Hurford conditionals[*]

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Abstract

Compare the following conditionals:

Bad   #If John is not in Paris, he is in France.

Good   If John is in France, he is not in Paris.

Good sounds entirely natural, whereas **Bad** sounds quite strange. This contrast is puzzling, because **Bad** and **Good** have the same structure at a certain level of logical abstraction:

(1)   If $\neg p^+$, then p.

We argue that existing theories of informational oddness do not distinguish between **Bad** and **Good**. We do not have an account of the divergence in judgments about the two, but we think this is a fascinating puzzle which we pose here in the hope others will be able to solve it.

1   Introduction

Consider the following conditionals:

Bad   #If John is not in Paris, he is in France.

Good   If John is in France, he is not in Paris.

Good sounds entirely natural, whereas **Bad** sounds quite strange. This contrast is puzzling, because **Bad** and **Good** have the same structure at a certain level of logical abstraction: in both cases, the negation of the antecedent entails the consequent. In other words, at a certain level of abstraction, both have the structure in (2), where p^+ is a sentence which asymmetrically entails p:

(2)   If $\neg p^+$, then p.

To see that **Bad** has this structure, let $p^+ =$ *John is in Paris* and $p =$ *John is in France*. To see that **Good** has this structure, let $p^+ =$ *John is not in France*, and let $p =$ *John is not in Paris*.

The goal of this squib is to explore in more detail the contrast between **Bad** and **Good**. We have not been able to find a satisfying explanation of the contrast, and so our main aim

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here is to share this puzzle, and say a little about its contours, in the hopes that someone else will be able to figure out what is going on here.

2   Hurford's disjunctions and theories of oddness

Bad and **Good** are related in a systematic way to well-known data in the literature on triviality and redundancy, namely *Hurford disjunctions* (Hurford 1974, Gazdar 1979). Hurford disjunctions are disjunctions in which one disjunct entails the other, i.e. disjunctions with the form $\ulcorner p$ or $p^{+}\urcorner$ or $\ulcorner p^{+}$ or $p\urcorner$. **Bad** and **Good** correspond to (3) and (4), respectively, in that each is constructed from (3) and (4) by way of an 'or-to-if' inference (Stalnaker 1975):

(3)   #Either John is in Paris or he is in France.

(4)   #Either John is not in France or he is not in Paris.

Since they are closely related to Hurford disjunctions in this way, we will call conditionals with the form of (2) *Hurford conditionals*.[1]

The observation that Hurford disjunctions are generally infelicitous is known as 'Hurford's constraint' (Chierchia, Fox & Spector 2012). We might take Hurford's constraint to be a primitive about disjunction. More satisfying, however, would be to explain it in terms of a broader theory about the distribution of information within sentences. Such a theory of *informational oddness* predicts when a sentence will be felt to be infelicitous due to how the information it conveys relates to information already known in the context, and how that information is parcelled out across connectives. A natural first place to look for an explanation of the contrast between the conditionals in **Bad** and **Good** is from such theories of oddness. But, as we will now show, existing theories of oddness treat **Bad** and **Good** as equivalent,

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1 Another pair of conditionals we can construct from these disjunctions in an 'or-to-if' fashion, but taking the negation of the right disjunct instead of the left as the antecedent, are as follows:

(5)   #If John isn't in France, he is in Paris.

(6)   #If John is in Paris, he is not in France.

