



Background: Two Views on Antecedent Contained Deletion (ACD)

(1) Sarah will read every newspaper that Katie will.

View 1: The QR Hypothesis (Sag, 1976, etc.)

Assumptions:

- (a) Semantic combinatorics are such that a VP meaning must be understood at the "ellipsis site"; for example, if [[will]] requires an <e,t> complement.
- (b) The meaning (or representation) must be supplied as the meaning (or representation) of some overt linguistic expression.

The problem:

No overt VP can supply the "missing meaning" (or representation). It can't be the (surface) matrix VP, because of the antecedent containment paradox.

The solution:

- QR: *every newspaper that Katie will* can raise, giving matrix VP [read t]
- Meaning is supplied as "missing" material in ellipsis site

View 2: The Transitive Verb (Phrase) (TVP) Ellipsis Hypothesis (often embedded in Categorical Grammar; Cormack, 1984; Jacobson, 1992a, 1992b, 2003, etc.)

Semantic composition of (2) involves just composing the 2-place relation [[read]] with [[will]] (e.g., Steedman, 1989)

(2) Sarah will read every newspaper that Katie will read.

- Composition of (1) is parallel.
- All that is "missing" and needs to be supplied is the 2-place relation [[read]] which is available as the meaning of the transitive verb in matrix

Under this view, ACD does not necessitate QR

Apparent new evidence for the QR Hypothesis

Hackl, Koster-Hale and Varvoutis (2012, HKV) provided new evidence for QR from on-line reading times and from off-line acceptability judgments

Analyses of HKV's data demonstrate that the critical effects were not statistically significant, contrary to HKV's reported results (Gibson, Mahowald, Piantadosi & Levy, in submission).

HKV's acceptability judgments were replicated in Gibson, Jacobson, Piantadosi, Mahowald, Fedorenko & Graff (in press). We focus here on those.

HKV assumptions:

- Processor takes minimal steps needed to compute a meaning
- [[read]] is of type <e,<e,t>>. Hence, if processor encounters an object of type e following *read*, no QR needed
- If the processor encounters an object of type <<e,t>> following *read*, then QR is needed
- Reanalysis is costly (and so would degrade acceptability)
- ACD involves VP Ellipsis (or supplying of a VP meaning), not TVP Ellipsis

Prediction: (3) should have higher acceptability than (4).

(3) Sarah read every book that Katie did. (4) Sarah read the book that Katie did.

- For (3), the processor applies QR as soon as it encounters *every*
- For (4), QR is not applied when *the* is encountered
- Later, the processor encounters an ellipsis site
 - It tries to resolve the ellipsis;
 - Matrix VP is already available for *every* in (3);
 - Not so for *the* in (4), so QR/reanalysis must be performed to resolve ellipsis.

Therefore, ACD with *the* should have lower acceptability ratings.

This prediction was borne out.

An alternative explanation for the HKV Effect: the "sameness" hypothesis

Greater acceptability with *every* over *the* has nothing to do with QR

The "sameness" hypothesis: (developed in Gibson, Jacobson, Piantadosi, Mahowald, Fedorenko & Graff, in press)

There is a pressure with *the* but not with *every* to highlight the "sameness" of the events – by insertion of *also* or *the same*

Independent evidence for the sameness hypothesis (Kaplan, 1984, and the literature on "Maximize Presupposition"):

(5) a. ??Katie reads *The New York Times*, and Sarah does/reads it.
 b. Katie reads *The New York Times*, and Sarah does/reads it too.

- However, the pressure for *too* disappears if some independent connection – such as a causal connection – can be established between the two events:

(6) Sarah reads *The New York Times*, because Katie does/reads it.

Hypothesis 2: The reason that the pressure is less with *every* than with *the* is because it is easier to establish a causal connection with *every*

Evidence for the "sameness" hypothesis over the QR hypothesis

1. No Ellipsis; Same Verb

Prediction of the "sameness" hypothesis: Advantage for *every* over *the* should persist with no ellipsis if the relative clause contains the same verb: (7a) should be better than (7b):

(7) a. Sarah will read every newspaper that Katie will read.
 b. Sarah will read the newspaper that Katie will read.

Prediction of the QR Hypothesis: No advantage for *every* over *the* in (7). Because there is no ellipsis, nothing would ever force QR with *the*.

