Biscuits and provisos: Providing unconditional information by conditional means[1]

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Abstract. Independence-based accounts of biscuit conditionals and the proviso problem are attractive due to their parsimony. This paper spells out the semantic and pragmatic background assumptions underlying such accounts, and raises the issue whether they can be adopted for both phenomena jointly. At first blush, the answer is clearly negative, but there is hope for reconciliation, once an independent Gricean factor is taken into account.

Keywords: biscuit conditionals, proviso problem, presupposition, independence

1. Introduction

The main aim of this paper is integrative. It considers two (near-)identical accounts of two similar phenomena that are very attractive in isolation, and asks whether the two accounts are compatible with each other. At first blush, the answer appears to be clearly negative, but we will see that there is hope for a uniform analysis that maintains the simplicity and elegance of the original accounts, once we pay attention to an additional Gricean factor. The two phenomena involve cases where an expression that otherwise has a conditional implication $A > p$, intuitively conveys something stronger, *viz.*, p.

The first phenomenon is the familiar case of 'biscuit' conditionals. (1) is an updated version of Austin's (1962) classic example. Even though conditional in form, an utterance of the sentence will usually convey that there is pizza in the fridge, regardless of whether the addressee is hungry.

(1) If you are hungry, there is pizza in the fridge.

The second phenomenon is what Geurts (1996) has dubbed the 'proviso problem' for certain accounts of presupposition projection. The relevant intuitions are intuitions about *presupposition accommodation*: In a context in which nothing about John's wetsuit-having is known, (2) will convey that the speaker believes that if John is a scuba diver, he has a wetsuit. Taken at face value, this suggests that a conditional $A > C$ where C presupposes p (written $A > C_p$) as a whole presupposes $A > p$. This is what satisfaction theories of presupposition projection (along with some others) predict.

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(2) If John is a scuba diver, he'll bring his wetsuit on vacation.

But, occasionally (indeed, frequently), when $A > C_p$ requires accommodation, what is intuitively accommodated is p. Upon hearing (3), we readily infer that (the speaker believes that) John has a wetsuit, regardless of whether he wants to impress his girlfriend. Geurts calls this phenomenon a problem, as it is not clear how the proponent of a satisfaction theory can explain how this unconditional accommodation comes about.[2]

(3) If John wants to impress his girlfriend, he will bring his wetsuit on vacation.

Not only do the two phenomena seem very similar, essentially the same account has been proposed for both: The appearance of an unconditional implication has been attributed to a contextual assumption of *independence* between antecedent and consequent, by Merin (2007) and Franke (2007, 2009) for biscuit conditionals and by Merin (2003) and van Rooij (2007) for the proviso problem. These accounts are very attractive, due to their extreme parsimony: Conditionals are taken to uniformly have the same (conditional) asserted content and uniformly project the same (conditional) presuppositions. It is only in virtue of a contingent contextual assumption that the conditional implications sometimes get perceived as unconditional ones. On independence-based accounts, biscuit conditionals and unconditional accommodations are simply cases in which a speaker happens to use a conditional implication to convey unconditional information.

I take it to be rather uncontroversial that these accounts are attractive enough individually that, if they can be made to work, they are preferable to alternatives. That is not to say, of course, that it is uncontroversial that the accounts can be made to work. Among the opponents of independence-based accounts we find, *e.g.*, Scheffler (2013); Ebert et al. (2014), for biscuit conditionals and Singh (2007, 2009); Schlenker (2011) for the proviso problem. But we find equally-recent proponents of (variants of) of such accounts in Sano and Hara (2014); Francez (2015); Csipak (2015) for biscuit conditionals and Lassiter (2012) for the proviso problem. So it is fair to say that the debate whether independence-based accounts are successful has not been settled either way.

This makes the question whether independence-based accounts of the two phenomena are compatible with each other quite pressing. If they are compatible, we likely can shed light on the respective phenomena by considering them jointly. If they are incompatible, as they appear to be at first blush, then the success of an independence-based analysis for one of the two phenomena will count against such an account for the other.

[2]Geurt's problem is not confined to conditionals, but also surfaces with conjunctions that are embedded under operators that cancel entailments but not presuppositions of their prejacent (*e.g.*, negation). To keep the discussion focused, I will confine attention to conditional sentences.

2. Conditional independence

Independence-based accounts build on the following intuition: The unconditional entailments and unconditional accommodations surface in particular if the truth of the consequent is felt to be 'independent', in the given context, of the truth of the antecedent—whether or not there is pizza in the fridge intuitively does not depend on whether the addressee is hungry. Likewise, whether Bill has a wetsuit intuitively does not depend on whether Bill wants to impress his girlfriend.

