

Signaling Non-Speaker commitment in Transparent Free Relatives: A paired Speaker-Hearer judgment study.

Jesse A. Harris

University of California, Los Angeles
jharris@humnet.ucla.edu

Abstract

In a typical conversation, Speakers are assumed to be committed to the content of their utterances. Recent research has uncovered several linguistic expressions or prosodic contours that convey subtle interactions between the commitments of discourse agents and the presumed source of the information. Another such case is that of Transparent Free Relatives, as in *That's an instance of what pragmaticians call 'implicature'*, which provide a systematic way to explicitly introduce a source (*pragmaticians*) into an attribution statement (*call 'implicature'*), but may also leave the source unexpressed, as in *That's an instance of what is called 'implicature'*. We explore the factors that give rise to Non-Speaker commitment in a novel two-person experimental paradigm, finding that (i) the presence of an explicit third person source and (ii) the tense of the attribution statement provide reliable cues to Non-Speaker commitment.

1 Introduction

The terms that a Speaker uses to describe an object or event often convey an implicit point of view, the connotations of which presumptively default to Speaker commitment or acceptance, unless there are clear cues to the contrary (Grice, 1978; Levinson, 2000; Harris and Potts, 2009). Speakers may selectively maneuver this default by modifying the *means* by which a potentially controversial element is designated. Here, the term *beergarita* (a literal and linguistic blend of *beer* and *margarita*) is enveloped in a so-called Transparent Free Relative (1b), which raises the issue of whether the Speaker believes the term *beergarita* is appropriate, relative to the canonical variant (1a).

- (1) a. John made Mary a beergarita.
b. John made Mary *what he calls a beergarita*.

Syntactically, Transparent Free Relative (TFR) clauses are Free Relative (FR) clauses that 'transparently stand in' for some constituent contained within the FR clause itself (Wilder, 1998; Grosu, 2003). In example (1b), the phrase *what he calls a beergarita* is the TFR clause, and the underlined noun *beergarita* is the element for which the entire clause substitutes, which often has a quotational or indirect speech effect. Pragmatically, TFRs introduce a term or expression (*beergarita*) through an explicit source (*John*) for the attribution (*he calls*). TFRs thus provide a systematic way to modulate the degree to which a Speaker conveys her commitment to a term.

After reviewing current research on commitment in pragmatics, we turn to a brief overview of the pragmatics of TFRs, followed by a description of a novel two-person experiment that tests the basic predictions of a cue-based account, in which multiple interacting cues work together to promote an interpretive shift from away from Speaker commitment (Smith, 2003; Harris and Potts, 2009).

2 Speaker commitment

Speakers presumably believe what they say, or at least intend to convey as much, unless their utterances are otherwise marked. In other words, they are assumed to be *committed* to the content of their utterance (Hamblin, 1971; Levi, 1991). We use the term 'commitment', in the sense that a discourse agent α may be committed to the (propositional) content ϕ expressed by an expression E when α makes public, in some way, α 's belief in ϕ through the use of E . A commitment differs from a *genuine belief* in that (i) commitments are necessarily public, and hence can be expected to generate implicature of the usual sort, and to li-

cense discourse moves, and (ii) commitments may be disingenuous, in that one may adopt a commitment for, say, the sake of polite conversation or deception, among other reasons (Hamblin, 1970).

Of course, discourse agents need not share the commitments of others in the discourse. Consequently, discourse agents – and models of discourse – need to somehow pair discourse agents with their commitments in order to draw appropriate inferences. This is unlikely to be an easy task. A great deal of varied information must go into assessing the commitments of our conversational partners. Presumably, discourse agents rely on linguistic conventions, coupled with general knowledge about the discourse and the agents therein, to form reasonable approximations of another agent’s commitments.

Several recent studies have investigated how particular lexical items, syntactic configurations or intonational contours interact with the commitments of agents in the discourse. Examples include rising declaratives (Bartels, 1997; Gunlogson, 2001), discourse particles (Farkas and Bruce, 2010), predicates of personal taste (Lasersohn, 2005; Malamud and Stephenson, 2011), polarity rises (Malamud and Stephenson, 2011), and expressive terms (Potts, 2005; Harris and Potts, 2009). For example, Gunlogson (2008) observes that rising declaratives typically require the Addressee to be publicly committed to the proposition under question. In (2), B has no reason for thinking that A would be committed to the proposition that the fruit she is eating is a persimmon; hence, B’s use of the rising declarative sounds infelicitous in the context. Once A makes that commitment public, a rising declarative addressing the Addressee’s commitment is licensed (3).