The infelicity of (5) and (6), however, is unsurprising: these both have the form $\ulcorner$If $\neg p$, then $p^{+}\urcorner$, which are trivially false on most theories; and one shouldn't assert trivial falsehoods (Stalnaker 1974, 1978). E.g. on a variably strict analysis (Stalnaker 1968, Kratzer 1981), $\ulcorner$If $\neg p$, then $p^{+}\urcorner$ is true just in case all the closest $\neg p$-world(s) are all p^{+} worlds; this cannot hold, since it can never be the case that all the closest $\neg p$-worlds are p^{+}-worlds. (At least unless there are *no* accessible $\neg p$-worlds; then these will be *trivially* true. But variably strict accounts anyways need an explanation of the infelicity of trivially true conditionals like $\ulcorner$If $p \wedge \neg p$, then $q\urcorner$. One explanation is that the indicative conditional presupposes that its antecedent is compatible with the context (Stalnaker 1975), which would provide a general explanation of the infelicity of trivially true conditionals.) Likewise, on a strict conditional analysis which presupposes that its modal domain includes antecedent worlds (as in indicative versions of Warmbrod 1981a,b, von Fintel 1999, Gillies 2007), $\ulcorner$If $\neg p$, then $p^{+}\urcorner$ is true just in case the modal domain includes some $\neg p$-worlds, all of which are p^{+}-worlds, which of course can never obtain, and so these sentences will be trivially false in any context of utterance (where they are well defined). (On strict conditional analyses which do not have this presupposition, (5) and (6) can be true, when there are no antecedent-worlds in the domain of quantification. This, however, just strikes us as a further reason to adopt the presuppositional analysis.) Many thanks to Benjamin Spector for helpful discussion on these points.

and thus cannot distinguish between them. This is not surprising, since both sentences are derived in the same way from equally infelicitous Hurford disjunctions; the real surprise, in our opinion, is the data. As we will show, however, even though existing theories of oddness do not explain the data, the data do put some constraints on those theories.

We will discuss the two most prominent theories of oddness. The first theory base the source of oddness of Hurford's disjunction sentences on a notion of redundancy, as defined in terms of structural complexity and contextual equivalence. The second is instead based on a notion of triviality, as defined in terms of information that is contextually entailed or contradicted.

2.1 Redundancy

The first theory is based on a formalization of Grice's (1975) maxim of brevity. The idea is that when the content of a sentence could have been expressed by a simpler alternative to the sentence, then the original sentence will be unacceptable, because they violate a brevity condition. Thus the Hurford disjunctions introduced above, repeated here, are equivalent to the simpler (7) and (8), respectively, explaining their infelicity. In other words, the left and right disjuncts, respectively, in (3) and (4) are redundant, as they don't add any information with respect to a simpler sentence which doesn't contain it.

(3)   #Either John is in Paris or he is in France.

(4)   #Either John is not in France or he is not in Paris.

(7)   John is in France.

(8)   John is not in Paris.

Meyer (2013), Katzir & Singh (2013), and Mayr & Romoli (2016) make this more precise as follows:

(9)   **Brevity:**
    a. p cannot be used in context c if $[\![p]\!]$ is contextually equivalent to $[\![q]\!]$, and q is a simplification of p.
    b. q is a simplification of p iff q can be derived from p by replacing nodes in p with their subconstituents.

It is easy to confirm that (7) and (8) are contextually equivalent simplifications, in this technical sense, of (3) and (4), respectively, explaining their infelicity in this context. Generalizing, any Hurford disjunction with the form $\ulcorner p \vee p^+ \urcorner$ or $\ulcorner p^+ \vee p \urcorner$ (where p^+ entails p) will have p as a simplification, and be logically equivalent to p.

2.2 Triviality-based theory

The second theory of oddness is based on a notion of triviality (Stalnaker 1974, 1978, van der Sandt 1992, Singh 2008a, Schlenker 2009, Mayr & Romoli 2016). The idea is that one

should not assert a sentence which has parts which only provides trivially true or trivially false information in their *local context*:

> **Triviality condition**: A sentence p cannot be used in a context c if part q of p is entailed or contradicted by the local context of q in c.