Forestalling a reply: Apparent HKV reasoning for not testing same verb condition:

- The processor might supply the deaccented prosody for *read*
- That in itself would force QR to license the deaccenting (i.e., the processor must find another VP of the form *read t* when *read t* in the relative clause is read deaccented)
- Hence the same-verb condition is just like ACD; *every* should have advantage over *the*.

But this logic is circular:

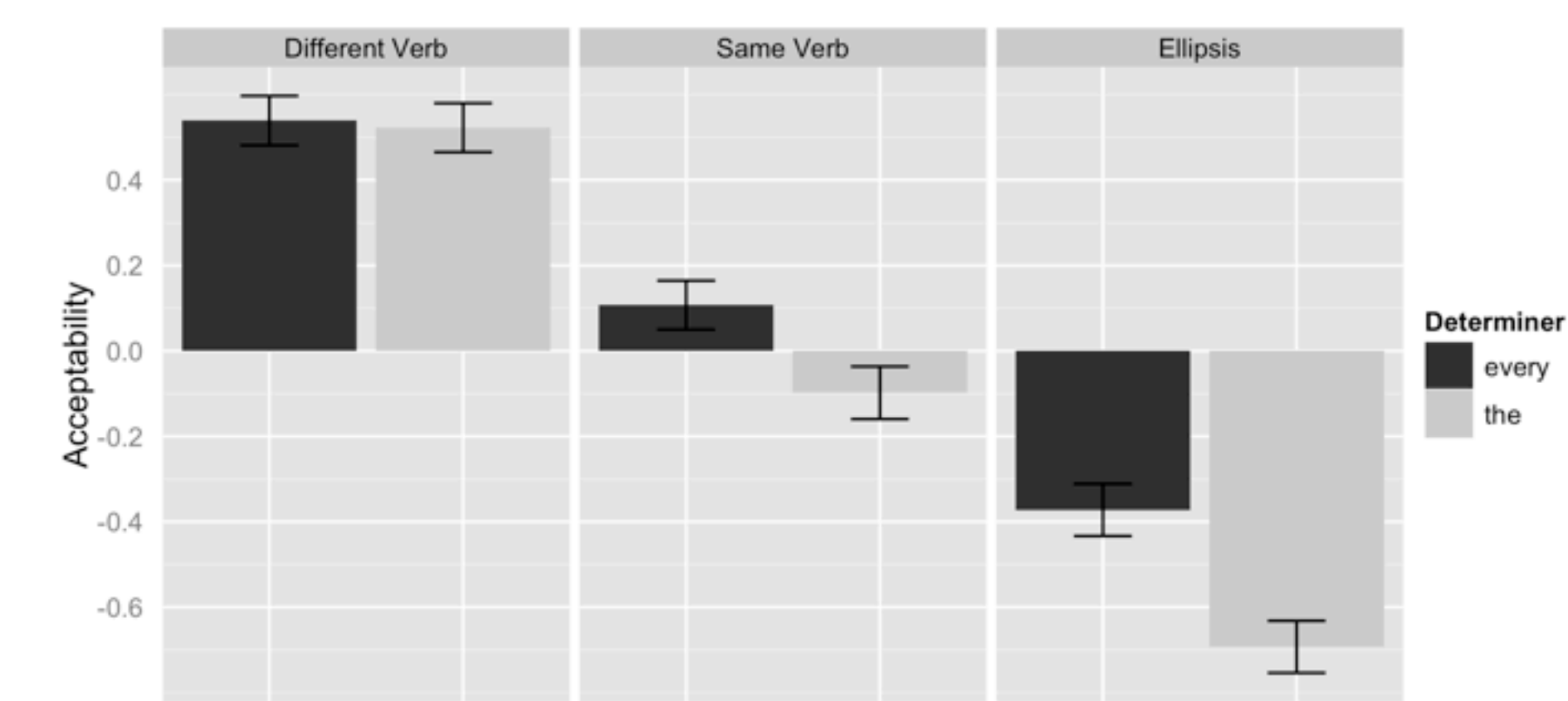
- A. Suppose deaccenting requires identical meanings/LF of the VP and some other VP. Then the conditions for deaccenting are not met; the processor did not supply deaccented prosody; meaning can be computed without deaccenting. *I.e. In that case, the processor cannot know to deaccent without having computed the meaning!*
- B. Suppose just encountering identical verb triggers deaccenting. Then QR is not needed for deaccenting! Identity at the lexical level is good enough.

