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Conversational backoff*

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Abstract I explore and analyze a phenomenon ("conversational backoff") where, instead of accepting an assertion in the normal way, a speaker challenges its exhaustiveness, but not its content. The result is that speakers publicly back off of the exhaustivity of the claim. These challenges are typically triggered by special questions of a conditional type, and I focus in particular on the case of "what if" questions, developing a detailed analysis of their semantics and dynamics.

Keywords: questions, responses, disagreement, discourse, dynamics, conditionals.

1 Introduction

This paper provides an exploration and analysis of a phenomenon that I term *conversational backoff*. In brief, conversational backoff occurs when discourse participants discover that they have made different assumptions about what facts might be important to the truth or falsity of a claim. The result is still a public acceptance of the claim, but only limited to possibilities that participants determine to be shared assumptions. Backoff is triggered by a number of linguistic expressions, and especially various types of questions with a conditional component; these are illustrated by the A responses:

(1) A: Is Alfonso going to the party?
B: Yes, he is.
A1: Even if Joanna is there?
A2: What if Joanna is there?
A3: What about Joanna?
} ⇒ Will he really go if J. is there?

The backoff reading present in A1-3 is approximately, "will he (really) go if Joanna is there?" This reading is unambiguously present in the "even if" question, but the

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other two types of questions are ambiguous, and I am setting aside other readings (one that I will refer to occasionally is the 'what would happen' reading of the "what if" question, where A accepts the answer and asks about its consequences.) The backoff reading in the above examples involves two parts: (i) the questioner accepts the attempt at an answer for cases where the content of the conditional isn't true, and (ii)"re-asks" the original question for cases where it is. Part (i) is the backoff effect itself, and I propose that in conversational backoff, discourse participants publicly take B's attempt at a response to be true, but not exhaustive. That is, backoff serves to raise the possibility that are some circumstances relevant to a complete (exhaustive) answer that B might have failed to consider, or excluded but shouldn't have. There is a sense in which the backoff response is like a denial or a correction, but it is more harmonious – in fact on the analysis I develop, it involves only monotonic update to the public context.

The detailed proposal is that conversational backoff is a repair mechanism to handle scenarios where speakers discover that they made different assumptions about what the context is like – in particular, how they chose to implicitly circumscribe the information taken to be in the common ground. Under one set of the assumptions, a conversational backoff trigger of the type illustrated above would be vacuous, but under wider assumptions about the domain, it would not be. The repair mechanism steps in to readjust the public/joint representation of the discourse context to the wider domain; in the examples above, on the relevant reading this is forced in order to avoid vacuity. Formally, backoff turns out to be quite similar to an *acceptance move* in the sense of Farkas & Bruce 2010.

In §2 I provide more detail on the scope and commonalities of triggers of conversational backoff, and their relation to other 'non-agreeing' responses. I then turn to the analysis, where I focus on conditional questions, sketching the idea informally in §3, and in much more formal detail in §4; backoff itself is implemented in §4.3. I show more details of how the analysis works by example in §5.

2 Conversational backoff

I will define the class of conversational backoff triggers as those responses that can trigger limited/restricted acceptance of an interlocutor's assertion that was not intended in a limited way.[1] The core cases are the various types of conditional-ish questions illustrated in the introduction: "what if" questions, "even if" questions, "what about" questions, and of course full conditional questions (which are the paraphrase for ambiguous examples above):

(2) A: Is Alfonso going to the party?

1 I will focus on assertions in this paper, but backoff responses can target other speech acts.

B: Yes, he is.

A: Will he (really) go even if Joanna is there?

The important feature of A's response, again, is that while it doesn't fully accept B's "yes" answer, it doesn't reject it altogether. Rather, A accepts it but only for cases that the conditional question is not focusing on.

While in this paper I focus on the conditional question-type of backoff trigger, there are at least two further kinds to consider.[2] First, there are 'direct' backoff triggers that involve asserting that there is another possibility; these typically presuppose that the targeted assertion was intended to exclude the newly identified possibility. Lewis (1979), in his example 6, discusses such a case (my formatting into linguist-style examples; see fn. 5 for the full quote):

(3) Lewis' scenario: "Suppose I am talking with some elected official about the ways he might deal with an embarrassment. So far, we have been ignoring those possibilities that would be political suicide for him."

O: You see, I must either destroy the evidence or else claim that I did it to stop Communism. What else can I do?

L: There is one other possibility – you can put the public interest first for once!

Here the backoff response is to a disjunction that was intended as exhaustive (cued by "either"), and adds a new alternative to those that O identified.

There are also indirect backoff triggers that still do not raise an issue (e.g. ask a question). These are empirically varied, and many cases involve a possibility modal (though it isn't necessarily epistemic), as in A1 below.[3] But modality isn't necessary, and one can simply mention relevant facts, or raise their possibility in other ways, illustrated in A2-3 below:

(4) A: Is Alfonso going to the party?

B: Yes, he is.

A1: Joanna might be there.

