

Is working memory sensitive to at-issueness? Experimental evidence from at-issue appositives

Margaret Kroll & Matt Wagers
University of California, Santa Cruz

Introduction This project presents new experimental evidence that challenges a view of discourse processing in which at-issue and not-at-issue content rely on different sets of working memory resources. Under the assumption that restrictive relatives and appositives differ in contributing at-issue and not-at-issue content, respectively, a recent finding by Dillon et al. that acceptability ratings are much more sensitive to the length of restrictive relatives than to the length of appositives supports a model of discourse processing in which the parsing operations that construct at-issue and not-at-issue content proceed independently [1, 2]. However, the assumption that appositives always contribute not-at-issue content is challenged in corpus and experimental work showing that appositives can sometimes be interpreted as at-issue [3, 4]. We present a new experimental design to control the at-issue status of appositive content, allowing us to directly test whether it is the at-issue status of appositives and restrictive relatives that is driving the observed acceptability differences. We find that, counter to the predictions of Dillon et al., acceptability ratings show the same sensitivity to appositive length whether the appositive contributes not-at-issue *or* at-issue content. We argue that the observed acceptability differences between restrictive relatives and appositives cannot be attributed to the not-at-issue status of appositive content, and offer an alternative explanation in which the differences are attributed to the burdening of particular prosodic domains.

Background The at-issue/not-at-issue distinction splits utterance content into primary and secondary information, respectively [2, 5, 6]. Not-at-issue content consists of projective meaning that does not contribute to resolving the current Question Under Discussion (QUD) [7, 8, 9]. It traditionally includes presuppositions, appositives, and parentheticals. Potts [2] influentially proposed that at-issue and appositive content are logically and compositionally independent. Subsequent work has complicated this view by demonstrating that appositive content can often behave as at-issue, such as appositives' ability to be targeted by polarity response particles [3, 4] and their failure to project in certain environments [10]. These observations suggest that appositives can sometimes be interpreted as contributing at-issue content [3, 4, 6].

Dillon et al. [1] show that the contribution of appositives to the perceived complexity of their embedding clause is less than the contribution of a comparable restrictive relative. To illustrate, adding the bolded material in (1) inside a restrictive relative decreases the acceptability of the entire sentence more so than adding the bolded material inside an appositive in (2).

- (1) The fox that is reading a poem **the host highly recommended** is sitting on the ottoman.
- (2) The fox (who is reading a poem **the host highly recommended**) is sitting on the ottoman.

Dillon et al. conclude that the parsing operations that construct not-at-issue structures consume resources independently from those that construct at-issue main clauses. The authors show in a series of follow-up experiments that this interaction effect is not due to attentional differences nor due to retrieval interference at the main verb.

Current Study While Dillon et al. rely on the canonical status of appositives as contributors of not-at-issue content, recent work suggests that appositive constructions **can** contribute at-issue content. We use this observation to probe the claim that the acceptability differences observed in sentences like (1)-(2) are due to the (not-)at-issue status of the appositive clause: **If the length effect in appositives is attenuated because of the clauses' not-at-issue status, then we expect the effect to strengthen when the appositive is interpreted as at-issue.**

Experiment 1 Exp. 1 extends the Dillon et al. findings. It used materials adjusted to more closely match syntactic structures across content types, a different subject pool, and different fillers. We found that when sentences are presented in out-of-the-blue contexts, adding additional length to a restrictive relative clause led to a greater decrease in the acceptability of the containing sentence than adding length to an appositive clause in a corresponding sentence (an interaction effect of sentence length and clause structure type, $p < .01$; $N_{\text{subj}} = 24$, $N_{\text{items}} = 24$). This finding is consistent with the Dillon et al. results.