Gibson et al. (in press): Experiments 1/2:

Determiner (every, the) x Ellipsis type (ellipsis, different-verb, same-verb)

The understaffed general hospital was negotiating with ...
every / the doctor that the nonprofit medical organization *was / funded / was negotiating with*

60 items (edited versions of HKV's Experiment 1/2 items); 90 M Turk subjects each



Predicted only by sameness:

Determiner and ellipsis type interact for same vs. different verb

Conclusion: the "sameness" hypothesis is supported, not QR

2. Ellipsis with insertion of *also*

Prediction of the "sameness" hypothesis: *every* should have no advantage over *the* when *also* is present:

(8) a. Sarah read the book that Katie also did.
 b. Sarah read every book that Katie also did.

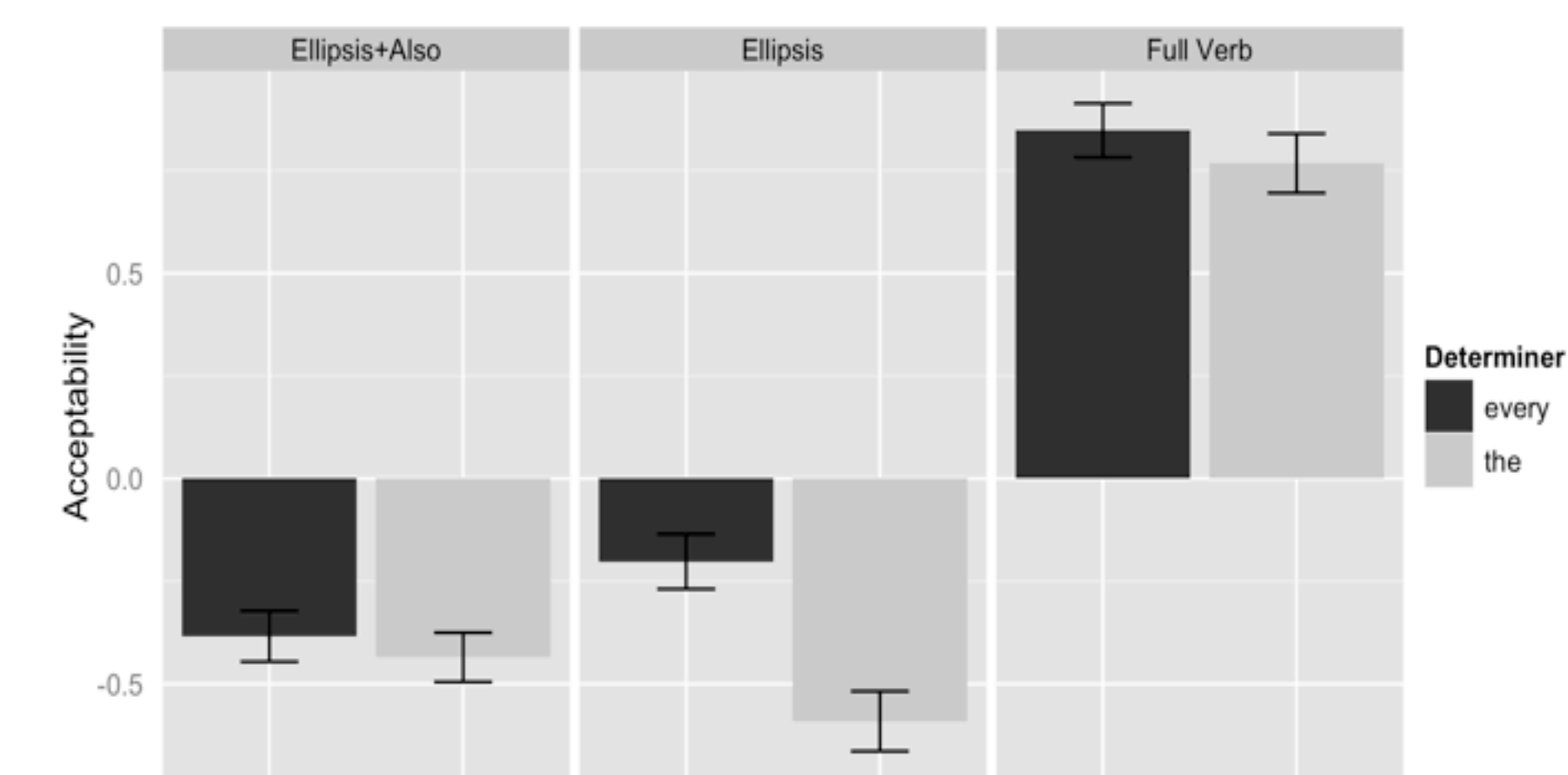
Prediction of QR Hypothesis: Advantage for *every* over *the* should persist.