A2: Will Joanna be there?

A3: He looked a little sick earlier today...

2 Another kind of data I won't consider here is the interaction of backoff-like responses with other types of domains: (i) "A: Everyone is going. B: Even John?" (Tamina Stephenson p.c.)

3 Lewis also gives an example of this type, which I won't focus on because it involves the additional complication of being a response to a knowledge attribution.

As with the "what about" case, interpretation of these as a backoff trigger is highly context-specific, and dependent on relevance reasoning.

A central feature of all of these cases is that conversational backoff can only target publicly omitted assumptions – it is not licensed if the crucial assumption has been committed to by a speaker in prior discourse.

(5) A: Is Alfonso going to the party?
B: Yes, he is, even though Joanna might be there.
A: What if Joanna is there? (only *what-would-happen* reading)
A′: # Even if Joanna is there?

The assumptions in play during conversational backoff are purely implicit.

2.1 Backoff responses and other non-agreeing moves

There are at least two kinds of special "non-agreeing" responses that backoff triggers might be related to. These are *corrections* (or more generally, denials) and *clarification requests*. I present clear evidence that they are not corrections. Clarification requests seem, at this point, to be a somewhat looser category and I don't know any diagnostics for it as a whole, so the situation is less clear. Backoff responses seem to have an affinity with certain kinds of clarification request that involve asking about a speaker's assumptions.

There is an intuitive sense in which backoff is used to correct potentially mistaken assumptions. Aside from this, however, backoff triggers don't pattern with the class of corrective responses as they are typically characterized in the literature (van Leusen 1994; Asher & Gillies 2003; Asher & Lascarides 2003; Maier & van der Sandt 2003; van Leusen 2004). A typical example of a correction is below:

(6) A: Alfonso is driving to the party.
B: No, he's WALKING to the party.

I will highlight two reasons to treat backoff responses differently from corrections. First, corrections can always be marked with "no" (Asher & Gillies 2003; van Leusen 2004), but backoff triggers cannot typically be marked in this way:

(7) B: Alfonso is going to the party.
A: # No, what if Joanna is there?
A: # No, Joanna might be there.

Second, corrections are by their nature unambiguously incompatible with the corrected utterance (van Leusen 2004), and backoff responses are not.[4] Interestingly, direct backoff examples as in Lewis' politician example pattern differently on both of these criteria, and so might be corrections, but other backoff responses are not. For this reason my analysis will not deal with direct corrections.

The class of clarification requests (Ginzburg 1998; Purver 2004; Ginzburg to appear) is somewhat empirically broader and I don't know of any defining characteristics, but again, intuitively, backoff responses are often used to effectively ask for clarification of a speaker's assumptions. Many of the cases discussed by Ginzburg and others involve clarification of a question/assertion itself:

(8) A: Did Billie show up at all?
B: Billie?
A: Billie Whitechapel. (Ginzburg to appear ex. 17)

Backoff responses never serve this function. But they do seem to pattern more like clarification requests such as:

(9) B′: Why do you ask?

Furthermore, like other clarification requests, and unlike corrections, backoff responses don't put the discourse in a 'crisis' state.

In absence of a more strict defining properties for the class, it seems natural to say that backoff responses are a species of assumption-clarification requests, but not content-clarification requests. Clearly we are in need of an articulated typology of non-agreeing responses, and I will leave this for future work.

3 Analysis in brief

Before proceeding to the formal details of the analysis, I'll sketch the basics informally. First I discuss "what if" and conditional questions, and then I turn to the backoff mechanism.

I adopt here the analysis of "what if" questions developed in Rawlins 2010. The basic idea is that a "what if" question is a conditional question with the issue raised being supplied anaphorically by a salient question under discussion (QUD; Roberts 1996; Büring 2003 a.o.). In its broad outlines I adopt the analysis of conditional questions (CQs) from Isaacs & Rawlins 2008 – a CQ involves first assuming the antecedent, then asking the question in the consequent. Putting these two gives the "what if" meaning below:

4 Though some might be construed as incompatible in a technical sense, given the details of the analysis developed later.

(10) Conditional question update (Isaacs & Rawlins 2008; see also Velissaratou 2000): $c + $ "if ϕ, ψ?" $= (c + \textsc{assume}\ \phi) + ?\psi$

(11) What-if update (Rawlins 2010): $c + $ "what if ϕ" $= (c + \textsc{assume}\ \phi) + ?\textsc{qud}_c$

It is important to note that in typical contexts underspecification of the QUD the speaker has in mind leads to ambiguity of a "what if" question, and many such readings do not lead to conversational backoff. The core instances of backoff readings are cases where the QUD is supplied directly by a question that another speaker has attempted to answer. Therefore, understanding why "what if" questions trigger backoff is reduced to understanding why conditional questions in general do. "Even if" questions also can be reduced to CQs – instead of basing their question off a recently asked question, they base it off a recently made assertion, asking if that assertion is true even in the "if"-clause circumstances.