Experiment 2 Exp. 2 directly tests whether the observed acceptability effects are affected by the at-issue status of appositives. To do this, we embedded target sentences in a multi-exchange discourse organized as a simulated text message exchange between two interlocutors. For each item, the target sentence was presented as one interlocutor's answer to an explicit question from the other interlocutor. The design utilizes two observations: 1) only at-issue content can address the current QUD; and 2) appositive relative clauses are able to address part of a coordinated-question QUD [11], and in doing so contribute at-issue content. Exp. 2 uses a 2x2x2 design that crosses the conditions LENGTH (*long* and *short* sentences), STRUCTURE type (*parenthetical* and

FIGURE 1. EXPERIMENT 2 PARTIAL ITEM EXAMPLE

Condition	QUD	Short Parenthetical
At-issue	Where is the bear standing and what is it wearing?	The bear (who is standing on the ball) is wearing a hat.
Not-at-issue	What is the bear wearing?	

restrictive), and AT-ISSUENESS of the appositive clause (*not-at-issue* and *at-issue*). The at-issue status of appositives was controlled for by varying whether the target sentence appeared as the answer to a single QUD (not-at-issue condition) or to a

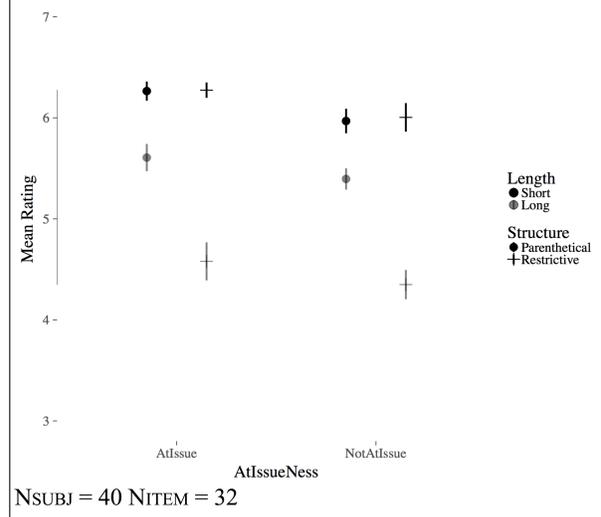
coordinated QUD (at-issue condition). Two conditions are exemplified in Figure 1.

We found main effects of LENGTH, STRUCTURE, and AT-ISSUENESS, and an interaction of LENGTH and STRUCTURE (all $ps < .001$). No other effects reached significance. Crucially, we found no interaction of LENGTH, STRUCTURE, and AT-ISSUENESS. As Figure 2 shows, **no length effects were affected by AT-ISSUENESS.**

Experiment 3 Exp. 3 is identical to Exp. 2 but uses items containing final appositives—appositives whose matrix anchor is an object—instead of medial appositives. Final appositives have been argued to more easily contribute at-issue content [11]; therefore, these items constitute a stronger test than Exp. 2. Even so, the results for Exp. 3 show the same pattern of length effects that we found in Exp. 2.

Conclusion The contributions of this project are twofold: we develop a new methodology for studying at-issueness experimentally, and present evidence complicating the picture of discourse processing in which at-issue and not-at-issue content draw from separate resources in working memory. We show that, counter to predictions, at-issue appositives burden working memory to the same extent as not-at-issue appositives. We account for the acceptability differences between restrictive relatives and appositives by proposing that appositive prosody facilitates how input is chunked in short term memory *independently* of the at-issue status of the input material [12, 13, 14].

FIGURE 2. EXPERIMENT 2 MEAN RATINGS DATA



References [1] Dillon, B. et al. 2014. Pushed aside. [2] Potts, C. 2005. *The logic of conventional implicatures*. [3] Koev, T. and K. Syrett. 2014. Experimental evidence. [4] AnderBois, S. et al. 2011. Crossing the appositive/at-issue meaning boundary. [5] Chierchia, G. & McConnell-Ginet, S. 2000. *Meaning and grammar*. [6] Simons, M. et al. 2010. What projects and why. [7]

Roberts, C. 1996/2012. Information structure in discourse. [8] Ginzburg, J. 1996. Interrogatives. [9] Roberts, C. et al. 2009. Presupposition, conventional implicature, and beyond. [10] Potts, C. & J. Harris. 2009. Perspective-shifting with appositives and expressives. [11] Koev, T. 2013. *Apposition and the structure of discourse*. [12] Redeker, G. 2006. Discourse markers as attentional cues. [13] Fodor, J.D. 2002. Prosodic disambiguation in silent reading. [14] Drury, J.E. et al. 2016. Punctuation and implicit prosody in silent reading.