Franke and van Rooij, on whose proposals I will focus here, give this idea an epistemic characterization:[3] Two propositions are called *conditionally independent* for an agent iff "learning one proposition to be true or false (where this was not decided before) is not enough evidence to decide whether the other proposition is true or false (where this was not decided before)" (Franke 2009, p. 266). The requisite notion is cashed out formally by fixing a propositional language $\mathcal{L}$ with connectives $\wedge, \vee, \neg$ and $\supset$, proposition letters $P = \{p, q, r, \ldots\}$, enriched with a modality $\Diamond$ that combines only with propositional formulas. The propositional subpart of the language gets a classical semantics relative to a valuation determined by the world, and we write $w \vDash S$ if propositional S is true at w. Then we define a notion of *support* for information states (4), and characterize conditional independence as in (5). The crucial observation about this notion is in (6).

(4) For any belief state σ and any propositional formula S:
   a. $\sigma \vdash S$ iff for all $w \in \sigma : w \vDash S$
   b. $\sigma \vdash \Diamond\varphi$ iff there is $w \in \sigma : w \vDash \varphi$.

(5) **Conditional Independence.** Propositional formulas A and C are *conditionally independent* in σ iff

$$\forall X \in \{A, \neg A\} : \forall Y \in \{C, \neg C\} : \text{ If } \sigma \vdash \Diamond X \text{ and } \sigma \vdash \Diamond Y \text{ then } \sigma \vdash \Diamond(X \wedge Y)$$

(6) **Observation** (Franke 2007; van Rooij 2007). Any σ that satisfies (i-iii) ...
   (i) A and C are conditionally independent in σ.
   (ii) $\sigma \vdash \Diamond A$
   (iii) $\sigma \vdash A \supset C$
   ... also satisfies (iv):
   (iv) $\sigma \vdash C$

[3] All proponents of independence-based accounts ultimately cash out the notion in epistemic terms—but the underlying representational assumptions differ. Merin (2003, 2007); Lassiter (2012) use probabilistic frameworks—and hence probabilistic independence, while Franke and van Rooij use a non-probabilistic representation. With respect to the points made in here, I don't think the choice makes a difference. A comparison of probabilistic and non-probabilistic independence accounts has to await another occasion.

(6) says that if a belief state σ is compatible with A, and A and C are conditionally independent in σ, then σ will support $A \supset C$ only if the belief state also supports C. This, in a nutshell, is how conditional independence is used in Franke's and van Rooij's analyses to predict the 'strengthening' of conditional implications into unconditional ones: In a context in which the hearer believes that the speaker takes A and C to be conditionally independent, learning that the speaker's belief state supports $A \supset C$ amounts to learning that the belief state supports C. This way, by making an utterance that conveys that he believes that $A \supset C$, a speaker can convey that he believes C.

3. Modeling utterance interpretation

The short informal sketch of how a conditional implication can be used to provide unconditional information in the previous paragraph is suggestive, but in what follows, I want to be more explicit about the meta-reasoning about (speaker-)information states that it invokes, by spelling out a simplified version of the *dynamic pragmatics* of Lauer (2013). Doing so will be useful in showing more precisely how the accounts work, and what kind of pragmatic and semantic assumptions they make, and will allow us to precisely state the problematic prediction we derive when naïvely combining them.

Distinguish three languages: Firstly, there is an *object language* $\mathcal{L}_o$, which is the language spoken by the agents that we are modeling. Secondly, there is an *update language* $\mathcal{L}_u$ that is used to specify what these agents learn when observing utterances. And finally, there is a *pragmatic language* $\mathcal{L}_p$, that we use to describe the pragmatic reasoning of these agents. All three languages are interpreted on (substructures of) the same class of models.[4]

(7) **Models.** A pragmatic model is tuple $\langle W, V, \sigma, u\rangle$ such that:

a. W is a set of possible worlds;

b. $V : W \mapsto (P \mapsto \{0, 1\})$ is a world-dependent valuation for some set of propositional letters P;

c. $\sigma : W \mapsto \wp(W)$ is a function mapping each world w to the speaker's belief state in w.[5]

d. $u : W \mapsto \wp(\mathcal{L}_o)$ is a function mapping each world w to the set of sentences uttered (by the speaker) in w.

[4] To ease readability, when supplying a world argument to a function, I will write it as subscript, while additional arguments are given in parentheses.

[5] Although, for the sake of perspicuity, I will refer to σ_w as the 'speaker belief state', I want to leave open how, exactly, this state should be understood—it could be viewed as the speaker's belief state proper, or his view of what the common ground is or should become, or some related notion.

3.1. The object language $\mathcal{L}_o$

For concreteness and simplicity, I assume that the object language spoken by our agents is the language of classical propositional logic, enriched with a conditional operator $>$ that receives a strict conditional interpretation on σ_w. I index $>$ with σ to remind the reader that it is interpreted relative to the speaker belief state.