This theory relies on an underlying theory of local context. Different theories of local context will thus make different predictions about oddness. In order to make sense of the infelicity of Hurford disjunctions, we must adopt an account of local contexts along the following lines (see the symmetric version of Schlenker 2009 for a theory that make these predictions):

(10) **Disjunction**:
   a.   The local context of p in $\ulcorner p \vee q \urcorner$ in global context c is $c \cap [\![\neg q]\!]$
   b.   The local context of q in $\ulcorner p \vee q \urcorner$ given a global context c is $c \cap [\![\neg p]\!]$

Given this theory, any Hurford disjunction with the form $\ulcorner p \vee p^+ \urcorner$ or $\ulcorner p^+ \vee p \urcorner$ will be predicted to be infelicitous. In both cases, p^+ is contradicted by its local context, which will entail $\ulcorner \neg p \urcorner$, predicting that sentences of this form will be infelicitous.

3   The puzzle

Recall our key pair of Hurford conditionals:

Bad   #If John isn't in Paris, he is in France.

Good   If John is in France, he is not in Paris.

The problem is that neither the redundancy-based theory nor the triviality-based theory predicts the contrast between **Bad** and **Good**: depending on details of their implementation, both either predict **Bad** and **Good** to be both felicitous, or both infelicitous. This is not at all surprising, since **Bad** and **Good**, again, have the same logical form at the level of abstraction that these theories care about. The details, however, are instructive, so we will briefly discuss each of these theories in turn.

3.1   The redundancy-based theory

Consider first the redundancy-based theory. The predictions of this theory depend on the underlying semantics of the conditional; we will explore its predictions in the context of three prominent semantic theories of the conditional.

3.1.1   Material implication

To begin with, consider a material implication analysis of conditionals, on which $\ulcorner$If p then $q \urcorner$ is true just in case p is false or q is true. Although this analysis is not very plausible, it provides a simple way to see the problem. On the material implication analysis, **Bad** and **Good** are equivalent to their consequents:

Bad   #If John isn't in Paris, he is in France.

Good   If John is in France, he is not in Paris.

It's obvious that this will be so, since, on the material implication analysis, **Bad** and **Good** just are Hurford disjunctions. And so on the brevity analysis, both are predicted infelicitous, since all Hurford disjunctions are infelicitous on this analysis.

3.1.2   Strict implication

A more plausible analysis of the conditional is the strict implication analysis. On this analysis, a conditional with the form $\ulcorner$If p then q$\urcorner$ is analyzed as having the logical form $\Box(p \supset q)$, where $\supset$ is the material conditional and $\Box$ is a universal quantifier over epistemically accessible worlds, which are presupposed to contain some p-worlds (see von Fintel 1999, Gillies 2009 for sophisticated recent versions of this theory). Then our key conditionals have the form of $\Box(\neg p^+ \supset p)$. Suppose first that such a conditional is asserted in a context where $\neg p^+$-worlds are accessible from every world. Then the presupposition of the conditional is satisfied, and the substitutability of logical equivalences in modal logics, together with the facts about the material conditional just reviewed, then ensures that these conditionals are equivalent to the simplifications consisting of their modalized consequents $\Box(p)$. Thus once more both conditionals will be predicted to be infelicitous.[2] Suppose next that the conditional is asserted in a context in which some worlds can access no $\neg p^+$-worlds. Then it will not be contextually equivalent to its modalized consequent, since at those worlds the conditional will be a presupposition failure, whereas its modalized consequent will be true at those worlds. But, once again, the conditional will be predicted to be infelicitous, since it is a presupposition failure in some worlds in the context.[3] And so, either way, both **Bad** and **Good** are predicted to be infelicitous on this approach.

