handsome at w. When we read (22) in this way, we imagine Adonis unattractive and Socrates handsome, so we judge the conditionalsfalse.

Recall from the previous section that the *de re* reply required the *de re* readings to be obligatory to make the correct predictions (even when the *de dicto* reading would rescue the sentence from falsity). Yet here the *de dicto* readings are clearly available. The same observations apply to the other contrasts we have considered; for example:

(23)   *Alice and Bob are both 15. One must be 18 or over to enter the bar.*
    If Bob were older than Alice and Alice were 18, they could both enter the bar.

(24)   *Alice is at home and Bob is outside in the rain.*
    If Bob were near Alice and Alice were outside, they would both be wet.

We can also test the sentences from the previous section that the *de re* reply required to be read *de re*.

(25)   *Cards A and B are both 2. Each card can be 1, 2, or 3. Suzy wins just in case card A is 3 and card B is 2.*
    If card B were lower than card A and card A were 3, there is a 50% chance that Suzy would have won.

This has a salient true reading. For the same reasons as in (22), this is true *de dicto* and false *de re*. On the latter, the antecedent says that card B is lower than the actual value of card A (which is 2), and card A is three. In that case card B would be 1 and Suzy would have zero chance of winning.

The *de re* reply is forced to say that, when we interpret "If card B were lower than card A" by itself, the *de dicto* reading is unavailable—even when it would save the conditional from falsity—while when we add the conjunct "...and card A were 3", the it suddenly becomes available again. Such moves are extremely implausible, to say the least. We should be deeply suspicious of any approach that requires us to perform dazzling feats of *de re–de dicto* gymnastics.

In contrast, the aboutness approach handles these complex antecedents straightforwardly. Unlike the similarity approach, it never needed to rule out the *de dicto* readings to make the right predictions. The aboutness approach therefore predicts (22) to be true on its *de dicto* reading. According to it, "Socrates resembles Adonis" and "Adonis resembles Socrates" behave differently as conditional antecedents on both their *de re* and *de dicto* readings. Read *de dicto*, they are logically equivalent, but on to the aboutness approach conditionals are also sensitive to what their antecedents are about. The antecedents differ in what they are about. Sentences are about their subjects. In "Adonis resembles Socrates and Socrates is handsome" there are two subjects: Adonis and Socrates. When we interpret it we allow Adonis' appearance and Socrates' appearance to vary. Restricting to worlds where Adonis resembles Socrates and Socrates is handsome, both are indeed handsome, so the conditional is true.

Belief contexts   The *de dicto* readings that the *de re* reply claims to be unavailable are also available in belief contexts. Take (17), where Suzy has false beliefs—rather than no beliefs—about the dog's location. Suzy believes that the cat is near the wall and the dog is far away. In fact, the dog is near the wall and the cat is far away (Figure 5). Consider (17) again in this context.
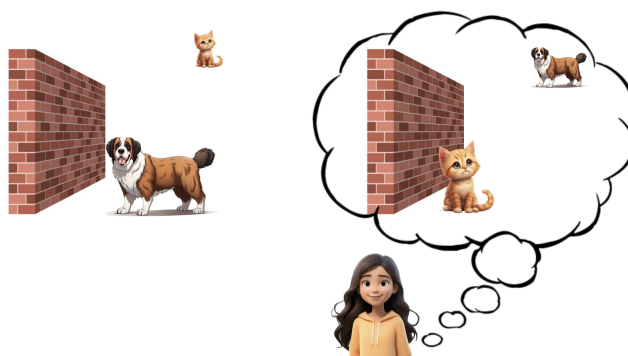

Figure 5: Reality (left) and Suzy's beliefs (right).

(17)   Suzy believes that the cat is near the dog.

In this context it is extremely hard, if not impossible, to read (17) as true. On the *de dicto* reading it is indeed false. However, on the *de re* reading (17) says that Suzy believes that

the cat is near where the dog actually happens to be—namely, beside the wall—which is in fact true.

For a second example, suppose that blocks A, B, and C are arranged at particular location with A above B and B above C. Suzy believes that the blocks are at the same location, but mistakenly believes that C is above A and A above B (Figure 6).
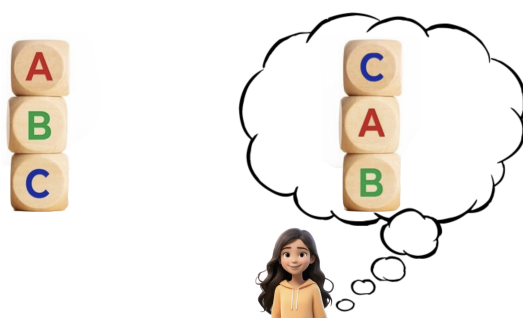

Figure 6: Reality (left) and Suzy's beliefs (right).

(26)   Suzy believes that block A is above block C.

This easily reads as false. It is indeed false on a *de dicto* reading. However, it is true on the *de re* reading, on which it means that Suzy believes that block A is above where block C actually happens to be; namely, the bottom position.

The difficulty in accessing *de re* readings here aligns with recent experimental work on the topic. Zhang and Davidson (2021, 2024) tested the availability of *de re* and *de dicto* readings in belief reports. They found that *de dicto* readings were robustly accepted by nearly all speakers, while speakers disagreed over the availability of *de re* readings: "While judgments for *de dicto* readings overwhelmingly aggregate toward the "highly agree" end, judgments for *de re* readings are bimodal—although more than half of the judgments are agreed with, another sizable proportion goes to the "highly disagree" edge" (Zhang and Davidson 2021, 6).

This presents a challenge to the *de re* reply, which proposed that comparators are by default interpreted *de re*. The judgements we have observed point in exactly the opposite direction: comparators are by default interpreted *de dicto*. In many cases the *de re* interpretation is extremely hard to access, even when it would rescue the sentence from falsity.

In contrast, these judgements are perfectly compatible with the aboutness approach proposed here. That approach does not rely on *de re* readings to make the right predictions for conditional antecedents, instead making use of aboutness, an independent component of meaning. Its prediction that, say, *A is above B* and *B is below A* behave differently in conditional antecedents is more robust, holding both *de re* and *de dicto*.

5 Conclusion

I hope to have brought aboutness approaches of conditionals firmly into the foreground of the future work on conditionals.

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