- (2) A. (Coworker silently eating a piece of fruit.)
 B. # That’s a persimmon?
- (3) A. This is the best persimmon I’ve ever tasted.
 B. That’s a persimmon?

Following Hamblin, Gunlogson (2008) proposes that every discourse agent has a set of publicly available discourse commitments, which may be modeled as the set of worlds which conform to those beliefs:¹

- (4) $cs_{\alpha,d} = \{w \in W : \text{all discourse commitments of agent } \alpha \text{ in discourse } d \text{ are true in } w\}$

The discourse context C , at a particular point in time, can be represented as a tuple of such commitment sets for all agents in the discourse: $C_d = \langle cs_{\alpha,d}, cs_{\beta,d}, \dots \rangle$. The common ground – mutually held beliefs about the world that unfold throughout a discourse – is then to be understood as the intersection of individual commitment sets.

As Gunlogson and others realized, however, the more complicated case of *implicit* commitment presents itself. In example (5), whether or not the Speaker is committed to the identification is left vague or underdetermined by the semantics. Provided that John is a reliable source, (5) could be used to indicate that the proposition *that’s a persimmon* is likely correct. For example, if John is an expert gardener, I’m surely going to trust his judgment by default. However, if John is contextually understood to be largely ignorant about such things, the intuition is that (5) becomes a comment on John’s beliefs, from which the Speaker must now take pains to distance herself.

- (5) According to John, that’s a persimmon.

Additionally, John’s reliability may simply not be known. The Speaker may use the *According to John* clause to identify her *source* of information, without necessarily committing one way or the other. Discourse agents may require more information regarding John’s reliability before accepting (or rejecting) the statement into the common ground (Farkas and Bruce, 2010; Malamud and Stephenson, 2011).

I will classify such cases as *Non-Speaker commitment* even though there are surely important distinctions to be explored further. The case in which John is ignorant about gardening might more accurately be called *Speaker Non-commitment*, in that the Source, not the Speaker, is committed to the attitude. The case in which John’s reliability is unknown is vague with respect to Speaker commitment. Hence, Speaker commitment and Non-Speaker commitment need not be incompatible: a Non-Speaker source can serve as a proxy for the Speaker, as discussed below.

to it, results in a consistent model (Gunlogson, 2008). Similar constraints holds for standard models of common ground (Lewis, 1969; Fagin et al., 1995; Stalnaker, 2002). Possible worlds are used for convenience without commitment to their adequacy in capturing the finer points of belief or belief revision.

¹We may assume for simplicity that $cs_{\alpha,d}$, and any update

In a case similar to (5), Simons (2007), among many others, discusses the *evidential* use of embedding attitude predicates, such as *thinks*, *believes*, *imagines*, and so on.

- (6) A. [Context: Pointing to a piece of fruit.]
What is that?
B. i. That's a persimmon.
ii. I think/believe that's a persimmon.
iii. That, I think/believe, is a persimmon.
iv. John thinks/believes that's a persimmon.

The direct answer (6B.i) conveys a high degree of Speaker certainty, and thus complete Speaker commitment. First person embedding predicates (6B.ii–iii) function as hedges, allowing the Speaker to introduce some uncertainty regarding the accuracy of the statement. Finally, third person embedding cases defer the relevant attitude state to a Non-Speaker agent (*John*), triggering the inference that the Speaker is not in an appropriate epistemic state to provide an answer.

Such cases underscore the need to associate a commitment with a *source* for the content, defined by Gunlogson (2008) as follows:

- (7) An agent α is a **source** for a proposition ϕ in a discourse d iff:
a. α is committed to ϕ ; and
b. According to the discourse context, α 's commitment to ϕ does not depend on another agent's testimony that ϕ in d .