(8) **Interpretation of $\mathcal{L}_o$.** Given a model $\langle W, \sigma, u\rangle$:

a. $[\![p]\!] = \{w \in W \mid V_w(p) = 1\}$
b. $[\![A \wedge B]\!] = [\![A]\!] \cap [\![B]\!]$
c. $[\![\neg A]\!] = W \setminus [\![A]\!]$
d. $[\![A >_\sigma C]\!] = \{w \in W \mid \sigma_w \vdash A \supset C\}$

3.2. The update language $\mathcal{L}_u$

(9) **Update language.** $\mathcal{L}_u := \mathcal{L}_o \cup \{\text{utter}(S) \mid S \in \mathcal{L}_o\}$

In a more extended system, we would want to give the utter-predicate a speaker argument (as well as a time argument), but for present purposes, we can assume that there is a single speaker, which we leave implicit. utter(S) then represents that this speaker utters S. Updates from $\mathcal{L}_u$ add information to **hearer information states** I, which, like the speaker belief states σ_w, are conceived of as sets of worlds. However, while speaker belief states are fixed statically as part of the model, addressee information states are dynamic and get updated as new utterances are made.[6] An update with $S \in \mathcal{L}_o$ removes all worlds from an information state at which S is not true; an update with utter(S) removes all worlds at which the speaker does not utter S.

(10) **Updates.** Given a model $\langle W, V, \sigma, u\rangle$, for all information states I and all $S \in \mathcal{L}_o$:

a. $I[S] = I \cap [\![S]\!]$
b. $I[\text{utter}(S)] = I \cap \{w \in W \mid S \in u_w\}$

[6] In full generality, of course, we want the speaker belief states to be just as dynamic as addressee belief states—but this is another complication I avoid here as it complicates the system significantly, and is not needed for present purposes. See Lauer (2013) for a more comprehensive system.

3.3. The pragmatic language $\mathcal{L}_p$

The pragmatic language $\mathcal{L}_p$ is richer than both object and update language. Besides allowing us to talk about utterance events (via utter formulas), it allows us to talk about speaker beliefs via a modality $\Diamond_\sigma$. Its syntax and semantics are given in (11) and (12).

(11) **Syntax of $\mathcal{L}_p$.**
$\mathcal{L}_p$ is the smallest set st.:

a. $\mathcal{L}_o \subseteq \mathcal{L}_p$
b. $\mathcal{L}_u \subseteq \mathcal{L}_p$
c. $\{\Diamond_\sigma S \mid S \in \mathcal{L}_o\} \subseteq \mathcal{L}_p$
d. $\mathcal{L}_p$ is closed under $\wedge$
e. $\mathcal{L}_p$ is closed under $\neg$

(12) **Satisfaction for $\mathcal{L}_p$.** Given a model $\langle W, V, \sigma, u\rangle$, $w \in W$, $S \in \mathcal{L}_o$, $\phi, \psi \in \mathcal{L}_p$:

a. $w \models S$ iff $w \in [\![S]\!]$
b. $w \models \text{utter}(S)$ iff $S \in u_w$
c. $w \models \Diamond_\sigma S$ iff $\sigma_w \vdash \Diamond S$
d. $w \models \phi \wedge \psi$ iff $w \models \phi$ and $w \models \psi$
e. $w \models \neg\phi$ iff $w \not\models \phi$

The remaining propositional connectives can be introduced via the usual equivalencies, and we treat $\Box_\sigma$ as an abbreviation for $\neg\Diamond_\sigma\neg$. We lift the satisfaction relation to a support relation for (hearer) information states in the obvious way:

(13) **Support for $\mathcal{L}_p$.** For any information state I and any $\phi \in \mathcal{L}_p$:

$$I \models \phi \text{ iff for all } w \in I : w \models \phi$$

3.4. Communicating contents

To illustrate the basic workings of the system, let us spell out how the contents of sentences are communicated in the present set-up—that is, how does it come about that a hearer who observes the utterance of sentence a S (sometimes) comes to believe that S is true?

This would be immediately guaranteed if we represented the utterance of $S \in \mathcal{L}_o$ by updating the hearer information state with S (recall that $\mathcal{L}_o$ is a subset of $\mathcal{L}_u$). For clearly, we have for any info state $I : I[S] \models S$. This is what is usually assumed in dynamic update semantics à la Veltman (1996) for non-modal sentences. But it is not what is assumed here. The updates performed on hearer information states should be construed as (heavily idealized) information gain by observation. That is, if S = **it is raining in Chicago**, then the update with S represents what happens when the hearer observes rain in Chicago, not what happens when he observes an utterance of S. The latter situation is represented as an update with utter(S)—and clearly, it is not guaranteed, for arbitrary $I : I[\text{utter}(S)] \models S$. Instead, what is guaranteed is only $I[\text{utter}(S)] \models \text{utter}(S)$.

But that is as it should be. Generally, hearers do not believe everything they are told. A hearer who

observes an utterance of a sentence S will come to believe that the truth-conditions of S obtain only if he thinks the speaker is trustworthy with respect to S—that is, sincere and well-informed, in the following sense.