3.1.3   Variably strict semantics

On a variably strict semantics (see Stalnaker 1968, Lewis 1973, Kratzer 1986), a conditional with the form $\ulcorner$If p, then $q$$\urcorner$ is analyzed relative to a contextual parameter f, which, following the Stalnaker/Lewis formulation, we treat as a function which takes a world and proposition to a set of worlds: the "closest" worlds to the world of evaluation which verify the proposition in question. Then we say $\ulcorner$If p, then $q$$\urcorner$ is true at w relative to f just in case q is true at all the worlds in $f(w, [\![p]\!])$.[4] On this analysis, assuming that w is always minimal in $f(w, [\![p]\!])$ if w is in $[\![p]\!]$ (the *centering* assumption), then $\ulcorner$If $\neg p^+$ then $p$$\urcorner$ entails p: if $\ulcorner\neg p^+\urcorner$ is true,

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2 More precisely, these are simplifications of (10-a) and (10-b) if we assume that a covert modal is present at LF, as is standard (Lewis 1975, Heim 1982, Kratzer 1986). If we do not assume that, then neither conditional will be equivalent to any simplification, and so both will be predicted to be felicitous.

3 This assumes that presuppositions must be satisfied throughout the context for felicity, a standard assumption known in the presupposition literature as *Stalnaker's Bridge* (see Stalnaker 1974, von Fintel 2008).

4 This paraphrase builds in the 'limit' assumption that there is a set of closest p-worlds, just for simplicity. There are a variety of proposals about what other properties the ordering must have; these details don't matter for our purposes.

then p will be, thanks to centering. And if $\ulcorner \neg p^{+} \urcorner$ is false, then p^{+} is true, and so p is true. But the other direction does not hold: if p is true but $\ulcorner \neg p^{+} \urcorner$ false, then $\ulcorner$ If $\neg p^{+}$, then $p \urcorner$ could well be false (if the closest $\ulcorner \neg p^{+} \urcorner$-worlds are ones where p no longer holds).[5] So $\ulcorner$ If $\neg p^{+}$, then $p \urcorner$ will not always be equivalent to p, or to any other simplification.

The variably strict semantics, thus, unlike the material conditional or strict semantics, does not predict that **Bad** or **Good** will be infelicitous. This still does not account for the puzzling contrast above, since it fails to account for the infelicity of **Bad**, but, as we discuss below, undergeneration in this context may be a virtue as compared with overgeneration.

3.2 The triviality-based theory

Let us turn now to the second theory of oddness: the triviality-based theory. The predictions of this theory of oddness depend on the underlying theory of local contexts.[6] There are a number of choice points for implementing that theory:

i. On a traditional dynamic theory of local contexts (Heim 1983, Beaver 2001, Chierchia 2009, Rothschild 2011), the conditional is essentially a dynamic material conditional. The local context for the antecedent of a conditional $\ulcorner$ If p, then $q \urcorner$ in context c is just c, and the local context for the consequent is $c \cap [\![p]\!]$. The local contexts will be the same in what we might think of as the dynamic strict conditional given in Gillies 2004, as well as in the dynamic variably strict conditional given in Heim 1992.[7]

ii. On an incremental parsing-based theory of local contexts (Schlenker 2009), together with either a material conditional, a variably strict conditional, or a strict conditional, the local contexts will be as on the dynamic theories; likewise for Schlenker's symmetric parsing-based algorithm together with the variably strict conditional.

iii. On the symmetric parsing-based algorithm of Schlenker's (2009), together with the material or strict analysis of the conditional, the local context for the antecedent of a conditional $\ulcorner$ If p, then q $\urcorner$ in context c is $c \cap [\![\neg q]\!]$, and the local context for the consequent is $c \cap [\![p]\!]$.

Now suppose we evaluate **Bad** and **Good** against an uninformative global context (i.e. comprising all possible worlds). On the first two of these approaches, both conditionals are predicted to be felicitous, since in neither case does the antecedent entail or contradict the consequent. By contrast, on the third approach, both conditionals will be predicted to be infelicitous, since, in both cases, the negation of the consequent entails the antecedent (schematically, $\neg p$ entails $\neg p^{+}$).

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5 Nor would it make any difference to assume there is a covert selection-function modal s present at LF which could be included in a simplification, since $s(p)$ will be equivalent to p, as Cariani & Santorio 2017 discuss.