Gunlogson proposes that commitments have sources. Sources may be the Speaker herself, or another discourse agent, such as the Addressee in the case of rising declaratives (2–3) or a third party mentioned in the sentence (5). In such cases, α 's commitment might be said to be a *dependent commitment*:

- (8) An agent α has a **dependent commitment** to a proposition ϕ in a discourse d iff:
a. α is committed to ϕ ; and
b. According to the discourse context, α is not a source for ϕ in d .

Provided that an alternate source is not specified, a plausible interpretation takes the speaker to be the source of the claim, all else being equal. We may codify this intuition into the following presumptive inference:

- (9) **Speaker commitment by default:** Unless otherwise indicated, assume that a Speaker is committed to content ϕ expressed in E .

This is a direct result of Grice's Maxim of Quality (roughly, "Do not say what you believe to be false or do not have evidence for"); in general, if speakers are expected to say what they have evidence for, then they should be likewise committed to the content of their reports.

We take it that discourse agents rely on *cues* from various sources to signal a contravention of default Speaker commitment (Smith, 2003; Harris and Potts, 2009), a position which raises a number of additional questions, including the following:

- (10) i. What cues signal a Non-Speaker commitment to ϕ ?
ii. How reliable are such cues?
iii. How do these cues interact? Do multiple cues work together to better signal Non-Speaker commitment? If so, are some cues stronger or more reliable than others?

We now turn to Transparent Free Relatives as a case study in this area in order to begin addressing these questions.

3 Transparent Free Relatives

Transparent Free Relatives (11b) are a type of Free Relative (11a) structure which serve to introduce a term or expression through predicates like verbs of saying, such as *call* or *describe as*, that select for equatives or small clauses, or else a clausal hedge, such as *appear to be* or *seem to be*. Like other types of FRs (Bresnan and Grimshaw, 1978; Caponigro, 2003), TFRs can stand in for many kinds of syntactic categories, but stand in most often for NPs. Although TFRs have a number of interesting syntactic and semantic properties (Wilder, 1998; Grosu, 2003; Schelthout et al., 2004), those are not reviewed here.

- (11) a. In the divorce hearing, John gave Mary
[FR what she wanted].
b. In the divorce hearing, John gave Mary
[TFR what she thinks of as reparations].

The examples below illustrate the most common use of TFRs, which are in abundance in news reporting, in which the commitments associated with the term shift to a Non-Speaker agent.

In (12), the use of the politically charged term *amnesty* is clearly ascribed to *Ted Cruz* in his description of the Democrats' proposal, contributing to a global perspective shift (Harris and Potts, 2009) in which evaluative terms like *right* reflect the point of view of Cruz, rather than of the reporter or the Senate Democrats. In (13), it is clear that the phrasing of the report reflects the attitude holder (Cummings), leaving the reporter's own commitments somewhat vague.

- (12) Speaking Wednesday with conservative radio host Rush Limbaugh, Ted Cruz said that by promoting what he called "amnesty" for immigrants in the U.S. illegally, Senate Democrats are indeed hoping to get a lot more Democratic voters – but not among immigrants who did things the right way, like his father. (NPR: 20 May, 2013)
- (13) But Cummings was not so happy about a media buildup to the hearing with what he called unfounded accusations aimed at smearing public officials. (NPR: May 09, 2013)

Pragmatically, however, TFRs are compatible with multiple interpretations besides a Non-Speaker perspective. Whether the Speaker accepts the appropriateness of the term *beergarita* depends, in part, on the extent to which John is deemed a trustworthy or authoritative source, and whether the Speaker is willing to adopt the term in question. Furthermore, authoritative sources can also be used to *introduce* the term to an ignorant audience, rather than to reject it; for example, *what we mixologists call a beergarita* identifies the Speaker as an authority, just as *what I would call a beergarita* can be understood as idiosyncratic or original to the Speaker. Additional factors such as modality, intonational marking, and non-verbal indicators such as head tilt or eyebrow raising may also play a role in establishing Non-Speaker commitment (Harris and Potts, 2011).

