**Dynamics of referent demotion and promotion: Consequences for pronoun interpretation**

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Implicit causality (IC) research shows that some verbs bias subject-position pronouns to refer to preceding *subjects*, while other verbs bias reference to preceding *objects* (e.g.[1,2,3,5]). We use these IC verb effects, known to be associated with thematic roles, as a backdrop for new work testing how pronoun interpretation is guided by the referential dynamics of the transitions between clauses – i.e., the consequences of promoting vs. demoting referents to more or less salient positions. We consider grammatical *and* thematic roles, as both influence referent salience.

We test *referential structure effects in the pronoun-containing clause*: whether one or both referents from the preceding clause are re-mentioned. The **Referential Structure Hypothesis** states that a subject pronoun in clause 2 is more likely to refer to the clause1 subject when both clause 1 referents are re-mentioned in clause 2 (*2-pro*), compared to only one (*1-pro*, ex.1-2). This is based on the idea that **demoting** a higher-salience referent (clause1 sub) to a less-privileged position (clause2 obj), while **promoting** a lower-salience referent (clause1-obj) to a privileged position (clause2 sub), yields a less-coherent transition (Tbl2) (for related ideas, see [4]).

**(1) Exp 1 Exp-Stim/Stim-Exp verbs** (*all-male name items (50%), all-female name items (50%)*)

    **a.** Henry {**surprised$_{IC1}$ (SE) / respected$_{IC2}$ (ES)**} Kevin because **he daxed him**.     **[2-pro]**
    **b.** Henry {**surprised$_{IC1}$ (SE) / respected$_{IC2}$ (ES)**} Kevin because **he daxed Tom**.     **[1-pro]**

**(2) Exp 2 Agent-Patient verbs** (*all-male name items (50%), all-female name items (50%)*)

    **a.** Henry {**cheated$_{IC1}$ (AP1) / saluted$_{IC2}$ (AP2)**} Kevin because **he daxed him**.     **[2-pro]**
    **b.** Henry {**cheated$_{IC1}$ (AP1) / saluted$_{IC2}$ (AP2)**} Kevin because **he daxed Tom**.     **[1-pro]**

If we find referential structure effects, this would mean that models of pronoun interpretation need to incorporate more relational information about the *transitions between clauses*: specifically, not only the semantics of cross-clausal transitions [7], but also the referential properties of the transitions between clauses (Table 2). We report two studies testing the Referential Structure Hypothesis with IC1/IC2 verbs. We also test if **thematic roles** modulate referential structure effects, to better understand the relation between thematic roles and discourse salience.

**Exp1** (n=40) tested Stimulus-Experiencer verbs whose IC biases change when the thematic role mapping changes: Stim$_{subj}$-Exp$_{obj}$ verbs (e.g. *surprise*) elicit a subject bias (IC1); Exp$_{subj}$-Stim$_{obj}$ verbs (e.g. *respect*) elicit an object bias (IC2) ([1,2,3,5]). Changes in IC bias are associated with a change in thematic roles. **Exp2** (n=60) tested Agent$_{subj}$-Patient$_{obj}$ verbs. Some Ag-Pat verbs (e.g. *cheat*) elicit a subject bias (IC1); others (e.g. *salute*) elicit an object bias (IC2), ([1,3,5]). With this verb class, changes in IC bias do *not* involve any changes in thematic roles.

**Method**: Exp1-2 had 24 targets, 36 fillers. We manipulated (i) the referential structure of clause 2 (2-pro: *He…him,* 1-pro: *He…Tom*, ex.1-2) and (ii) the verb in clause 1 (IC1/IC2, Table 1). Nonce verbs in clause 2 minimized semantic variability. We used a picture task (Fig.1): People typed the names in the boxes such that the picture matches the event of the underlined part.
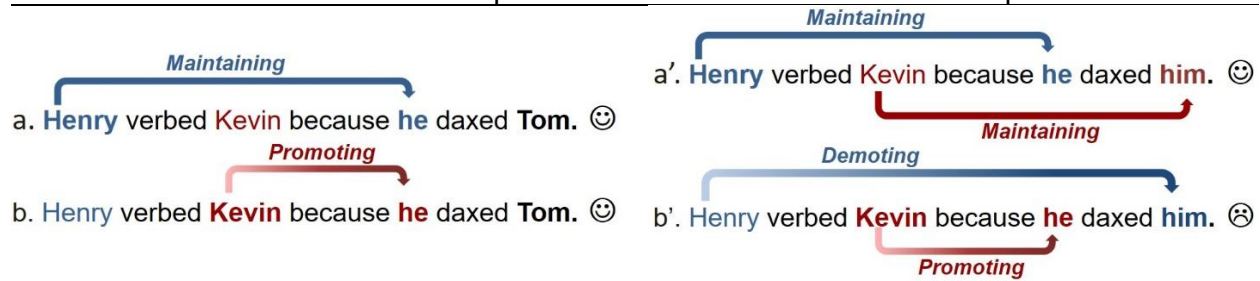
**Results: Exp1** (Stim-Exp, **Fig.2**) shows referential structure effects with both ES and SE verbs (more obj choices, less subj choices, in 1-pro than 2-pro, lmer, p<.001). SE conditions elicit fewer object choices than ES conditions (IC effect: p<.001). Strikingly, SE conditions show weaker effects of referential structure than ES (interaction, p<.01). This asymmetry may stem from Experiencers being inherently more topical than Stimuli (due to animacy, sentience, [8,9]): Demotion of Stimulus subjects (SE condition) may be less problematic than demotion of more salient Experiencer subjects (ES), yielding weaker referential structure effects with SE verbs.