How do CQs participate in backoff? Speaker A first asks a question (in the running example, the polar question "Is Alfonso going to the party?"). B then proposes a complete answer to this question (e.g. "yes"). If accepted, because this is a complete answer the context would become 'uninquisitive' – no further answering is necessary. But A now asks a question that would be trivial if B's answer is in fact complete (e.g. "What if Joanna is there?"). I will derive this triviality formally in later sections, but the idea is that this question would already have been answered if A accepted B's answer attempt. B infers that A didn't intend this question to be trivial, and further infers that A believes there is a mismatch between the way they were viewing the context. The mismatch concerns what worlds they were taking into consideration: A thinks B was implicitly setting aside worlds where Joanna is there (W_J), though they were attending to worlds where Joanna isn't there ($W_{\neg J}$). A, on the other hand, was considering both sets of worlds.

This mismatch needs to be resolved somehow, and conversational backoff, I propose, is the means. Both speakers will in the end take the domain restriction to be the larger one (including W_J). But B's attempt at an answer is no longer interpreted under this wider domain assumption, but rather under the more limited view of the context that A appears to have been assuming. That is, B's response is accepted with the domain restriction that excludes worlds where Joanna is there – for purposes of interpreting it, speakers temporarily adopt the more restricted context. The update involved in the conditional question can then proceed in a non-trivial way, as the question isn't fully resolved relative to the context with the wider domain. The CQ would be trivial relative to just the $W_{\neg J}$ worlds, but isn't trivial relative to $W_J \cup W_{\neg J}$.

The idea I will develop is that by asking a CQ, A reveals a defect in the common ground – B is taken to be assuming a way of making the context precise where Joanna isn't there. I take the idea most directly from an example in Lewis 1979, where the examples discussed earlier in the paper are explored.[5] Interestingly, it is irrelevant what B's actual assumptions were, unless they were already made explicit. Suppose B did in fact consider the possibility that Joanna might be there – their option for pointing this out is to proceed and answer the CQ. This point is important to keep in mind – conversational backoff isn't about private information states, but rather about public perception of them (cf. Thomason, Stone & DeVault 2006).

4 Conversational backoff in a dynamic semantics

I will analyze conversational backoff on the context of a dynamic semantics for discourse. Before getting to backoff itself, I synthesize several crucial properties of the representation of a discourse context, and give a detailed account of conditional questions. I then turn to the nature of contextual vagueness, and backoff.

4.1 An articulated representation of discourse contexts

The representation of a discourse context needs to be able to handle two issues in order to be suitable for the analysis of conversational backoff. First, it needs to take into account the fact that, while we do often operate on mutual public commitments in the sense of Stalnaker 1978, commitments are at their root made by a particular speaker, independently of whether other speakers accept them (see e.g. Thomason 2000; Gunlogson 2001). Second, it needs to take into account the related fact that one interlocutor making a public commitment is a distinct move from others accepting that commitment into the common ground (Farkas & Bruce 2010).

To handle non-mutual but public commitments, I will use Gunlogson's *commitment sets* (Gunlogson 2001, 2008). These can be thought of as a blend of Hamblin's (1971) discourse commitment slates with Stalnaker-style context sets. I will tend to simplify and assume only two interlocutors. (I will notate variables that are part of a context structure C with a superscript, e.g. cs_X^C.)

(12) **Commitment set**
$$cs_X \underset{\text{def}}{=} \big\{ w \,|\, w \in \bigcap \big\{ p_{\langle s,t \rangle} \,|\, X \text{ has publicly committed to } p \big\} \big\}$$

5 Lewis 1979, pp. 354–5, my emphasis: "Suppose I am talking with some elected official about the ways he might deal with an embarrassment. So far, we have been ignoring those possibilities that would be political suicide for him. He says: 'You see, I must either destroy the evidence or else claim that I did it to stop Communism. What else can I do?' I rudely reply: 'There is one other possibility – you can put the public interest first for once!' *That would be false if the boundary between relevant and ignored possibilities remained stationary. But it is not false in its context, for hitherto ignored possibilities come into consideration and make it true.* And the boundary, once shifted outward, stays shifted. If he protests 'I can't do that', he is mistaken."

(13) **Context structures v.1**
A context C involving participants X,Y is an n-tuple $\langle cs_X, cs_Y, ...\rangle$.

While it isn't often analyzed this way, an important empirical observation about natural language is that assertions don't take immediate effect. Interlocutors must tacitly or actively accept them. Tacit acceptance is the typical case, where the discourse moves forward without comment, but as Farkas & Bruce (2010) point out (p. 19), there are many overt ways to accept a claim: "One can nod, say uh huh, sure, right, you bet, yup, etc." I follow Farkas & Bruce's treatment of accepting moves[6] – instead of the content of an assertion moving directly into an information store, it is placed in a special slot in the context prior to acceptance. This slot is termed the *table*. It is in a sense a generalization of a QUD, as it is updated for all types of speech acts. Here I use a somewhat simpler formalization of the table than F&B, since I don't need its full power.[7] (I will implicitly shift between sets and functions in the formulas below.)