From among the many potential factors leading to Non-Speaker commitment, we concentrated on just two: (i) the presence of a third person source and (ii) the tense of the report, following previous findings that present tense promotes Non-Speaker interpretations of attitude reports in extended discourse contexts in comparison to past tense (Harris, 2012). In the case of TFRs, the present tense

generates a habitual or generic interpretation of the attributive statement, suggesting that the attribution reflects a consistent commitment. In contrast, the past is consistent with an episodic reading, indicating that the attribution may not reflect a long-term belief, in addition to the habitual reading.

Although the variations in (14) are all ambiguous, they differ in whether we can attribute the term *beergarita* to a specific source (*John*) and whether the mode of reference is habitual (*calls, is called*) or possibly episodic (*called*).

- (14) John made Mary what $\left\{ \begin{array}{l} \text{is called} \\ \text{he called} \\ \text{he calls} \end{array} \right\}$
a beergarita.

We predicted that the presence of a TFR would be insufficient, by itself, to overturn the Speaker default, but that the presence of a third person source would be a more important indicator. We also expected that the third person source would more greatly contribute to Non-Speaker interpretations when coupled with a present tense predicate, and that the combination of such cues would lead to more reliable interpretations between Speakers and Hearers.

4 Speaker-Hearer judgment task

This section introduces the results of a paired Speaker-Hearer experiment, in which two subjects participate in an interpretation judgment task.²

4.1 Materials and method

Fifteen pairs of subjects from UMass Amherst participated in the study (for a total of 30 subjects). Subjects were randomly assigned a role (Speaker or Hearer) prior to the experiment, and were seated facing away from one another, so that facial cues and gestures would not be a factor in the task.

Subjects were presented with 12 triplets of the form of (15), manipulating the presence of a Source (*Src, No-Src*) in the TFR and the Tense of the TFR predicate (*Present, Past*). The three conditions consisted of (i) No Source-Present (*No-Src; is called*), meant to establish a baseline for Speaker commitment with the construction, (ii) Source-Past (*Src-Past; he called*), giving one cue

²The terms 'Speaker' and 'Hearer' only indicate labels for the roles in the experiment. While it is expected that these roles would generalize, to a limited extent, to real conversation, it is also acknowledged that the 'Speaker' was reading the script, rather than articulating his or her own intention.

for Non-Speaker commitment, and (iii) Source-Present (Src-Pres; *he calls*), giving multiple cues for Non-Speaker commitment.

- (15) John gave Mary what ...
- a. **is called** a beergarita. (*No-Src*)
 - b. **he called** a beergarita. (*Src-Past*)
 - c. **he calls** a beergarita. (*Src-Pres*)
- (16) *How did you interpret that sentence?*
- i. Only John calls it a ‘beergarita’. (*NSpO*)
 - ii. Everyone calls it a ‘beergarita’. (*SpO*)

Items were presented in counterbalanced individually randomized order, so that subjects saw or heard one and only one item from each triplet, interspersed with 42 items from unrelated experiments (though all items asked about commitment in some form or another). Items were constructed so that only a quarter of the items contained potentially unfamiliar terms in the TFR, using a variety of attitude predicates: *call*, *think*, *believe*, *consider*, and *expect*. All items are provided in the appendix.

After Speakers read the item silently, they chose between two responses to an interpretation question like (16). As discussed above, Non-Speaker commitment is sometimes vague with respect to whether the Speaker would also endorse the attitude. The responses were constructed to be as unambiguous as possible, so that the Non-Speaker Oriented response (NSpO; 16.i) was phrased in terms of the stronger Speaker Non-commitment interpretation. The Speaker Oriented response (SpO; 16.ii) was intended cover all other interpretations, most prominent of which is Speaker commitment, by hypothesis. Order of responses was individually randomized for each participant.

After responding to the interpretation question, Speakers were asked to perform the item as though they were having a conversation, and their speech was recorded on a head-mounted microphone. The instructions to the Speaker included the following directions:

You should think of this experiment as “a mind reading game” in which you report on what someone else has said. Your goal is to convey whether you also believe what you report on, while speaking as naturally as possible.

Hearers then made a judgment on the same interpretation question from the Speakers’ performance alone – i.e., they responded to the question (16) without seeing additional text. The paradigm thus allows us to explore additional measures not typically gathered in similar experiments; in addition to interpretations and voice recordings, we also have a measure of Speaker-Hearer agreement, allowing us to determine precisely what factors reliably signal Non-Speaker commitment.