**Exp2** (Ag-Pat, **Fig.2**) replicates referential structure effects with both AP1 and AP2 verbs (p<.001), and IC effects (p<.05). Now, there is **no** interaction (p's>.3): Referential structure effects are equal with AP1 and AP2 verbs. _Between-experiment analyses_ yield a marginal 3-way interaction (exp x IC1/2 x ref.str.; p=0.057), and effects of referential structure, IC1/2, exp, and interactions (ref.str. x IC1/2; IC1/2 x exp) (p's<.02). **IN SUM:** Exp1-2 support the Referential Structure Hypothesis, showing that (i) its effects generalize across verb classes and that (ii) thematic roles and their relative topicality also play a role by modulating discourse salience.
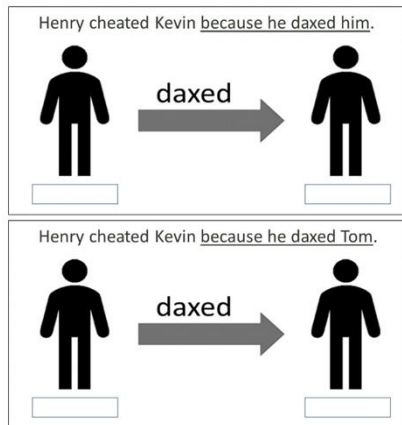
**Table 1.** IC bias of verb types used (All targets used 'because')

| | Exp 1 | | Exp 2 | |
|---|---|---|---|---|
| | **S-biased Stim-Exp** | **O-biased Exp-Stim** | **S-biased Ag-Pat** | **O-biased Ag-Pat** |
| **IC bias [3],[5]** | S bias: M=67.4%, sd=13.6 | O bias: M=76.3%, sd=11.7 | S bias: M=67.6%, sd=9.16 | O bias: M=72.1%, sd=5.53 |

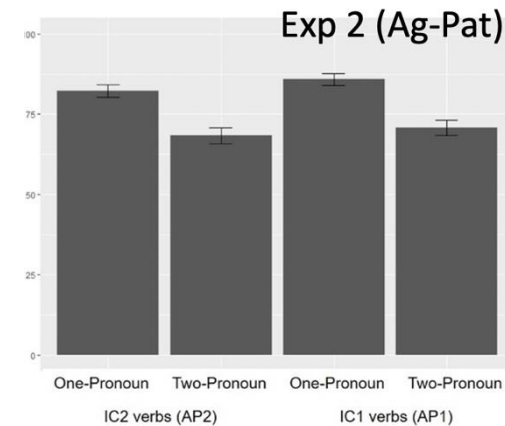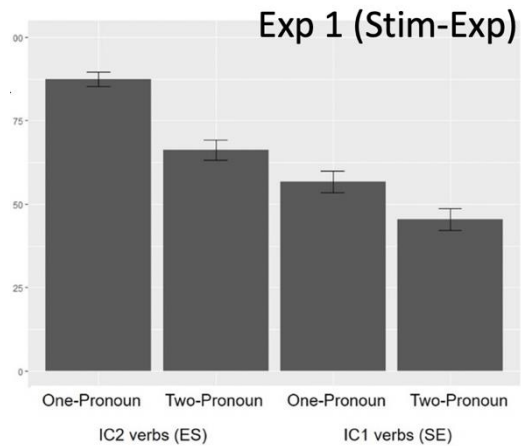**Table 2.** Referential structure with 1 pronoun    Referential structure with 2 pronouns

*Maintaining*

a. **Henry** verbed Kevin because **he** daxed **Tom.** ☺

*Promoting*

b. Henry verbed **Kevin** because **he** daxed **Tom.** ☺

*Maintaining*

a'. **Henry** verbed Kevin because **he** daxed **him.** ☺

*Maintaining*

*Demoting*

b'. Henry verbed **Kevin** because **he** daxed **him.** ☹

*Promoting*

*Both (a) and (b) yield coherent transitions.*    *(b') yields a **less** coherent transition than (a').*

Henry cheated Kevin <u>because he daxed him.</u>

daxed

Henry cheated Kevin <u>because he daxed Tom.</u>

daxed

**<= Fi**g.**1** Example items: 2-pro (top), 1-pro (bottom)

**Fig.2 =>** Proportion of trials where subject-position pronoun refers to preceding **object**



Exp 1 (Stim-Exp)

One-Pronoun  Two-Pronoun    One-Pronoun  Two-Pronoun
IC2 verbs (ES)                IC1 verbs (SE)



Exp 2 (Ag-Pat)

One-Pronoun  Two-Pronoun    One-Pronoun  Two-Pronoun
IC2 verbs (AP2)               IC1 verbs (AP1)

**Selected references [1]** Au 1986. A verb is worth a thousand words. JML. **[2]** Caramazza et al. 1977. Comprehension of anaphoric pronouns. J of VLVB. **[3]** Ferstl et al. 2011. Implicit causality bias in English: A corpus of 300 verbs. BRM. **[4]** Grosz et al 1995. Centering: A framework for modeling the local coherence of discourse. CL **[5]** Hartshorne and Snedeker. 2013. Verb argument structure predicts implicit causality. LCP. **[6]** Kaiser. 2009. Investigating effects of structural and information-structural factors on pronoun resolution. **[7]** Kehler. 2002. Coherence, reference, and the theory of grammar. **[8]** Plank. 1979. Ergativity, syntactic typology, and universal grammar. **[9]** Verhoeven. 2014. Thematic prominence and animacy asymmetries.