(14) **Table** A table T is a pair $\langle A, Q\rangle$ where A is either an object of type $\langle s,t\rangle$, potentially $\emptyset$, and Q is either an object of type $\langle\langle s,t\rangle t\rangle$, also potentially $\emptyset$.

(15) **Contexts v.2** A context C involving participants X,Y is an n-tuple $\langle T, cs_X, cs_Y, ...\rangle$, where T is a table.

A Stalnakerian assertive update would affect the commitment sets directly. Here this step is decomposed into two; first we put the content of an assertion on the table, and then a speaker can accept it. (I refer to α here as a sentence radical.)

(16) **Assertive update** $C + [\text{ASSERT } \alpha] \underset{\text{def}}{=} \langle\langle [\![\alpha]\!], Q^C_T\rangle, cs^C_X, cs^C_Y, ...\rangle$

(17) **Acceptance move v.1** (made by Y)
$C + \text{ACCEPT}(Y) \underset{\text{def}}{=} \langle\langle\emptyset, Q^C_T\rangle, (cs^C_X \cap A^C_T), cs^C_Y, ...\rangle$
Defined only if $A^C_T \neq \emptyset$.

Questioning similarly puts the question on the table; I return to the consequences of this in much more detail below. I assume that assertion radicals will be of type ⟨s,t⟩, and question radicals of type ⟨⟨s,t⟩t⟩ (following Hamblin 1973; Karttunen 1977, etc), so at present all there is between the two slots is a type difference.

(18) **Questioning update** $C + [\text{QUESTION } \alpha] \underset{\text{def}}{=} \langle\langle A^C_T, [\![\alpha]\!]\rangle, cs^C_X, cs^C_Y, ...\rangle$

Next I turn to the analysis of conditional questions.

6 Though the details here are somewhat different.

7 One crucial factor that I am not explicitly representing is the source of entries on the table.

4.2 Conditional questions and 'what if' questions

Following Isaacs & Rawlins (2008), I take conditional questions to involve an "if"-clause restricting the domain of a question operator. They propose that an "if"-clause does this dynamically by introducing a temporary assumption into the context. (Recall the update sequence sketched earlier: $c +$ "if ϕ, ψ?" $= (c + \text{ASSUME}\ \phi) + ?\psi$.) The question now arises how to represent temporary assumptions.

Kaufmann (2000), Isaacs (2007), and Isaacs & Rawlins (2008) use a stack of context sets to represent temporary assumptions; an assumption involves putting a copy of the context on top of the stack, and temporarily restricting that copy. Leaving the temporary assumption involves popping the stack. Here I do something simpler, suggested as an alternative (but not explored) by Isaacs & Rawlins (2008): I use temporary assumptions to restrict the *view* of the current context.[8] I don't provide arguments one way or the other between the stack approach and the view approach, but I think for present purposes the view approach is cleaner and easier to understand. Technically the key difference is that instead of representing assumptions indirectly, by restricting some context set, I represent them directly as part of the context:

(19) **Contexts v.3** A context C involving participants X, Y is an n-tuple $\langle T, a, cs_X, cs_Y, \ldots\rangle$, where T is a table, and $a \in \mathscr{P}(\mathscr{W})$.

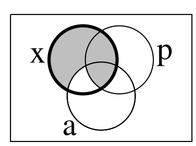
Isaacs & Rawlins (2008), building off of Kaufmann (2000), introduce various machinery for manipulating stacks of context sets, and here we need analogous machinery for manipulating temporary assumptions. Basically, all access to any mutual representation of commitments must be filtered through the a parameter. Making an assumption and getting rid of temporary assumptions is straightforward:[9] (Note that inquisitivity is defined below.)

(20) **Assuming** $C + \text{ASSUME}\ \phi \underset{\text{def}}{=} \langle\langle A_T^C, Q_T^C\rangle, a^C \cap [\![\phi]\!], cs_X^C, cs_Y^C, \ldots\rangle$

(21) **Popping** $C + \text{POP} \underset{\text{def}}{=} \langle\langle A_T^C, Q_T^C\rangle, \mathscr{W}, cs_X^C, cs_Y^C, \ldots\rangle$
Undefined if C is inquisitive.

The complication comes in from the fact that any acceptance moves must be filtered through whatever temporary assumptions are currently in play. Here I use an operator based on Kaufmann's (2000) $\vdash$ operator; I refer to this as *domain-limited update*:

(22) **Domain-limited update**
$x \vdash_a p \underset{\text{def}}{=} (x \cap \bar{a}) \cup (x \cap a \cap p)$
(cf. Kaufmann 2000)



8 The sense of the word 'view' here is exactly that found in relational databases.

9 One difference from the stack analysis is that here all temporary assumptions are eliminated by popping, as opposed to the most recent one.