NOTE: Under some views, *also* would trigger QR. Hence: QR is triggered before encountering ellipsis site. This is irrelevant. Reanalysis is still required in the *the* and not in the *every* condition; the reanalysis just takes place earlier (on encountering *also*).

Gibson et al. (in press) Experiment 3:

Determiner (every, the) x Ellipsis type (ellipsis, ellipsis+also, full verb)
 The understaffed general hospital was negotiating with *every / the* doctor that the nonprofit medical organization *was / also was / was negotiating with*.

60 items; 60 subjects; Z-scored ratings: 1 (extremely unnatural)-5 (extremely natural)



Ratified predictions of the sameness hypothesis:

- Determiner and ellipsis type interact for ellipsis vs. full verb
- Determiner and ellipsis type interact for ellipsis vs. ellipsis+also (a different baseline)

Open Question: Why the use of *also* actually degrades the stimuli with *every*. Insertion of *also* in (6) also appears to degrade the sentence; this needs verification.

Why is there no pressure to insert *also* in the *every* condition?

Hypothesis 2: The reason that the pressure is less with *every* than with *the* is because it is easier to establish a causal connection with *every*

See, e.g., (5) vs. (6)

Claim: speakers tend to establish a causal connection in the *every* condition and not in the *the* condition. Call this the "copycat" reading.

(9) a. Bill read *every/the* book that Mary read.
 b. Mary read *Crime and Punishment*.
 c. Bill reads the *Crime and Punishment* because Mary did.

Prediction: Speakers will rate (c) more likely in the *every* condition than in the *the* condition.

New Experiment:

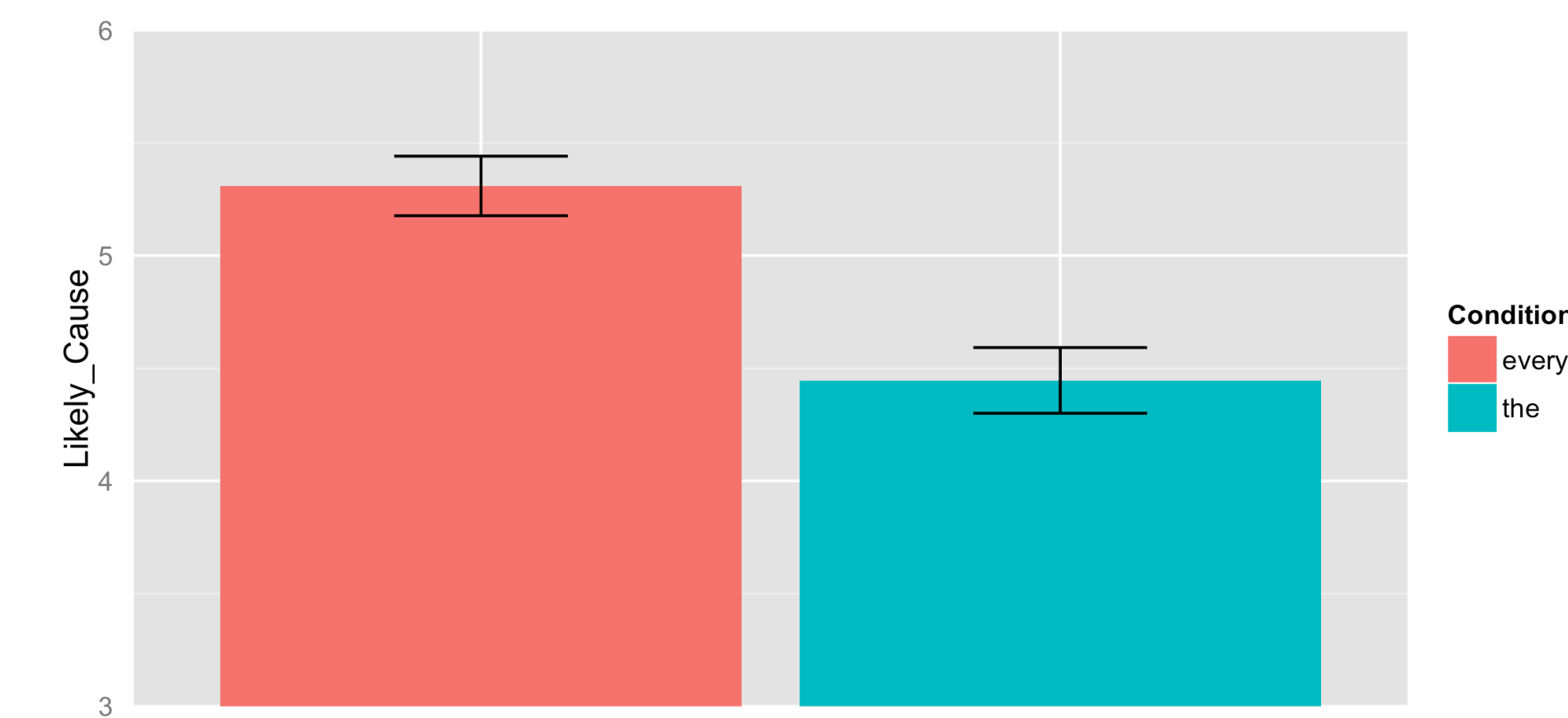
Rate the likelihood of the causal statement, given the context text.

John read *the / every* book that Mary read. Mary read *Crime and Punishment*.
 How likely is the following causal statement?

John read *Crime and Punishment* because Mary read *Crime and Punishment*.

Ratings: 1 (extremely unlikely) – 7 (extremely likely)

20 items; 40 M Turk subjects



The prediction of hypothesis 2 was ratified.

Background: HKV's Experiment 2 with "Large Ellipsis"

HKV conducted a second experiment with ellipsis in embedded contexts. Focus here is on their Large Ellipsis condition

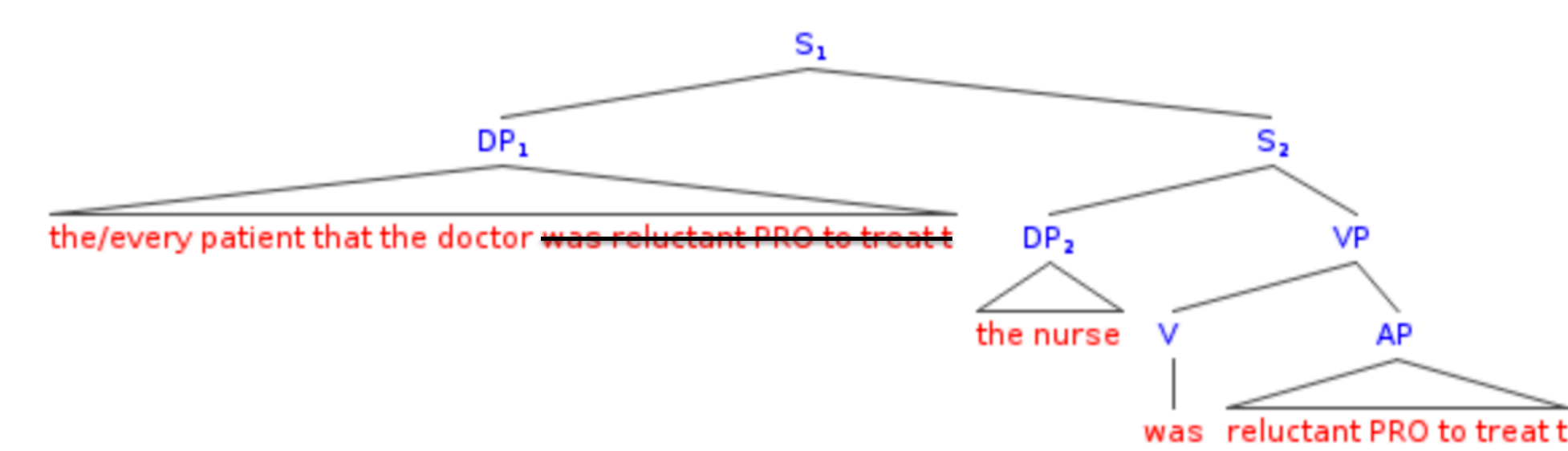
(10) The nurse was reluctant to treat the/every patient that the doctor was.