Items were presented with Linger (Rohde, 2003), which recorded responses from both Speaker and Hearer, as well as the audio performance of the Speaker. Each experimental session typically lasted no more than 45 minutes.

4.2 Results

Responses to interpretation questions (16) were coded so that NSpO responses counted as successes ($DV = 1$) and SpO responses were counted as failures ($DV = 0$). The data were modeled as various logistic linear mixed effects regression models (Baayen et al., 2008), with dummy coded predictor variables³ with by-subjects and by-items random slopes and intercepts (Barr et al., 2013). All analyses were conducted within R using the `nlme4` package (Bates and Maechler, 2009) for model fitting. The experimental design permitted numerous measures, such as Responses aggregated across Speakers and Hearers, Speaker response only, Hearer response only, and Percent agreement between Speaker-Hearer pairs, each of which is presented in turn below. Reaction time was not formally examined.

Treating Speaker and Hearer responses as independent events within the same data set – i.e., not distinguishing between Speaker and Hearer responses, Src-Past ($M = 82\%$, $SE = 4$) elicited significantly more NSpO responses than No-Src ($M = 42\%$, $SE = 5$), $z = 4.90$, $p < 0.001$, and, in turn, Src-Pres ($M = 95\%$, $SE = 2$) elicited more NSpO responses than its Src-Past counterpart, $z = 7.33$, $p < 0.001$.⁴ The means for each condition

³Dummy coding compares each level to a baseline, in this case the No-Src condition; however, qualitatively similar results obtained under ANOVA-style deviation coding, which compares the means of each level against the grand mean.

⁴This is one instance where choice of contrast coding mattered. In ANOVA-style deviation coding, where the No-Src condition was again treated as the baseline for deviation, Src-Pres elicited more non-speaker responses than the grand mean ($M = 73\%$, $SE = 2$), $z = -8.15$, $p < 0.001$, but Src-Past did not, $t < 1$. However, we concentrate on dummy coding here, as it coheres best with evaluating the predictions against

are shown in Figure 1. Note that the response pattern supports our basic predictions. First, TFRs do not, by themselves, mandate a shift to a Non-speaker commitment. Second, the more cues that are available, the more likely the shift.

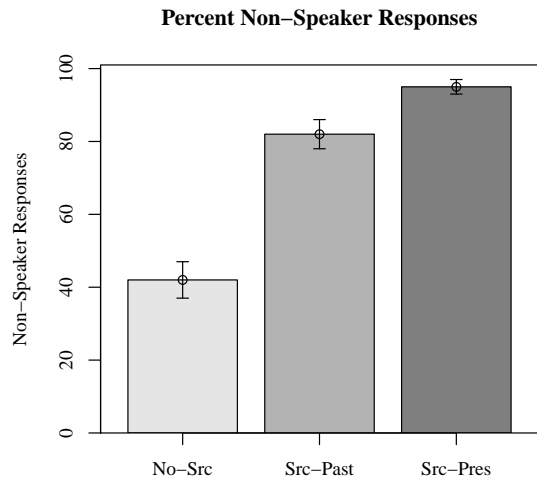


Figure 1: Percent Non-Speaker Responses.

We may also fit the data to a model containing the Role (Speaker, Hearer) of the participant as a predictor (random effect structures were simplified to by-subjects and by-items random intercepts in order allow the model to converge). As before, we find more NSpO responses for Src-Past than the No-Src baseline, $z = 6.27$, $p < 0.001$, and additional NSpO responses for Src-Pres over Src-Past, $z = 6.16$, $p < 0.001$. We also find a small (and possibly spurious) main effect of Role, such that those in the Speaker role ($M = 74\%$, $SE = 3$) selected NSpO responses more often than those in the Hearer role ($M = 71\%$, $SE = 3$). This effect is likely to be driven by the 20% increase in the No-Src condition, as there were actually *fewer* NSpO responses for Speakers in the Src-Past condition ($d = -10\%$, with a significant interaction, $z = -2.78$, $p < 0.01$), and no difference whatsoever in the Src-Pres condition, illustrated in Figure 2. At the moment, we do not have a clear account for why participating in different roles may have yielded different behavior in the different sentence types. One possible explanation is that the Speakers failed to produce No-Src sentences with consistent prosody.