The picture on the right illustrates the effect of $\vdash$. Basically, it is a circumscribed (domain-restricted) assertion operator: inside the domain specified by a, the two sets are intersected, but outside that domain, x is left intact.[10] Acceptance involves domain-limited update:

(23) **Acceptance move v.2** (made by Y)
$C + \textsc{Accept}(Y) \underset{\text{def}}{=} \langle\langle\emptyset, Q_T^C\rangle, a^C, (cs_X^C \vdash_{a^C} A_T^C), cs_Y^C, \ldots\rangle$
Defined only if $cs_X^C \cap a^C \cap A_T^C \neq \emptyset$ (for all non-Y participants).

Note that if there are no temporary assumptions ($a = \mathscr{W}$), then the domain-limited update reduces to standard set intersection.

At this point the standard dynamic treatment of a conditional follows: the sequence $((c + \textsc{assume}\ \phi) + \psi) + \textsc{pop}$ is equivalent to e.g. Heim's (1983) treatment in terms of the joint context produced.

How do questions interact with temporary assumptions? It is easy to see how assumptions filter assertions, but less so for questions. Isaacs & Rawlins solve this problem by representing the assumption only indirectly, in its effect on a temporary context. I solve this problem here by defining a construct that I will call a *GS-context*:

(24) The GS-context g^C of a context C is:
$$\left\{\langle w_1, w_2\rangle \mid w_1, w_2 \in (cs_X^C \cap cs_Y^C \cap a) \text{ and } \forall p \in Q_T^C : w_1 \in p \leftrightarrow w_2 \in p\right\}$$

A GS-context is a relation on worlds that are jointly present in the context; it is guaranteed to be reflexive and symmetric. Recall that I am taking the denotation of a question radical to always be a (Hamblin) set of propositions, and that asking a question in C puts its denotation in Q_T^C. If this slot of the table is empty, the second conjunct is trivially true, and all worlds in the context will be connected. Thus an empty table is a special case of uninquisitivity (defined below). More interestingly, if the propositions in this set are mutually exclusive and exhaustive, i.e. form a partition (see "Hamblin's Picture"; Hamblin 1958; Groenendijk & Stokhof 1997), the GS-context forms an equivalence relation. I will assume that this is always so. (If not, alternatives can overlap a la Velissaratou 2000; Groenendijk & Roelofsen 2009.) This equivalence relation is exactly the kind used as a question meaning by Groenendijk & Stokhof (1984), and used directly in the representation of a context by Groenendijk (1999). Here I treat the Hamblin-style representation as primary and derive the G&S version. Using this construct some standard notions can be defined following Groenendijk (1999) most directly.[11]

10 Kaufmann's paraphrase for a similar operator may be helpful, if a is thought of as a context also: we learn in a context x that context a supports p.

11 This is not to say that the GS-context is necessary for defining these properties, but it is both convenient and demonstrates the connection to Groenendijk's dynamics. While some might argue

(25) **Inquisitiveness**

a. A G-context g is inquisitive iff $\exists w_1, w_2$ s.t. $\langle w_1, w_1 \rangle \in g \wedge \langle w_2, w_2 \rangle \in g \wedge \langle w_1, w_2 \rangle \notin g$.

b. A context C is inquisitive iff g^C is inquisitive.

(26) A question move in context C resulting in C' is **trivial** iff $g^C = g^{C'}$.

(27) An assertion move α is **completely resolving** in a context C if, for some X, $g^{C+\alpha+\textsc{Accept}(X)}$ is uninquisitive. (I will call α a **complete answer** in that context.)

Groenendijk's notion of "licensing" and so on could be adapted, but I will not do this formally here; I take it that an assertion is licensed in an inquisitive context (at least) if it contributes to answering the question on the table in some way. Note that when these definitions are combined with the POP operator above, the system requires a question to be completely resolved (or otherwise dispensed with) before abandoning the temporary assumption; this is the same as in Isaacs & Rawlins. (In fact, g^C corresponds directly to the top element of the stack in the I&R analysis.)

The formalism so far is enough to characterize a conditional question update:

(28) $C +$ [If Joanna goes to the party, will Alfonso go?] $=$
$(C + [\textsc{Assume}$ J. goes to the party$]) + [\textsc{Question}$ A. goes to the party?$]$

The assumption step reduces a^C to only worlds where Joanna goes to the party, and the question puts the set $\{\lambda w\,.\,$A. goes to the party, $\lambda w\,.\,$A. doesn't go$\}$ (the denotation of the question radical) on the table. Because the GS-Context is sensitive to temporary assumptions, it is an equivalence relation on worlds jointly in the context that are also in the restricted a^C. In this example, the GS-context connects worlds just in case they resolve the issue of whether Alfonso goes to the party in the same way. A subsequent answer is also filtered through the assumption, and so will only address the issue relative to worlds where Joanna does go to the party.