- ellipsis can be (understood as) *reluctant to treat (t)*

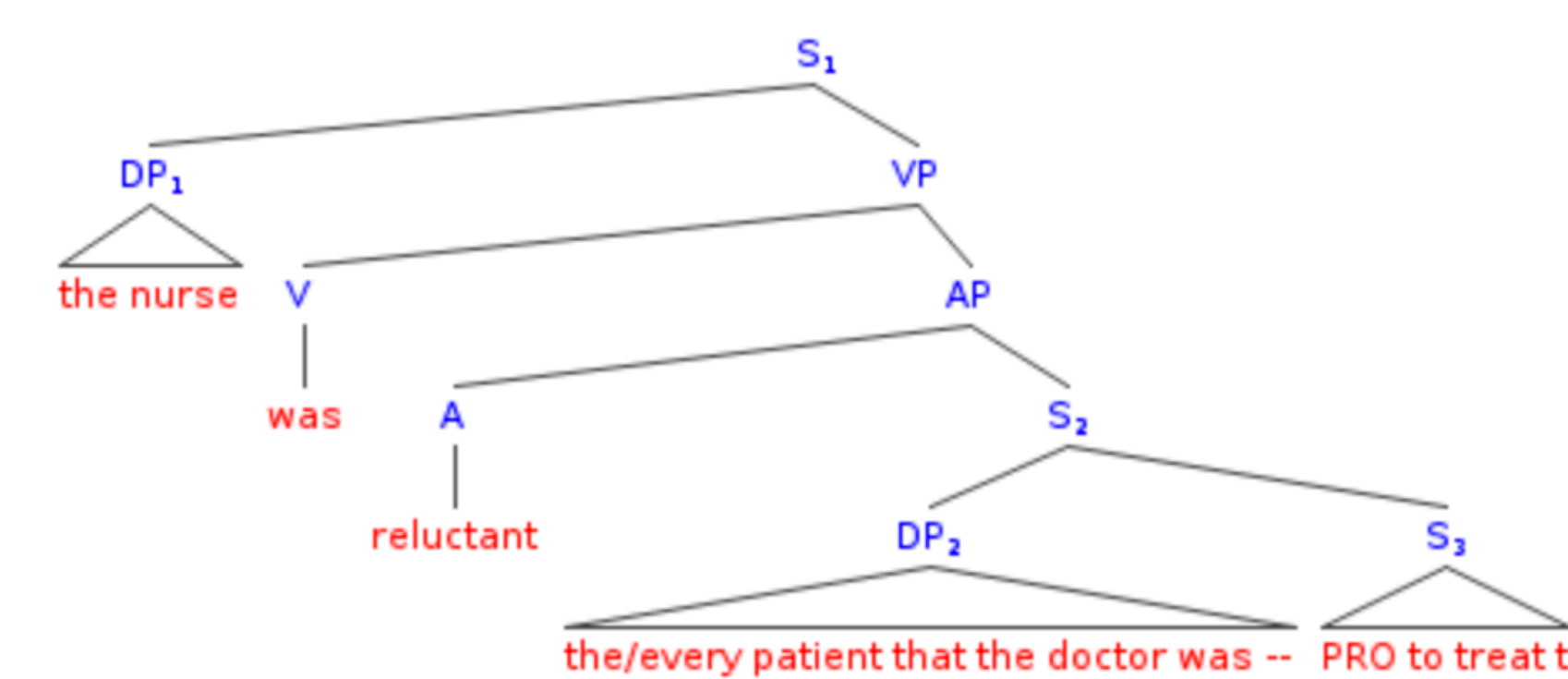
Note: in TVP analysis, *reluctant to treat* can be composed up to give a complex TVP