(14) a. **Belief in sincerity with respect to** S: $I \models \text{utter}(S) \supset \Box_\sigma S$
b. **Belief in well-informedness about** S: $I \models \Box_\sigma S \supset S$

If I satisfies (14a), then $I[\text{utter}(S)] \models \Box_\sigma S$. And if I further satisfies (14b), then $I[\text{utter}(S)] \models S$. So the system as defined so far captures the fact that an addressee will only come to believe in the content of the speaker's (declarative) utterances if he takes her to be trustworthy, *i.e.*, sincere and well-informed.

In the following, I will confine attention to information states that satisfy (14a) and (14b), for any object language sentence S. But it is useful to keep in mind that, even for plain asserted content the update procedure does not guarantee that the speaker comes to believe it. Instead, this is a sort of 'side-effect' that arises in suitable contexts. Of course, this side-effect will often be the main effect intended by the speaker in situations of cooperative information exchange—but this intended effect has to be achieved in an indirect way.

This is relevant because in what is to follow, conditional implications will be 'strengthened' in just this way—as side-effects under certain contextual assumptions. Just as, on the assumption of sincerity and well-informedness, learning that the speaker uttered S *amounts to* learning that S is true, so learning that the speaker uttered a sentence with a certain conditional implication will amount to learning that the speaker believes its consequent. This is the heart of independence-based accounts, and hence it would be somewhat misleading to describe them as deriving the unconditional implication from the conditional implication by means of a pragmatic strengthening mechanism.[7] This formulation would suggest that there is a separate mechanism operating on the basis of conventionally-supplied content. But, on the current construal, there is no more of an 'independent pragmatic mechanism' appealed to in independence-based accounts than there is an 'independent pragmatic mechanism' involved in explaining how hearers come to believe in the truth of the content of an utterance that they observe, if they happen to believe the speaker to be sincere and well-informed.

3.5. A word on dynamics

The reader will have noticed that all three languages are interpreted point-wise, *i.e.*, sentences of $\mathcal{L}_o$ and $\mathcal{L}_p$ determine truth values at worlds, and the updates made via $\mathcal{L}_u$ are distributive and

[7] This is how Geurts (1996) describes a class of similar (potential) accounts that can be seen as precursors of the independence-based ones.

eliminative.[8] This means that, from a logical perspective, the *dynamics* of the system are not necessary. We could have simply given the static semantics of $\mathcal{L}_p$ and be done with it. Instead of putting conditions on information states and then talking about what is supported if we update the information state with a particular formula, we could have equivalently spoken about entailment between sets of $\mathcal{L}_p$ sentences.

From a certain perspective, then, the dynamic notation is just syntactic sugar that lets us talk about entailment in a particular way. But the separation into three languages, and the notions of update and support, are quite useful conceptually.

Firstly, the system makes a clear separation between the function of the different formulas. Formulas of the object language $\mathcal{L}_o$, and its interpretation $[\![\cdot]\!]$ represent *grammatical facts*, formulas of the update language $\mathcal{L}_u$ and the associated update procedure specify what new information an addressee receives in a discourse, while the pragmatic language $\mathcal{L}_p$ and its notion of support, is used to talk about information states of interlocutors. These are three quite distinct kinds of things a theory of semantics and pragmatics should keep apart. And secondly, the system is a *restricted* way of talking about entailment, enforcing a particular shape for pragmatic explanations. We are limited to specifying premises that capture ('pre-utterance') conditions, and then add to them only utter-premises to derive desired ('post-utterance') effects. Unless and until the system is extended to *necessitate* a dynamic model, I grant that the update-talk is mere conceptual sugar, and not strictly necessary. But it is useful because it makes transparent what is assumed about utterance interpretation.

4. Unconditional implications via conditional independence

To spell out how unconditional implications arise from conditional ones, we extend the pragmatic language $\mathcal{L}_p$ with formulas saying that two sentences are conditionally independent for the speaker, as in (15). From observation (6) above, (16) immediately follows.

(15) $w \models CI_\sigma(A, B)$ iff A and B are conditionally independent in σ_w in the sense of (5).

(16) **Observation.** For any I, if ...
- (i) $I \models CI_\sigma(A, C)$ and
- (ii) $I \models \Diamond_\sigma A$ and
- (iii) $I \models A >_\sigma C$

...then:
- (iv) $I \models \Box_\sigma C$

[8] That is, for all I, $\varphi \in \mathcal{L}_u : I[\varphi] = \bigcup_{w \in I} \{w\}[\varphi]$ and $I[\varphi] \subseteq I$).