One of the benefits of this paradigm is that it provides a measure of Speaker-Hearer agreement. In general, there was a relatively high rate of

the data.

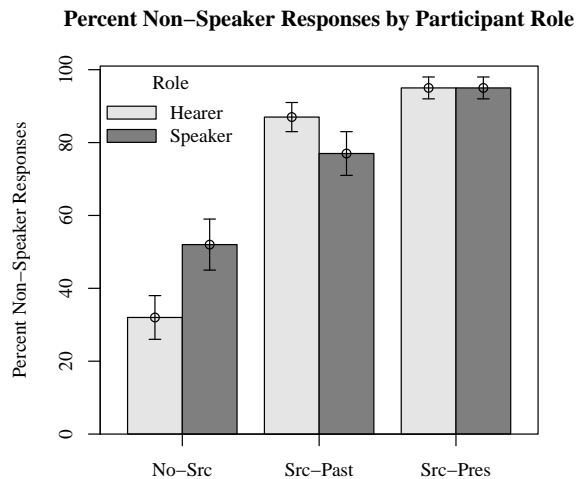


Figure 2: Percent Non-Speaker Responses by Participant Role.

agreement across the entire experiment (including unrelated manipulations) at rate of 62%, significantly above chance in a binomial test, $p < 0.001$. At 73%, the rate of agreement was in fact higher for the present manipulation. Interestingly, participants tended to agree more often on some conditions than others: Src-Pres elicited more agreement ($M = 90\%$, $SE = 4$) than the No-Src ($M = 60\%$, $SE = 6$) condition, $z = 3.47$, $p < 0.001$, which did not significantly differ from the Src-Past ($M = 70\%$, $SE = 6$) condition, $z = 1.25$; see Figure 3.

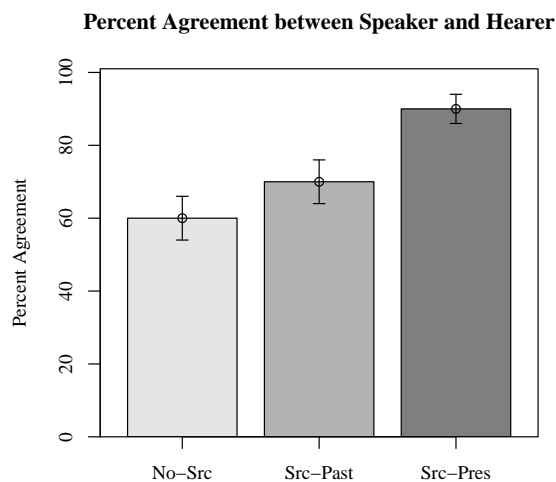


Figure 3: Percent Agreement between Speaker and Hearer.

Further, when participants agreed on the inter-

pretation, the NSpO response was selected at an even greater rate for Src conditions (Pres: $M = 100\%$, $SE = 0$; Past: $M = 95\%$, $SE = 3$; this 5% difference between Src conditions was not significant) compared to the No-Src condition ($M = 36\%$, $SE = 8$), $z = 3.79$, $p < 0.001$.

Although auditory recordings were made of the Speaker's performances, they have not been analyzed in detail. Our impression is that most Speakers simply read the text without giving it much expressive nuance. However, for the few participants who did expressively perform the text, we noted an interesting pattern: Speakers sometimes placed contrastive pitch accent on the source pronoun or the attitude verb, along with a slight pause before the term within the TFR, possibly indicating a quotational effect. We suspect that these intonational cues, among others, would positively correlate with a Non-Speaker interpretation of the TFR. We are currently investigating this issue within a corpus of more natural speech, such as conversations and news reports.