- As shown in Sag (1976; see also Williams 1977) (10) has the relevant interpretation only if *the/every patient that the doctor was (reluctant to treat)* is interpreted **de re**
- With Sag, HKV assume that the **de re** reading is possible only if QR applies to the matrix clause as in (11a) but not (11b)

(11a) high QR allows ellipsis to be resolved; gives **de re** reading



(11b) low QR will not allow the ellipsis to be resolved (it does not remove the antecedent containment)



HKV's Experiment 2: "Large Ellipsis" (cont'd)

Prediction under QR analysis (combined with "Minimal Processor" assumptions)

- Additional Assumption:** When the processor discovers it needs QR, it applies it "minimally", i.e. to the lowest site possible (Supported by fact that de dicto readings preferred)

HKV claim:

- QR analysis (combined with Minimal Processor + Minimal QR) predicts that in (10) *every* has no advantage over *the*
- In the *every* condition, QR would have already applied, to the lowest site possible, i.e., as in (11b). *This does not allow the ellipsis to be resolved.*
- Hence in either condition, reanalysis and another QR is needed

The prediction was borne out (somewhat). In fact, a large advantage for *the*.

Our claim: Under HKV assumptions, the advantage for *every* over *the* should persist

- Processing (10) with *every*:
 - Initial representation is (11b) (low QR)
 - The ellipsis cannot be resolved
 - The processor tries reanalysis and additional QR to give (11a)
 - The ellipsis can now be resolved

- Processing (10) with *the*
 - Initially no QR
 - The processor encounters ellipsis, cannot resolve it, so tries something else

HKV: "When the non-local ACD site is hosted by a definite DP, however, the parser can determine at the point where QR is triggered, that is when the parser encounters the ACD site marked by *was*, also how far the object DP has to be moved. Thus only one instance of reanalysis is necessary." (HKV, p. 182, fn. 45)

- Our claim: The processor cannot "determine... how far the object DP has to be moved". The processor is not clairvoyant: It doesn't know what meaning it is looking for, nor can it predict that low QR will not be able to resolve the ellipsis. The processor just tries what it can to find a VP whose meaning/LF can be used to resolve the ellipsis.

- Thus the processor will initially try minimal QR giving (11b)
- This doesn't work, so it re-computes and does a second QR

Overall, the *every* condition requires 1 reanalysis, whereas the *the* condition requires 2

Hence the *every* condition should maintain its advantage.

Prediction of our analysis in the "Large Ellipsis" Condition:

Given the need for a **de re** reading plus the fact that the upper verb/adjectives are non-agentive, the availability of a "copy cat" reading goes away

See Cormack, 1984 and Jacobson 1992b for an analysis as to why only the **de re** reading with large ellipsis is possible under the TVP ellipsis analysis.

Example: **de re** reading of (10) paraphrased as (12):

(12) For every patient x that the doctor was reluctant to treat, the nurse was reluctant to treat x.

Hence:

- (a) Nurse's mental state does not include reluctance to "be a copycat" (unlike what would be possible for a **de dicto** reading, as in HKV's small ellipsis condition)
- (b) "Copycat" reading is induced only by volitional predicates. (Assumption: no deliberate copying of or control over mental states; no other causal connection is plausible.) For example, implausible that Person A will decide to have the same reluctances as Person B.

- HKV's Experiment 1 (where *every* has advantage over *the*) – of 60 stimuli, 47 clearly volitional; 5 clearly not; 8 unclear.
- HKV's Experiment 2 (Large Ellipsis) – where *every* has no advantage over *the* – of 60 stimuli: 6 stimuli arguably volitional; 6 unclear; 48 clearly non-volitional.
- Our new experiment above: 20 items, all volitional. Hence a lack of advantage for *every* is predicted: the "copycat" reading (causal connection) is unavailable.
- Hence a lack of advantage for *every* in HKV's Large Ellipsis is predicted by the "sameness" hypothesis: the "copycat" reading is inaccessible in most items
- Note: Neither analysis predicts the advantage for the *the* condition; Possibly the **de re** reading is easier to get with *the*.

Conclusion: HKV Effect (advantage of *every* over *the* in non-large ellipsis cases) has nothing to do with QR.

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