There is growing evidence that discourse representations may vary in the detail they encode, and may sometimes be underspecifed (e.g., Ferreira, Ferrara, & Bailey, 2002; Sanford, 2002; Sanford & Sturt, 2002).

We investigated underspecifion in relation to anaphoric reference. Poesio, Reyie, and Stevenson (2003) proposed that anaphoric underspecifion may occur if (a) the potential antecedents are part of a single mereological structure, and (b) the structure makes the interpretations equivalent. For example, in sentence (1a), the potential antecedents (engine and boxcar) are part of a single mereological structure (i.e., a train). Using ‘it’ to refer to any of these entities (engine, boxcar, or train) is equivalent, as hooking up the objects means they are all going to London. Poesio et al. conducted an offline study, comparing the acceptability of sentences like (1a) and (1b):

(1a) The engineer hooked up the engine and the boxcar and sent it to London.

(1b) The engineer saw the engine and the boxcar and sent them to London.

Examples like (1a) were judged as being more acceptable than (1b), in which the two potential antecedents (engine and boxcar) are part of a different mereological structure, (i.e., a train in (2a), compared to no natural object in (2c)).

We further investigated Poesio et al.’s findings by assessing disruptions in processing using eye-tracking. Previous research has shown that when two potential antecedents of a singular pronoun occur in a coordinated NP, a processing difficulty results (i.e., a conjunction cost, Albrecht & Clifford, 1998). This difficulty is expected in (2a) and (2b), at, or following the pronoun ‘it’. The goal of this experiment will be to confirm the result by Poesio et al. that this difficulty disappears when the antecedents are part of a mereological structure, as in (2a) and (2c). An additional hypothesis was that underspecifion may only be licensed when the two NPs form a natural object when conjoined (i.e., a train in (2a), compared to no natural object in (2c)).

Forty-eight participants had their eye movements monitored while they read sentences that were either mereology constructing (2a and 2c) or neutral (2b and 2d), in which the two entities described in the sentence conjoined to make a natural object (i.e., a train in 2a and 2b), or not (i.e., no natural object as in 2c and 2d), and in which reference to the NPs was either singular or plural (vs them):

(2a) Mereology constructing/natural object/singular or plural

(2b) Neutral/natural object/singular or plural

There were many delays,

The manager stapled together the revised timetable, and sent it to the central station.

He hoped things would improve soon.

There were many delays,

The manager stapled together the letter of complaint and the revised timetable, and sent them to the central station.

He hoped things would improve soon.

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Data for each region were subjected to two 2(mereology constructing vs neutral) x 2(natural object vs no natural object) x 2(singular vs plural anaphor) within participants ANOVAs.

Pronoun region (Region 4)

Structure x anaphor type interaction in first pass regressions out (F1 = 3.58, p = .065; F2 = 3.80, p = .057). For it sentences: neutral > mereology constructing (F1 = 10.48, p<.01; F2 = 5.50, p<.05). For them sentences: no significant differences (Fs<1).

This is in line with singular reference being underspecified for mereology constructing sentences, but there being a conjunction cost for neutral sentences. It is also possible that it refers to the new discourse object created in mereology constructing sentences. This effect occurred regardless of whether the two NPs formed a natural object when conjoined.

First pass, regression path, and total times showed longer reading times for them than it sentences, probably due to different region lengths.

Adverb (Region 5)

No significant first pass or regression path effects (Fs<1.6). Fewer regressions out for it than them sentences (F1 = 12.75, p < .01; F2 = 11.96, p<.01). Shorter total reading times for mereology constructing than neutral sentences (F1 = 7.81, p < .01; F2 = 8.13, p<.01).

Fewer regressions in for mereology constructing than neutral sentences (F1 = 17.51, p<.01; F2 = 14.46, p<.01), and a sentence structure x object type interaction (F1 = 4.87, p<.05; F2 = 3.79, p = .058). For neutral object sentences: mereology constructing < neutral (F1 = 18.88, p<.01). For no natural object sentences: no difference (F<2.8). This interaction was mirrored in second pass reading times.

This interaction could suggest that objects that naturally go together are easier to represent when they are joined than when they are not joined. When objects don’t naturally go together, it doesn’t matter whether they are joined or not, in terms of how they are represented.

Final region (Region 6)

First pass and total reading times showed no robust effects. Structure x anaphor type interaction in regression path times (F1 = 8.79, p<.01; F2 = 6.71, p<.05). For it sentences: neutral > mereology constructing (F1 = 10.45, p<.01; F2 = 5.50, p<.05). For them sentences: no significant differences (Fs<1). This interaction was also found in regressions out of Region 4.

Fewer regressions out of mereology constructing than neutral sentences (F1 = 3.85, p = .056; F2 = 3.78, p = .058). Sentence structure x object type interaction in regressions out (F1 = 3.46, p = .069; F2 = 3.06, p = .087). For neutral object sentences: mereology constructing < neutral (F1 = 6.73, p<.05; F2 = 7.23, p<.05), for no natural object sentences: no difference (F<1). This interaction was also found for regressions in and second pass times for Region 5.

Change detection study

Text change detection has recently been used to study depth of semantic processing (e.g., Sanford & Sturt, 2002). In this task, participants have to detect changes across two consecutive presentations of a piece of text. This study examined whether participants would detect the word ‘them’ changing to the word ‘it’.

MC stimuli: The engineer hooked up the engine and the boxcar and sent them to London.

Neutral stimuli: The engineer saw the engine and the boxcar and sent them to London.

28 participants, 16 items, 84 filler items (52 with no change, 32 with random changes).

Predictions: If the meaning of ‘it’ is underspecified in the MC condition, participants should detect fewer changes from ‘them’ to ‘it’ in the MC condition than in the Neutral condition.

Results: Participants correctly detected more changes in Neutral than MC condition, t1 = 2.15, p<.05; t2 = 2.18, p<.05. If you remove participants who had scores of zero in both conditions: Neutral > MC, t1 = 2.27, p<.05; t2 = 2.18, p<.05.

References