4.3 General discussion

We presented a two-person judgment experiment testing how the presence of a third person source and tense contribute to Non-Speaker interpretations of Transparent Free Relatives. Our findings support the conclusion that TFRs do not semantically signal Non-Speaker interpretations by themselves, as they are consistent with both Speaker and Non-Speaker interpretations. Rather, elements within the TFR serve as subtle, yet reliable, cues for commitment. Specifically, the presence of a Non-Speaker source is a reliable indicator of Non-Speaker commitment, an effect which is increased by the present tense, indicating a habitual, rather than episodic, stance with respect to the attribution described in the TFR. Further, these cues may be used very effectively to signal a shift away from Speaker commitment, as indicated by the high rate of agreement between Speaker and Hearer participants in the experiment.

5 Conclusion

Judgments regarding commitment may not be an all or nothing affair. Hearers rely on subtle pragmatic cues to infer Non-Speaker orientation. Although such interpretations are most likely *invited* inferences, in that they are not mandated by lexical or structural elements, they nevertheless present a

crucial component to full comprehension of text and dialogue. This study probed a few factors that give rise to Non-Speaker commitment within the understudied, yet ubiquitous, TFR construction, and showed that various cues work together to strengthen Non-Speaker commitment.

That multiple cues conspire to more effectively indicate Non-Speaker commitment makes intuitive sense. We suspect that deviating from the canonical assumption of Speaker commitment might be a risky endeavor, as the indicators of Non-Speaker commitment are not lexically encoded in English. Should the Speaker fail to successfully communicate her intentions, she runs the risk of being associated with the very point of view from which she wishes to distinguish herself. Thus, using multiple, possibly redundant, cues to cement Non-Speaker interpretations may ensure a greater likelihood of success.

The pragmatics of the TFR construction intuitively parallel issues often discussed in audience design, in that the terms that one uses for an object may reflect a particular conceptualization of that object (Brennan and Clark, 1996). Discourse participants understand that such conceptualizations may well vary, and a conceptual pact to use one mode of reference can be established through continued interaction, in a process called *lexical entrainment*. While the use of TFRs is, in a sense, more general than entrainment in that it applies to more aspects of linguistic communication than copresent reference, we fully expect that common principles govern them both. The case of TFRs is particularly interesting with respect to commitment, as the construction offers a systematic method for pairing a commitment with a source, which is especially important when the term is rich in perspectival information. Nevertheless, TFRs are just one of the many ways that speakers navigate potential disagreement between audience members. We expect that a multitude of cues which discourse participants use to adapt to differing perspectives overlap in the two cases. Understanding how these cues work together will hopefully help us develop more complete models of discourse, along with a richer notion of commitment.

Appendix

Experimental items are provided below. Only the Source-Present condition is given past item 1.

1. John gave Mary what (is called / he called / he calls) a beergarita.
2. Karen made what she calls a goulash.
3. Dylan picked up what he thinks is a rare diamond.
4. Megan ran over what she believes was a mutant rodent.
5. Paterson admitted to what he considers a heinous betrayal.
6. Ken told his boss about what he acknowledges was a grave mistake.
7. The artist sold what she considers her greatest achievement.
8. The television executive promotes what he calls edutainment.
9. The priest performed what he calls a shotgun marriage.
10. The judge condemned the defendant for what he calls a reckless act.
11. The producer released what he expects to be a one hit wonder.
12. The editor denounced what he thinks is a gross abuse of power.

Acknowledgments

This work has benefited greatly from discussions with Lyn Frazier, Chris Potts, and Carson Schütze. Part of this project was presented previously at the UCSD SemBabble group. Many thanks to Ivano Caponigro, Jonathan Cohen, Andrew Kehler and others there for their generous feedback. Thanks also to Mara Breen for her guidance on programming the experiment and to Adrian Staub for use of his lab space and support to run the experiment. Finally, the final version of the paper was improved by following the recommendations of three anonymous reviewers.

