

Quantified Coherence Relations and Donkey Anaphora

Ezra Keshet

Coherence Relations Researchers since Hobbs (1979) have proposed that an important part of understanding a multi-sentence discourse such as (1) is understanding the (often unspoken) relationship between the various sentences (see also Kehler 2002 and Asher & Lascarides 2003). For instance, the two-sentence texts in (1) are most easily understood as in (2), where the so-called **EXPLANATION** and **RESULT** relations are paraphrased overtly. Such relations are known as *coherence relations* since they facilitate an overall coherent discourse.

- (1) a. John broke his arm. He slipped on the ice. [EXPLANATION]
b. Bill was late for class. He was punished with detention. [RESULT]
- (2) a. John broke his arm because he slipped on the ice.
b. Bill was late for class, and therefore he was punished with detention.

Embedding The first goal of this paper is to show cases where coherence relations embed, especially under quantifiers. Most theories of coherence relations allow relations to embed under certain operators, such as negation and attitude reports:

- (3) John broke his arm.
a. He didn't slip on the ice, though.
b. Mary said he slipped on the ice.

Rohde, Levy, & Kehler (2011) report that a coherence relation may hold between a relative clause and the sentence in which it appears:

- (4) John detests the coworkers who are arrogant and rude.
→ John detests them because they are arrogant and rude. [EXPLANATION]

These cases, like the unembedded cases, could arguably just involve reasoning about actual events and states in the world. Even the modal in (3-b) could potentially be analyzed as simply denoting evidential marking on the event of slipping. The new contribution of this paper is the observation of cases where coherence relations hold between the restriction and the nuclear scope of a quantifier, as shown in (5) and (6):

- (5) Every time I get an 'A' one day, ...
a. ... I get a 'B' the next day. [PARALLEL]
b. ... my GPA goes up the next day. [RESULT]
- (6) a. Everyone who ate the shellfish got food poisoning. [RESULT]
b. No one who drinks Pomegranate juice regularly dies young. [RESULT]

These cases are much more abstract than the previous ones, requiring a hearer to consider the same coherence relation holding over a range of related situations, events, or states. And yet, similar coherence effects still arise in these more abstract cases, pointing to the potential that coherence resolution might occur locally, within an embedded clause.

Pronouns Kehler, Kertz, Rohde, & Elman (2008) present experimental results strongly supporting the hypothesis that pronoun resolution is driven largely by coherence resolution. For instance, consider the following clause and its potential continuations:

- (7) Samuel threatened Justin with a knife, and
- a. ... Erin blindfolded him (with a scarf). [PARALLEL]
 - b. ... Erin stopped him (with pepper spray). [RESULT]
 - c. ... he blindfolded Erin (with a scarf). [PARALLEL]
 - d. ... he alerted security (with a shout). [RESULT]

When presented with sentences such as these and asked to resolve the pronouns, participants overwhelmingly chose the pronoun referent most compatible with the coherence relation holding between the two clauses. This paper observes similar effects in quantified versions of the sentences above, which contain so-called donkey pronouns (*he* or *him*) in their main clauses:

- (8) Whenever a man threatens another man with a knife,
- a. ... An accomplice blindfolds him (with a scarf). [PARALLEL]
 - b. ... Security else stops him (with pepper spray). [RESULT]
 - c. ... he blindfolds someone else (with a scarf). [PARALLEL]
 - d. ... he alerts security (with a shout). [RESULT]

Even though these cases do not have well-defined individuals for the pronouns to refer back to, similar effects are seen. The PARALLEL cases bias the pronouns to refer to the parallel individual in the first clause (object to object, subject to subject) while the RESULT cases reverse this bias (due to the way the examples were constructed).

Analysis I propose that the process of coherence resolution may change the assignment function used to give denotations to pronouns. At the sentence level, this process leads to the effects observed by Kehler et al. (2008). Within a sentence, this process may change the assignment function more dynamically, for instance resolving a pronoun to denote an individual bound in a previous clause. This leads to the effects shown in (8), where a pronoun such as *he* in (8-d) can denote the same individual as the bound trace of the phrase *a man* from the previous clause in order to facilitate a RESULT coherence relation between the two clauses.

The main advantage that this analysis holds over E-type, DRT, and Dynamic Semantics analyses of donkey anaphora comes in explaining the tight connection between coherence resolution and pronoun resolution. For instance, one mystery of donkey anaphora is the so-called Indistinguishable Participants problem (Heim 1991), exemplified by the following sentence:

- (9) When a bishop meets a/nother bishop on the road, he blesses him.

Although meeting someone on a road is a symmetrical relation, we get a feeling that the pronoun *he* refers to the subject-position bishop, and that *him* refers to the object-position bishop. The analysis pursued here explains this as the result of satisfying a PARALLEL relation between the *when*-clause and the main clause of (9).