4.1. Biscuit interpretation via conditional independence

Franke's account of biscuit uses of conditionals is now almost immediate, if we assume that English **if ..., then ...** is modeled by $>_\sigma$, *i.e.*, has a strict conditional semantics.[9] All that we need in addition is that the addressee believes that the speaker would utter an (indicative) conditional only if he takes its antecedent to be possible:

(17) **Indicative Sincerity.** $I \models \text{utter}(A >_\sigma C) \supset \Diamond_\sigma A$

I will simply retain this as a contextual assumption that the addressee makes. One way to motivate it is to assume that indicative conditionals come with a felicity condition, presupposition, or Potts (2005)-style conventional implicature requiring that the antecedent is compatible with σ, and that the speaker is sincere with respect to it. Another is to assume that *subjunctive* conditionals come with the opposite constraint, with (17) arising as an implicature via competition with the subjunctive. Leahy (2011) has recently argued that the former option is correct, but we don't need to decide this issue here.

(18) Let I be an information state that satisfies $I \models CI_\sigma(A, C)$, as well as **Indicative sincerity** (17) and **Sincerity about** $A >_\sigma C$ (14a), then:
(i) $I[\text{utter}(A >_\sigma C)] \models CI_\sigma(A, C)$
(ii) $I[\text{utter}(A >_\sigma C)] \models \Diamond_\sigma A$
(iii) $I[\text{utter}(A >_\sigma C)] \models A >_\sigma C$
and hence, by (16):
(iv) $I[\text{utter}(A >_\sigma C)] \models \Box_\sigma C$

That is, on the assumption that the speaker takes A and C to be independent (and is sincere), the utterance of a conditional $A >_\sigma C$ will convey that the speaker believes in the truth of C. As an example, consider (19a), which we can schematically represent as (19b).

(19) a. If you are hungry, there is pizza in the fridge.
b. **hungry** $>_\sigma$ **pizza**

In this case, the independence assumption is eminently plausible—learning whether or not the addressee is hungry will usually not influence anyone's belief about whether there is pizza in the (speaker's) fridge. So we can assume $I \models CI_\sigma(\textbf{hungry}, \textbf{pizza})$. Together with the requisite

[9] Franke (2009) provides a version of the independence condition that obtains the same result for the more popular variably-strict analysis of conditionals.

sincerity assumptions, we derive (20a). If the speaker is furthermore taken to be well-informed about **pizza**, we get the even stronger (20b).

(20) a. $I[\text{utter}(\textbf{hungry} >_\sigma \textbf{pizza})] \models \Box_\sigma [\textbf{pizza}]$
b. $I[\text{utter}(\textbf{hungry} >_\sigma \textbf{pizza})] \models \textbf{pizza}$

What goes 'wrong' on a hypothetical use of conditional like **If John left on time, he is at home now** is that the assumption of independence is not plausible, hence we have $I \not\models CI_\sigma(\textbf{left on time}, \textbf{home now})$. Consequently, making the requisite sincerity assumptions, we only derive $I[\text{utter}(\textbf{left on time} >_\sigma \textbf{at home})] \models$ **left on time** $>_\sigma$ **at home**—that is, we get a genuinely conditional interpretation.

4.2. Unconditional accommodation via independence

Integrating van Rooij (2007)'s account of the proviso problem into the current setup is just as straightforward, once we fix appropriate assumptions about presupposition projection and accommodation. I refrain from giving a full account of projection, but simply enrich the object language, allowing proposition letters to be subscripted with other proposition letters (intended to represent lexical presuppositions), and assume a 'projection function' $Pres : \mathcal{L}_o \mapsto \mathcal{L}_o$ that specifies for every (possibly complex) formula what its presuppositions are.[10] I make the minimal assumption that $Pres(p_q) = q$ and further, the crucial assumption from satisfaction semantics that leads to the proviso problem:

(21) **Projection of conditional presuppositions**
$Pres(A >_\sigma C) = Pres(A) \wedge (A \supset Pres(C))$

As for accommodation, we need to adopt what Katzir and Singh (2013) dub the 'speaker-based approach' of Beaver (1999, 2001).[11] Presupposition accommodation is understood as removing uncertainty about what the speaker might be (pragmatically) presupposing. In the current set-up, this can be captured by adding an an operator *Acc* to our update language $\mathcal{L}_u$, defined as in (22). Again, the result in (23) is immediate.[12]

[10] Assuming that the values of $Pres$ are formulas rather than, say, propositions is done for expository convenience here. Clearly, this is not the most attractive treatment of presupposition, but it will do for present purposes. In a more complete analysis, we could take $Pres$ to have sets of possible worlds as values and define it in terms of $[\![\cdot]\!]$—*e.g.*, for a static three-valued analysis of presupposition, we would let $Pres(\phi) = \{w \in W \mid [\![\phi]\!] = 0 \text{ or } [\![\phi]\!] = 1\}$

[11] As Simons (2003) argues in detail, this view of accommodation is closely related to that of Stalnaker (1974, et seq.). For critical discussion of the 'speaker-based' approach, see also Beaver and Zeevat (2007); von Fintel (2008).