The treatment of "what if" questions follows, though I haven't fully explicated the notion of QUD in this framework. But a question on the table is certainly the most immediate QUD, and this is the case that leads to backoff. "What about" questions are a complicated issue that I leave for later work, but they can be analyzed as conditional questions where the conditional clause is reconstructed by relevance reasoning from the content of the "about" clause. "Even if" questions have a straightforward analysis in this framework: they involve asking whether the assertion radical on the table is true even in the case identified by the "if"-clause. (A piece of

that it is overly complex to use both kinds of representations, I take each to be a different side of the same coin.

evidence for this approach is that they are polar in nature, always licensing "yes" and "no", unlike "what if" questions.)[12]

4.3 Contextual vagueness and backoff

I have claimed that in cases where backoff is triggered, it is because speakers make different assumptions about how to circumscribe the context. The following implements this idea.[13] The idea follows Gunlogson's (2001) notion of a reduction set. Gunlogson defines a reduction set to express the ways in which a context might evolve, but I use it here to express ways that a context might already be.

(29) R is an accessibility relation between contexts C, C' such that $\langle C, C' \rangle \in R$ iff

(i) $cs_X^{C'} \in \mathscr{P}(cs_X^{C})$ and $cs_Y^{C'} \in \mathscr{P}(cs_Y^{C})$,

(ii) C' is not empty,

and (iii) $T^C = T^{C'}$ and $a^C = a^{C'}$

(30) $\mathscr{R}(C) \underset{\text{def}}{=} \{C' \mid \langle C, C' \rangle \in R\}$

Two contexts are related just in case the second contains more information than the first, but other parameters are held equal (clause iii, the main difference from Gunlogson's definition). A particular member of the reduction set $\mathscr{R}$ represents an information state that a discourse participant is tacitly assuming the context to be, despite lack of public commitments to that effect. I will refer members of $\mathscr{R}(C)$ as *prunings* of C. What constrains a discourse participant's choice of prunings? The overt part of the analysis is that any public commitments constrain the reduction set. Other than that, since prunings are non-public (and I have chosen not to represent them as part of the context), we do not get direct access. We can, of course, reason about what other speakers' prunings must be.

Stalnaker introduced the notion of a defective context as one where speakers' assumptions are mismatched. Several kinds of defectiveness emerge on the present system. First-order defectiveness is where speakers commitment sets don't intersect. The more interesting case of second-order defectiveness involves mismatches in the tacit prunings of the context, for instance if $(cs_X^{Pr_X(C)} \cap cs_Y^{Pr_X(C)}) \neq (cs_X^{Pr_Y(C)} \cap cs_Y^{Pr_Y(C)})$. I will term a *pruning-only mismatch* as one where prunings of C differ by some proposition p that is not decided by the actual context C. This is a species of second-order defectiveness. It can occur if someone has forgotten a relevant fact,

12 One complication for "even" and "what if" questions is how their update proceeds if backoff clears the table (see below). I assume that the anaphoric content in each is reconstructed prior to application of the repair mechanism.

13 There are many other implementation options to consider, and I will not try to choose between them here.

or incorrectly assumed that some fact wasn't relevant to the issue at hand. The following operator is useful for stating the precise conditions for such a mismatch:

(31) **Unsettledness test:** $\oplus(c,p) = 1$ iff $c \cap p \neq \emptyset \wedge c \cap p \neq p$
i.e. true iff c does not settle whether p is true.

So a pruning-only mismatch happens when $\oplus(cs_X^C \cap cs_Y^C, p)$, and $\exists Z : \oplus(cs_X^{Pr_Z(C)} \cap cs_Y^{Pr_Z(C)}, p)$, but $\exists Z' : \neg \oplus (cs_X^{Pr_{Z'}(C)} \cap cs_Y^{Pr_{Z'}(C)}, p)$.

Conversational backoff is conditioned on the discovery of a pruning-only mismatch. It is designed to allow questions that would be trivial if a proposed assertion is accepted to be interpreted non-trivially.

(32) **Conversational backoff repair** If assertion radical p is on the Table in C due to a move by speaker X, and speakers discover a pruning-only mismatch on proposition q, then they can shift to a new context C':
$$C' = \langle\langle\emptyset,\emptyset\rangle, a^C, (cs_X^C \vdash_{(a^c \cap \neg q)} p), cs_Y^C\rangle$$
Furthermore, all speakers Z are now publicly committed to $\oplus(cs_Z^{Pr_Z(C)}, q)$.

This repair does two things: it clears the table, and performs a domain-limited update with the assertion radical that was on the table. The domain is limited to the case where the mismatched proposition is false. The precondition is that there is already some assertion radical on the table, i.e. someone has made an assertion that hasn't been accepted. Formally speaking, backoff closely resembles the acceptance move in (23), except that p is not accepted relative to the full context.

This repair mechanism sets the stage for a successful conditional question update (though it can be triggered in other ways); such an update will typically proceed by assuming q, and asking a question that is only non-trivial as long as q could be true. It is important to note that the choice of q is a wild-card in this system, and I leave a full exploration of how speakers reason about q to future work. I do assume that it must be signaled in some more or less direct way by the triggering move.

