

Prosodic distance iconically disrupts causal inferencing

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Understanding a discourse, and sometimes even a single sentence, means figuring out what relationships hold between the events or situations in the text. Many different relations have been posited to link events in discourse (Asher & Lascarides, 2003; Kehler, 2002; *inter alia*), though it has been argued that causal relations are inferred by default (Sanders, 2005). Causal interpretations can arise in the absence of causal connectives, as in the enrichment of *and* to mean *and so* (Grice 1975; cf. Txurruka 2003). However, in sentences like (1), the availability of this enrichment is undermined by the 2nd complementizer: i.e., the inference that the mayor's election caused the rioting is drawn more easily without the 2nd *that* (Bjorkman, 2010, 2013). Experiments on causal inference using written materials show evidence for this effect (Tyler, Rohde, & Carlson 2015). Bjorkman provides a syntactic account of the effect whereby the presence of the 2nd complementizer enforces a larger syntactic structure, conjoined CPs instead of IPs, and the non-causal interpretation (the newspaper reporting two unrelated events) is only permitted in this larger structure. Alternatively, the effect could be explained iconically, with *that* adding distance between the conjoined clauses and leading to the assignment of a less close/default, non-causal relation. The iconic account predicts that additional distance—like that provided by a prosodic boundary—would undermine causal interpretations; Bjorkman's account only predicts differences for manipulations at the syntactic level.

The current experiment tests auditory versions of sentences like (1) and finds that a major prosodic boundary before the second clause facilitates non-causal interpretations, which is most consistent with the iconic theory. The design crosses the presence/absence of the 2nd *that* with the presence/absence of an Intonational Phrase boundary (consisting of a continuation rise L-H% and pause) after *and*. Items (N = 24) consisted of 4 pairings of recordings as in (2). Participants (N = 63) played the 2 sentences and chose which sentence best conveyed a causal relationship between the conjoined clauses (i.e., for (1), they answered the question *Which sentence is more likely to mean that the mayor's election caused the riot?*). In keeping with the iconic account, causal interpretations were affected by the presence of a prosodic break: for the pairings (2b) and (2c), the first version (without the break) was preferred (significant intercept in logistic regressions modeling sentence choice for the pair in (2b): $\beta=.459$, $p<.01$, and the pair in (2c): $\beta=.382$, $p<.01$). Sentence preference did not vary significantly with the presence/absence of the 2nd *that* (no significant intercept for models of (2a) or (2d)). The presence of *that* may be more obvious in writing than speech, where it is quite reduced (142 ms average duration).

The overall findings suggest that the presence of *that* is just one way to introduce semantic distance between clauses, but that such distance can also be achieved prosodically. A major prosodic boundary in speech affected interpretation by reducing causal inferences very much as *that* did in written language, supporting an iconic account of both effects. This result is also interesting because prosodic boundaries usually affect interpretation at the level of syntactic attachment (Cutler, Dahan, & van Donselaar 1997; Watson & Gibson 2005; etc.). In both the prior work on *that* and these new prosodic findings, it is notable that elements which do not carry much inherent semantic content (an optional complementizer or a break in speech) can affect interpretation at the level of causal inference in establishing discourse coherence.

(1) The newspaper reported that the mayor was elected and (that) there was a riot.

- (2) a. [No That, No Break] vs. [With That, No Break]: test for effect of *that*
b. [No That, No Break] vs. [No That, With Break]: test for effect of break
c. [With That, No Break] vs. [With That, With Break]: test for effect of break given *that*
d. [No That, With Break] vs. [With That, With Break]: test for effect of *that* given break

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