[12] This is implicit in van Rooij (2007), but it bears emphasizing: It is crucial for the account that accommodation is construed in this way, as a wholesale elimination of potential speaker belief/presupposition states that do not already

(22) For all $I, S : I[Acc(S)] = \{w \in I \mid \sigma_w \vdash Pres(S)\}$

(23) Let I be an information state that satisfies $I \models CI_\sigma(A, p)$, as well as **Indicative sincerity** (17), then:

(i) $I[Acc(A >_\sigma C_p)][\text{utter}(A >_\sigma C_p)] \models CI_\sigma(A, p)$
(ii) $I[Acc(A >_\sigma C_p)][\text{utter}(A >_\sigma C_p)] \models \Diamond_\sigma A$
(iii) $I[Acc(A >_\sigma C_p)][\text{utter}(A >_\sigma C_p)] \models A >_\sigma p$

and hence, by (16):

(iv) $I[Acc(A >_\sigma C_p)][\text{utter}(A >_\sigma C_p)] \models \Box_\sigma p$

That is, if A and p are taken to be conditionally independent for the speaker, interpreting $A >_\sigma C_p$ (when accommodation takes place) will result in an information state that supports $\Box_\sigma p$—*i.e.*, an information state in which the speaker (unconditionally) believes in the presupposition of the consequent. If the speaker is further taken to be well-informed about p, we will derive the stronger $I[Acc(A >_\sigma C_p)][\text{utter}(A >_\sigma C_p)] \models p$. And just as before, this result depends on the assumption of independence. Without it, we only get the weaker (23iii), which says that the speaker believes in the conditional presupposition.

4.3. Summary, and an argument for a uniform analysis

Independence-based accounts of biscuit uses of conditionals and of the proviso problem are attractive in their simplicity and parsimony. While I have spelled out a rather involved formal apparatus to make them fully explicit, some version of this apparatus is arguably independently needed for any theory of utterance interpretation (Lauer 2013)[13]—and once it is in place, nothing is required to account for both phenomena but a contextual assumption that is plausible in some contexts (when we observe the unconditional implication), but not in others (when we do not).

Before creating trouble (in Section 5) for adopting independence-based accounts for both phenomena jointly, I want to point out a reason to think that, ultimately, we do want a uniform account of both phenomena. Consider Beaver (1999)'s example in (24).

(24) If Spaceman Spiff lands on Planet X, he'll notice that he weighs more than on Earth.

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support the presupposition of the sentence. In a dynamic setting, it may seem natural to define accommodation instead as *adding* the presupposition to an information state, by eliminating worlds. But this does not give the right result: Suppose that A and p are independent on σ, and further that A is contingent in σ. Then, unless the update is vacuous, $\sigma[A \supset p]$ will not support p—rather, A and p will be dependent in $\sigma[A \supset p]$!

[13] This is not to say that the various choices made throughout are necessarily the right ones. I consider it an advantage of the system of dynamic pragmatics that it requires us to spell out, in detail, what the underlying assumptions are, and hence where alternative choices could be made.

Beaver ingeniously uses (24) to create trouble for various accounts of presupposition accommodation and the proviso problem (and to argue for a speaker-based approach to accommodation). The crucial feature of (24) is this: Clearly, the sentence does not convey that the presupposition of its consequent is true, *i.e.*, that Spiff weighs more than on earth, regardless of whether he lands on planet X (Beaver: "it seems natural for [(24)] to be uttered under conditions where Spiff is hanging about in space, and completely weight-less"). But it still conveys a bit of unconditional information, namely "that Planet X is the sort of place where one is particularly heavy", regardless of whether Spiff lands there.

Let us consider what happens, on the present account, when the conditional presupposition predicted by satisfaction accounts (*viz.*, **if Spiff lands on planet X, he'll weigh more than on earth**) is accommodated. This accommodation will rule out any speaker belief state σ_w that does not support the conditional. Given plausible world-knowledge assumptions (*viz.*, that landing on planet X will not significantly alter Spiff's mass), this will only be the case if the speaker also believes **if Spiff lands on Planet X, gravity on X will be higher than on earth**. But, since Spiff's landing on X is likely conditionally independent (on σ_w) from the strength of the gravitational field of X, this accommodation will ensure that the speaker's belief state entails that gravity on X is higher than on earth, regardless of whether Spiff lands there. So the independence account, as spelled out here, also predicts that sometimes, what is 'strengthened' is not the conditional presupposition itself, but rather a necessary ancillary assumption.

Crucially, we find the same kind of effect with biscuit conditionals. Francez (2015) has recently drawn attention to the phenomenon of so-called *chimerical conditionals*. These are conditionals that give rise to contradicting intuitions about whether they convey conditional or unconditional implications. (25) is an example.

(25) If John entered the museum from the south, there were no guards (where he entered).

On the relevant reading, (25) does not convey that its consequent **there were no guards where [John] entered** is true. But it provides unconditional information, *viz.*, that there were no guards at the south entrance, regardless of whether John entered from the south.