5 Consequences and examples

Before going through a backoff case, I'll step through how a basic question-answer-accept sequence works (which is very similar to Farkas & Bruce 2010).

(33) A: Is Alfonso going to the party?
B: Yes, he is. A: Ok.

First we update the input context with the question. This puts the content of the question (a size-two set of propositions) on the table. This renders the GS-context inquisitive. For example, supposing that (i) Alfonso goes in w_1, w_2 but not in w_3, w_4, (ii) these are all the worlds, (iii) A and B have no prior public commitments (cs_A^C and cs_B^C each start with all four worlds, i.e. $= \{w_1, w_2, w_3, w_4\}$), and notating the contents of the table as sets in this domain rather than functions:

(34) $C = \langle\langle\emptyset,\emptyset\rangle, \mathscr{W}, cs_A^C, cs_B^C\rangle$

$$g^C = \left\{ \begin{array}{llll} \langle w_1,w_1\rangle & \langle w_2,w_1\rangle & \langle w_3,w_1\rangle & \langle w_4,w_1\rangle \\ \langle w_1,w_2\rangle & \langle w_2,w_2\rangle & \langle w_3,w_2\rangle & \langle w_4,w_2\rangle \\ \langle w_1,w_3\rangle & \langle w_2,w_3\rangle & \langle w_3,w_3\rangle & \langle w_4,w_3\rangle \\ \langle w_1,w_4\rangle & \langle w_2,w_4\rangle & \langle w_3,w_4\rangle & \langle w_4,w_4\rangle \end{array} \right\}$$

(35) $C2 = C +$ "Is Alfonso going to the party?" $=$

$$\langle\langle\emptyset, \{\{w_1, w_2\}, \{w_3, w_4\}\}\rangle, \mathscr{W}, cs_A^C, cs_B^C\rangle$$

$$g^{C2} = \left\{ \begin{array}{llll} \langle w_1,w_1\rangle & \langle w_2,w_1\rangle & & \\ \langle w_1,w_2\rangle & \langle w_2,w_2\rangle & & \\ & & \langle w_3,w_3\rangle & \langle w_4,w_3\rangle \\ & & \langle w_3,w_4\rangle & \langle w_4,w_4\rangle \end{array} \right\}$$

B's attempt at an answer is a complete answer by the definition above, and so (if accepted) would leave the context uninquisitive. In this example I have shown an overt acceptance move, which I take it triggers the ACCEPT update. The assertion update does not change the GS-context, but accepting does.

(36) $C3 = C2 +$ "Yes, he is [going to the party]" $=$

$$\langle\langle\{w_1, w_2\}, \{\{w_1, w_2\}, \{w_3, w_4\}\}\rangle, \mathscr{W}, cs_A^C, cs_B^C\rangle$$

$$g^{C3} = g^{C2}$$

(37) $C4 = C3 + \text{ACCEPT}(A) =$

$$\langle\emptyset, \{\{w_1, w_2\}, \{w_3, w_4\}\}, \mathscr{W}, cs_A^C, (cs_B^C \cap \{w_1, w_2\})\rangle$$

$$g^{C4} = \left\{ \begin{array}{ll} \langle w_1,w_1\rangle & \langle w_2,w_1\rangle \\ \langle w_1,w_2\rangle & \langle w_2,w_2\rangle \end{array} \right\}$$

A accepting the answer ensures that B's commitment set contains no more than worlds 1 and 2. Since the intersection of the commitment sets determines the domain of the GS-context, this ensures that the context is uninquisitive. Note that this is true even though the question remains on the table. (We might want acceptance of a complete answer to clear the table completely, but I will leave this issue aside as it isn't necessary for the data I'm dealing with. This issue is somewhat more complicated than it might presently appear, as the real question is how long and under what conditions do QUDs persist.)

I turn now to the case of the conditional question discourse that triggers backoff:

(38) A: Is Alfonso going to the party?

B: Yes, he is.

A: Will he go if Joanna is there?

Here, instead of an overt acceptance move, A asks a conditional question. There are two possibilities to consider. First, the CQ might be preceded by a covert ACCEPT. Second, it might not be. Each of these cases turns out to involve trivial questioning, and conversational backoff can repair the second case. I will leave the details of the first case to the reader, but the way it works is as follows. In $C4$ above (the input context to the CQ in this case) the question of whether Alfonso goes is completely resolved. The conditional question involves first assuming that Joanna is at the party, and then asking whether he will go. Even after making this assumption the question remains resolved, and asking the question does not affect the GS-context, rendering the questioning trivial.

If a hearer assumes no covert acceptance move, then the divergence from the above example starts at $C3$. Let us assume that Joanna is at the party in w_1, w_3 and not at w_2, w_4. (Note that the singleton nature of the alternatives is simply an artifact of choosing for expository purposes such a small domain of worlds.)