6 These in turn depend on the underlying theory of conditional, but we will not get into the gritty details here. See Mandelkern & Romoli (2017) for discussion, and for some assumptions necessary to get the outcomes we report here.

7 This is so at least as long as we are working with the propositional language of Heim 1992; once the fragment is extended in such a way that CCPs are no longer idempotent, this will no longer be quite true.

There is controversy about what theory of local contexts is the right one to build the triviality-based theory of oddness on top of.[8] But, as this discussion shows, no extant alternative that we know of can predict the observed distinction between **Bad** and **Good**: they all, again, operate at a level of logical abstraction which fails to distinguish these conditionals. Once more, as for the brevity theory, different implementations vary according to whether they predict both conditionals to be felicitous, or both to be infelicitous.

4 Summary

None of the combinations of theories of oddness together with a theory of the conditional can account for the puzzling contrast between **Good** and **Bad**. At a high level, this is because, again, at a certain level of abstraction, these have the same logical form, making the difference between them invisible to extant theories of oddness. Given that there were multiple choice points in the combination between theories, for ease of reference we summarise the predictions surveyed in Table 1.

While this discussion has not helped account for our central contrast, we think that it does have some interesting upshots for the theory of oddness. In particular, it seems to us that undergeneration is a better situation here than overgeneration: it is hard to see how we could patch up a theory of oddness which predicts both **Bad** and **Good** to be bad (the gray cells in Table 1), whereas if our theory of oddness fails to predict either to be felicitous, then we

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8 Here are a few considerations. To capture the infelicity of Hurford disjunctions, it looks like we need a symmetric theory of disjunction. When it comes to conjunction, things are not so clear. Sometimes conjunction seems to be likewise symmetric, as pointed out in Katzir & Singh (2013):

(11)   a.   #John is in France and Paris.
       b.   #John is in Paris and France.

A symmetric approach to conjunction is also supported by data involving epistemic modals under conjunction (see Mandelkern 2016 for discussion).

   But in other cases left-to-right asymmetries seem to color our judgments:

(12)   a.   John is in Paris and staying near the Louvre.
       b.   #John is staying near the Louvre and he is in Paris.

Katzir & Singh (2013) propose that these cases involve a re-analysis of the verb and are not genuine contrasts about oddness. Mayr & Romoli 2016, however, presents cases in which the same verb is used which do appear to pattern in the same asymmetric way:

(13)   a.   John is a linguist and a syntactician (so we should hire him).
       b.   #John is a syntactician and a linguist (so we should hire him).

Finally, data from antecedent-final conditionals suggest, again, that, at least if we are using a parsing-based approach like Schlenker's (2009), we need a symmetric approach, in order to account for the infelicity of a sentence like (14):

(14)   #John is in France, if he is in Paris and Mary is with him.

Note that the redundancy-based approach as we have presented it is necessarily symmetric, but an asymmetric version could be spelled out as well. Again, however, all these subtleties seem irrelevant to our core puzzle.

	⊃	⊰	>
REDUNDANCY-BASED	**Bad# Good#**	**Bad# Good#**	**Bad✓ Good✓**
TRIVIALITY-BASED			
⊕ Dynamic semantics	**Bad✓ Good✓**	**Bad✓ Good✓**	**Bad✓ Good✓**
⊕ Incremental	**Bad✓ Good✓**	**Bad✓ Good✓**	**Bad✓ Good✓**
⊕ Symmetric	**Bad# Good#**	**Bad# Good#**	**Bad✓ Good✓**

Table 1   The predictions of the different combinations of theories of oddness and theories of conditionals. By 'incremental' we mean Schlenker's (2009) incremental system; by 'symmetric' we mean Schlenker's (2009) symmetric system. ⊃ represents material implication, ⊰ strict implication and > variably strict; ✓ indicates that the theory does not predict the example to be infelicitous, # that it predicts that example to be infelicitous. Thus the desired (but not found) distribution is **Bad# Good✓**.

can look for an independent explanation of the infelicity of **Bad**. This suggests to us that we should adopt one of the combinations of theories above which predicts both to be felicitous.