References

- R. Harald Baayen, Douglas J. Davidson, and Douglas M. Bates. 2008. Mixed-effects modeling with crossed random effects for subjects and items. *Journal of Memory and Language*, 59(4):390–412.
- Dale J. Barr, Roger Levy, Christoph Scheepers, and Harry J. Tily. 2013. Random effects structure for confirmatory hypothesis testing: Keep it maximal. *Journal of Memory and Language*, 68(3):255–278.
- Christine Bartels. 1997. *Towards a compositional interpretation of English statement and question intonation*. Ph.D. thesis, University of Massachusetts Amherst.
- Douglas Bates and Martin Maechler. 2009. lme4: Linear mixed-effects models using Eigen and Eigen. R package version 0.999375-31.
- Susan E. Brennan and Herbert H. Clark. 1996. Conceptual pacts and lexical choice in conversation. *Journal of Experimental Psychology: Learning, Memory, and Cognition*, 22(6):1482–1493.
- Joan Bresnan and Jane Grimshaw. 1978. The syntax of free relatives in English. *Linguistic Inquiry*, 9(3):331–391.
- Ivano Caponigro. 2003. *Free not to ask: On the semantics of free relatives and wh-words cross-linguistically*. Ph.D. thesis, University of California, Los Angeles, Los Angeles.
- Ronald Fagin, Joseph Y Halpern, Yoram Moses, and Moshe Y Vardi. 1995. *Reasoning about knowledge*. MIT Press, Cambridge, MA.
- Donka F. Farkas and Kim B. Bruce. 2010. On reacting to assertions and polar questions. *Journal of Semantics*, 27(1):81–118, 2.
- H. Paul Grice. 1978. *Further notes on logic and conversation*. Harvard University Press, Cambridge, MA.
- Alexander Grosu. 2003. A unified theory of standard and transparent free relatives. *Natural Language & Linguistic Theory*, 21(2):247–331.
- Christine Gunlogson. 2001. *True to Form: Rising and Falling Declaratives as Questions in English*. Ph.D. thesis, University of California, Santa Cruz, Santa Cruz.
- Christine Gunlogson. 2008. A question of commitment. *Belgian Journal of Linguistics*, 22:101–136.
- Charles L. Hamblin. 1970. *Fallacies*. Methuen and Co, London, UK.
- Charles L. Hamblin. 1971. Mathematical models of dialogue. *Theoria*, 37(2):130–155.
- Jesse A. Harris and Christopher Potts. 2009. Perspective-shifting with appositives and expressives. *Linguistics and Philosophy*, 36(2):523–552.

- Jesse A. Harris and Christopher Potts. 2011. Predicting perspectival orientation for appositives. In *Proceedings from the 45th Annual Meeting of the Chicago Linguistic Society*, volume 45, pages 207–221, Chicago, IL. Chicago Linguistic Society.
- Jesse A. Harris. 2012. *Processing perspectives*. Ph.D. thesis, University of Massachusetts Amherst, Amherst, MA.
- Peter Lasnik. 2005. Context dependence, disagreement, and predicates of personal taste. *Linguistics and Philosophy*, 28(6):643–686.
- Isaac Levi. 1991. *The fixation of belief and its undoing: Changing beliefs through inquiry*. Cambridge University Press.
- Stephen C. Levinson. 2000. *Presumptive meanings: The theory of generalized conversational implicature*. The MIT Press, Cambridge, MA.
- David Lewis. 1969. *Convention. A philosophical study*. Harvard University Press, Cambridge, MA.
- Sophia Malamud and Tamina Stephenson. 2011. Three ways to avoid commitments: Declarative force modifiers in the conversational scoreboard. In *Proceedings of the 15th Workshop on the Semantics and Pragmatics of Dialogue*, pages 74–83.
- Christopher Potts. 2005. *The Logic of Conventional Implicatures*. Oxford Studies in Theoretical Linguistics. Oxford University Press.
- Doug Rohde. 2003. Linger. Computer Program.
- Carla Schelfhout, Peter-Arno Coppen, and Nelleke Oostdijk. 2004. Transparent free relatives. In *Proceedings of ConSOLE XII*.
- Mandy Simons. 2007. Observations on embedding verbs, evidentiality, and presupposition. *Lingua*, 117(6):1034–1056.
- Carlota S. Smith. 2003. *Modes of Discourse: The local structure of texts*. Cambridge University Press, Cambridge, UK.
- Robert Stalnaker. 2002. Common ground. *Linguistics and Philosophy*, 25(5):701–721.
- Chris Wilder. 1998. Transparent free relatives. *ZAS Papers in Linguistics*, 10:191–199.