(39) $C5 = C3 + $[ASSUME "Joanna is there"] =

$$\langle\langle\{w_1,w_2\},\{\{w_1,w_2\},\{w_3,w_4\}\}\rangle, a^{C5} = \{w_1,w_3\}, cs^C_A, cs^C_B\rangle$$

$$g^{C5} = \left\{ \begin{array}{ll} \langle w_1,w_1\rangle & \\ & \langle w_3,w_3\rangle \end{array} \right\}$$

After the assumption the context remains inquisitive – it is still at issue whether Alfonso goes to the party, exactly because A has not accepted the answer. But the next step of the conditional question update tries to raise exactly that issue. Since the only remaining worlds, w_1 and w_3 are already disconnected, asking the question component of the CQ would be trivial – the GS-context would be unchanged.

The first case doesn't meet the preconditions for conversational backoff, because there was no proposition on the table. Here, however, there is: B's attempt at an answer remains waiting. Furthermore, a hearer can infer that A must not have believed the conditional question to actually be trivial. There is no way to repair the case where the answer is fully accepted and handle this inference, but as long as there is a way to apply backoff, we can handle this inference for the case where the answer isn't fully accepted. In particular, the hearer can reason that A thinks that the two are assuming different prunings of the context (which is not defective in any first-order way). Further, A doesn't mean to simply ignore B's answer. Given the constraint that a pruning-only mismatch must be signaled by an overt move, the proposition in the antecedent provides an obvious candidate for the difference between the two implicit prunings of the context. (As noted earlier, much more than I am saying here needs to be said about how this difference is inferred.)

The repair then is to accept the answer into B's commitment set, but only relative to the domain imposed by this inferred minimal difference between ways of making the context precise (e.g. prunings). Where q is the proposition that Joanna is there:

(40) $C6 = \text{BACKOFF}(C3, q) = \langle\langle\emptyset,\emptyset\rangle, a^{C3}, cs_A^C, \{w_1, w_2, w_3\}\rangle$

In the repaired context we have learned that B is committed to Alfonso going to the party under the assumption that Joanna is not there, but we have not learned about B's commitments otherwise. That is, we have removed w_4 (where Alfonso does not go and Joanna is not there) from B's commitment set, but not w_2, where Alfonso does not go and Joanna is there. If accepted straightforwardly (as in $C4$ in the first example) both worlds would have been removed. This repair sets the stage for a non-trivial interpretation of the conditional question asked by A, by leaving enough worlds that the question can be asked non-trivially, and at the same time clearing the table. The intuition behind the clearing of the table is that B, at the time of answering, believed themselves to be fully discharging their answering duty.

(41) $C7 = C6 + [\text{ASSUME}$ "Joanna is there"$] =$

$$\langle\langle\emptyset,\emptyset\rangle, a^{C7} = \{w_1, w_3\}, cs_A^C, \{w_1, w_2, w_3\}\rangle$$

$$g^{C7} = \left\{ \begin{array}{cc} \langle w_1, w_1\rangle & \langle w_3, w_1\rangle \\ \langle w_1, w_3\rangle & \langle w_3, w_3\rangle \end{array} \right\}$$

(42) $C8 = C7 + [\text{QUESTION}$ "Will Alfonso go?"$] =$

$$\langle\langle\emptyset, \{\{w_1, w_2\}, \{w_3, w_4\}\}\rangle, a^{C8} = \{w_1, w_3\}, cs_A^C, \{w_1, w_2, w_3\}\rangle$$

$$g^{C8} = \left\{ \begin{array}{cc} \langle w_1, w_1\rangle & \\ & \langle w_3, w_3\rangle \end{array} \right\}$$

In the end result, there is a temporary assumption and the context is inquisitive. An answer relative to that temporary assumption is independent of the domain-limited answer accepted by the conversational backoff repair.

6 Conclusions

In this paper I have presented a case study of a previously unnoticed 'non-agreeing' but ultimately monotonic response type, and the reasoning it triggers. The analysis I have developed involves reasoning about tacit ways that speakers might be making the context more precise – conversational backoff is triggered by a mismatch in these precisifications, though the public context itself is not defective. I have focused on conditional questions of various flavors, and shown that they are especially suited to triggering backoff. The analysis itself, though it might seem complex, is largely composed of pieces that are each independently motivated – the two novelties are the synthesis of these pieces, and the proposed conversational backoff repair mechanism itself. One major result of this paper is to show that conversational backoff is actually a species of acceptance; it is a qualified acceptance, rather than the normal unqualified acceptance. Lewis' idea was that a mechanism of this type was a type of accommodation – how does this stack up? Backoff fits into the mold of 'enlightened' accommodation in the sense of Thomason et al. 2006 – an update that involves public recognition and negotiation about the nature of private commitments. It also resembles Bonomi's (2006) 'discommodation', which involves a suspension of a view of the common ground when there is a mismatch between private and public information. But it isn't quite the same as either, and it is clear that the typology of non-agreeing moves and repairs is rich, and barely explored; much work remains!

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