5 Moving forward

This, of course, does not solve our problem. Again, why we do not offer a solution here, we will conclude with some tentative thoughts about what directions one might pursue.

First, let us note that, although we have focused on conditionals so far in order to have a tractable focus, our problem can be reproduced in other environments. Thus, first, our observed contrast persists in sequences like (15) and (16):

(15)   A: John isn't in Paris.
          B: Where is he, then?
          A: #(Well,) he's in France.

(16)   A: John is in France.
          B: Where is he, exactly?
          a.   (Well,) he's not in Paris.

Likewise, as pointed to us by Nathan Klinedinst, an analogous contrast can be reproduced with universally quantified sentences:

(17)   #Every student of mine who isn't in Paris is in France.

(18)   Every student of mine who is in France is not in Paris.

In other words, our puzzle extends beyond conditionals, and any solution to it will have to as well.

5.1 Theories of oddness

One possible solution is to amend theories of oddness in such a way as to capture the contrast between **Bad** and **Good**. To distinguish these conditionals, a theory of oddness would need to be sufficiently sensitive to the form of conditionals in question. This is not out of the question − both theories considered here are indeed sensitive to syntax − but we do not immediately see a way to spell out an approach like this. An obvious attempt to distinguish **Good** and **Bad** comes from attention to the placement of overt negation, which differs across our two key cases. That is, the two conditionals have the following surface form, respectively:

(19)   **Bad Form**: # If $\neg p^+$, then p.

(20)   **Good Form**: If p, then $\neg p^+$.

At a suitably high level of abstraction (i.e. at a level which allows for substitutability of logical equivalents), these forms are the same; but what we want perhaps is a theory of oddness which can distinguish between sentences with the overt form of (19) and (20).

   One challenge for this approach comes from pairs like (21-a)/(21-b):

(21)   a.   #If the thief is outside my room, he is inside my house.
       b.   If the thief is inside my house, he is outside my room.

Intuitively, these have the form of (19) and (20) respectively. But how do we cash out this intuition? In what sense does 'outside' encode a kind of negation which 'inside' lacks? Somewhat impressionistically, it seems to us that what decides whether a relevant conditional is infelicitous is not the placement of overt negation, but rather something more elusive: a sense of semantic negativity. But we don't know how to cash out this intuition.

5.2 Obligatory particles

A different option is to conclude that our puzzle is not really a puzzle about informational oddness. We could then adopt one of the variants of the theories above which predicts both cases to be acceptable, and try to derive the oddness of **Bad** from a different source. One possible source would be from a requirement for obligatory particles in **Bad** which is not present for **Good**. The idea starts from the observation that **Bad** becomes felicitous once we add particles like *still*, as shown in (22):

(22)   If John isn't in Paris, he is #(still) in France.

Schlenker 2009 among others made a similar observation about Hurford disjunctions: (24) is somewhat improved if we include 'still.'

(23)   Either John isn't in Paris or he is #(still) in France.

And the same observation, as a referee for this journal has pointed out, goes for our cross-sentential variant on **Bad** above:

(24)   A: John isn't in Paris.
       B: Where is he, then?
       A: (Well,) he's #(still) in France.

Likewise for the quantified variants:

(25)   Every student of mine who isn't in Paris is still in France.

A hypothesis could therefore be that these particles are obligatory in contexts like the consequent of **Bad**, and it is their omission which leads to oddness (see Singh 2008b, Amsili & Beyssade 2010, Aravind & Hackl 2017 and references therein for discussion). The challenge for such a hypothesis would be to explain the exact conditions under which these particles would be obligatory, and in particular to explain why particles are not obligatory in the consequent of **Good**, where 'still' is optional but not required:

(26)   If John is in France, he (still) isn't in Paris.

In sum, we have what we think is a fascinating problem. We hope others can help us figure out what's going on here.

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