So, both in the case of presupposition accommodation and in the case of asserted conditionals, we find cases where what is 'strengthened' is not the conventional (conditional) implication, but rather another contextual assumption that needs to be made for the conditional implication to be true. That suggests that we ultimately want a uniform analysis of both phenomena that also extends to these cases. And independence-based accounts, besides being very parsimonious, seem to do rather well.

5. The package-deal problem

Not all is well in paradise, though. It is not at all clear that we can adopt both accounts jointly. Here is why: Both accounts trace the unconditional implication to the same assumption of conditional independence, in the same information state (namely, the speaker's): Whenever $I \models CI_\sigma(A, X)$ (and the appropriate sincerity assumptions are in place) then (26) and (27) obtain. But then it seems we are forced into the prediction in (28).

(26) $I[\text{utter}(A >_\sigma X)] \models \Box_\sigma X$ (27) $I[Acc(A >_\sigma C_X)][\text{utter}(A >_\sigma C_X)] \models \Box_\sigma X$

(28) **Package-deal prediction**. A sentence $A > X$ will get a biscuit interpretation in exactly the same contexts in which a sentence $A > C_X$ gets an unconditional accommodation.

But (28) is patently false. For example, in most contexts, (29a) will convey that Bill has a sister, regardless of whether he is flying to Toronto, while (29b) will not convey this.

(29) a. If Bill is flying to Toronto, his sister will meet him at the airport.
b. If Bill is flying to Toronto, he has a sister.

Such counter-examples can be produced at will—in a large majority of the cases where we get an unconditional accommodation, the corresponding conditional assertion will not be construed as a biscuit conditional. Taken at face value, the package-deal prediction shows that an independence-based analysis of both phenomena is not viable: The set of contexts in which conditional presuppositions get 'strengthened' is just not the same as the set of contexts in which we observe biscuit readings.

But there is hope. The contexts in which we observe the two phenomena are not unrelated. Indeed, it seems that set of contexts in which we get biscuit interpretations is a subset of the ones in which we observe 'strengthened' presuppositions: There do not appear to be counterexamples where, in a particular context, we observe a biscuit reading for a conditional $A > X$ but where we do not get a 'strengthened' accommodation if $A > X$ is presupposed. This opens up the possibility that, while an independence assumption is at play in both phenomena, this assumption is *necessary and sufficient* for a presupposition to be strengthened, but only *necessary* for biscuit uses[14]—for biscuit uses, another contextual condition is required in addition. This is what I shall propose in the rest of this paper.[15]

[14]Strictly speaking, of course, independence is never necessary: Both asserted conditionals and presupposed conditionals will always give rise to unconditional interpretations if their antecedents are independently taken to be true, as in so-called 'factual' uses of conditionals Iatridou (1991).

[15]Other ways to avoid the package-deal prediction are conceivable. One could argue that what is wrong with the way I have set things up here is that presupposition accommodation and the assertion of conditionals target the same

6. Towards a solution of the package-deal problem

Let's make the following two plausible assumptions: (i) whenever a speaker utters a conditional $A > C$, his utterance makes C salient as an alternative utterance that she could have made instead; (ii) all else being equal, any speaker prefers an utterance of C over an utterance of $A > C$, because the former is shorter and less complex than the latter.

If we assume both (i) and (ii), then, whenever an addressee observes an utterance of $A > C$, he can conclude that everything else is *not* equal—*i.e.*, that the speaker had another preference which is satisfied by an utterance of $A > C$, but not by an utterance of C, and further that this preference is stronger than his preference for a simpler expression. This is just the kind of 'Need a Reason' (NaR) reasoning I describe and formalize in Lauer (2013, Ch. 9) and Lauer (2014). In other words, whenever a speaker utters a conditional $A > C$, the hearer must be able to infer a reason why she did not instead utter the (simpler, less complex) C. Crucially, if no such reason can be inferred, infelicity will result.[16]

If we consider a simple, 'hypothetical' use of a conditional, such as **if John left on time, he is at home now**, it is not difficult to find a reason why the speaker uttered the conditional, rather than its consequent: She did not want to convey the truth of C (=**John is at home now**), because she does not know it to be (unconditionally) true, while she does know the conditional $A > C$ to be true.[17] Crucially, for this to be the speaker's reason for preferring the conditional over its consequent, A and C have to be taken to be conditionally dependent—for else, an utterance of $A > C$ would convey the truth of C.[18]

If A and C are independent, there has to be a different reason for the speaker choosing to utter the conditional rather than its consequent. For classical cases of biscuit conditionals, such as **if you are hungry, there is pizza in the fridge**, we can say (following Franke 2009, p. 275ff.) that the speaker uses the conditional in order to provide his audience with a *cue* for the interpretation of the consequent—it, somehow, indicates which potential decision problem of the hearer the consequent is relevant to (see also Francez (2015, Section 4.3) for an articulation of this idea). This is not the only reason for uttering a conditional that conveys the truth of its consequent. Another is to

belief state σ—perhaps accommodation should target the speaker's presuppositional state, while asserted conditionals target his belief state proper. Or maybe it could be argued that different but related notions of independence are at play in the two phenomena. There good arguments that neither option will solve the problem in a satisfying manner, which for reasons of space, I have to omit here.

[16] More or less the same idea is behind the ANSWERHOOD CONDITION of Katzir and Singh (this volume) requiring that a speaker not make a 'needlessly inferior' utterance from a set of options.

[17] This reasoning is essentially Nadathur's (2014) take on what von Fintel (2001) calls 'conditional strengthening'—a weaker version of Geis and Zwicky's (1971) 'conditional perfection'. Besides in von Fintel and the work he builds on (especially van der Auwera 1997 and Horn 2000), we find very similar ideas in Franke (2009)'s discussion of conditional perfection.

[18] In fact, ignorance is only one of a range of possible reasons—*e.g.*, the speaker might know that C is unconditionally true, but may not wish to reveal that. Again, for this to be the operative reason for choosing the conditional, the addressee must take it to be possible that A and C are conditionally dependent for the speaker.

structure the discourse, as in Franke's **if we now turn to the last point of order, fund cuts have been tremendous** or to mark a property of the speech act by use of a self-referential antecedent, as in **if I am being frank, you look awful** (see Csipak (2015), for discussion of the intricacies of latter case). I will call this motley collection of reasons for employing a conditional 'biscuit reasons'.

Here, then, is what I think is going on in cases like (29), where (29a) results in an unconditional accommodation in most contexts, while (29b) does not receive a biscuit interpretation. Suppose (29b) is uttered in a context in which there is a (default) assumption that **Bill is flying to Toronto** and **he has a sister** are conditionally independent. Hence the conditional should give rise to a biscuit interpretation. What goes wrong, I conjecture, is that there *is no plausible 'biscuit reason'* for using the conditional, in most contexts. On pain of infelicity, the hearer is hence forced to revisit his (default) assumption of independence, and conclude that antecedent and consequent are dependent (for the speaker) after all.

(29) a. If Bill is flying to Toronto, his sister will meet him at the airport.
b. If Bill is flying to Toronto, he has a sister.

Now suppose (29a) is uttered in the same context. In this case, there is no reason for revisiting the (default) assumption of conditional independence. The use of the conditional, instead of its consequent, is straightforwardly justified because the speaker does not know that Bill's sister will meet him at the (Toronto) airport, regardless of whether Bill is flying to Toronto. Consequently, the unconditional accommodation will straightforwardly arise for (29a). Quite generally, when a sentence $A > C_X$, in context, happens to convey that X is (unconditionally) true, this does not raise the question why the speaker did not simply presuppose X instead. By contrast, when a speaker utters $A > X$ in a context in which the utterance happens to convey that X is (unconditionally) true, the question why the speaker did not just utter X instead does arise, and if it does not have a plausible answer, this will lead the hearer to revisit his assumptions about the context.[19]

[19] I think that the reasoning sketched in this section might also shed light on the question why strengthened presuppositions are absent in cases like (ia) (after Geurts 1996), which presumably competes pragmatically with (ib).

(i) a. Walter knows that if Bill is flying to Toronto, he has a sister.
b. Walter knows that Bill has a sister.

Sentences like (ia) *can* get get a strengthened precondition—if a 'biscuit reason' is plausible, as in (ii). This suggests that sentences that contain a constituent denoting the presupposed conditionals pattern with biscuit conditionals, rather than with conditionals with a presupposing consequent.

(ii) Walter knows that if he is hungry, there is pizza in the fridge.

7. Conclusion and outlook

In order to integrate the proposal from the previous section into a formal system such as the one set out in the earlier parts of this paper, we require the apparatus of an 'optimization-based' theory of implicature (such as those in Franke 2009 or Lauer 2013, Ch. 9) to derive NaR implicatures more generally, and in addition, the following two ingredients: Firstly, the system needs to allow us to talk about non-monotonic belief revision, so as to model what goes on when a hearer rejects a prior default-assumption of conditional independence. And secondly, we need a more articulated theory of 'biscuit reasons' for preferring the utterance of a conditional over an utterance of its consequent. The remarks made by Franke and others are suggestive, but we need a better understanding of how conditional antecedents can serve as 'cues' for the interpretation of their consequents, etc., and the conditions under which speakers feel the need to give such cues.

In introducing his sketch of this idea, Franke (2009, p. 274) says: "What is left to be explained is why a conditional with an unconditional reading should be used at all in conversation, given that its discourse effect, as far as information is concerned, is that of a simple assertion of the consequent." If what I have said before is correct, this is not an idle question, but one that has empirical bite: An articulated account of the reasons that motivate speakers to utter biscuit conditionals will be a crucial ingredient in establishing that independence-based accounts of both the proviso problem and biscuit conditionals are viable and desirable, by showing that they can correctly predict in which contexts the two phenomena come apart.

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