Discourse behavior of possessives reflects the importance of interpersonal relationships

A principal property of discourse-level representations of meaning is that referents in a discourse vary in prominence, e.g. animates are typically more prominent than inanimates [1,2]. Explaining why differences in prominence arise is a core task for theories of discourse representation and processing. However, prior work has neglected a frequent structure with potential to inform current theories: **nominal possessives** (e.g. *Sam's car*, *Sam's doctor*). Unlike simpler nominals (*a car/doctor*), nominal possessives reference two entities: a possessor (*Sam*) and a possession (*car/doctor*). Drawing on work in linguistic meaning and cognition more generally, we test three hypotheses about animate and inanimate possessions' prominence.

H_1: Animate entities are widely viewed as more prominent in discourse and memory, e.g. animates are more frequently pronominalized [3], mentioned earlier [4], and persist in memory (in both a linguistic and domain-general sense) more than inanimates [5]. According to the Animacy Hypothesis, animate possessions (*Sam's doctor*) are more prominent in discourse than inanimate ones (*Sam's car*) for the same reasons and to the same extent that simpler nominals exhibit animacy effects (*a doctor* vs. *a car*).

H_2: Possessives are referentially and semantically more complex than simpler nominals, and increased representational complexity promotes accessibility in memory [6]. Additionally, possessions can be discourse-new or given [7], unlike simpler indefinites, and given referents tend to be more prominent [8] (we leave definites for future work). On this basis, we consider the Possessive Hypothesis: possessions are more prominent than simpler indefinite nominals.

H_3: Work in social cognition and neuroscience associates interpersonal relationships and health [9,10]. Relatedly, evolutionary theories claim that better memory for animates arose from selection pressures to identify threats, mates, and social groups [11]. As animate possessions explicitly denote interpersonal relationships, we consider the Interaction Hypothesis: possessed animates are especially prominent in discourse, in excess of additive effects of animacy and possession, due to the domain-general cognitive significance of interpersonal relationships.

Method: We used a sentence-continuation task, which is commonly regarded to reflect the prominence of competing discourse entities [12]. Participants (n=40) wrote continuations to prompt sentences (24 targets, 32 fillers). Targets followed the frame: [name] [nonce verb] [indefinite/possessive] [animate/inanimate]. We manipulated (i) the animacy of the direct object (human role nouns vs. alienable objects) and (ii) whether the direct object was possessed or indefinite. An example target item in the resulting four conditions is given below:

Daniel zatted a nurse. **(Indef. Animate)**	Daniel zatted his nurse. **(Poss. Animate)**
Daniel zatted a jacket. **(Indef. Inanimate)**	Daniel zatted his jacket. **(Poss. Inanimate)**

The name and animate object within an item mismatched with respect to stereotypical gender to minimize referential ambiguity; gender order and frequency was counterbalanced. Nonce verbs minimized potential effects of verb semantics (e.g. from implicit causality [13]). Post-hoc analyses found no consistent biases in the how participants treated individual nonce verbs.

Analysis: Given prior claims that realization in subject position reflects prominence [12,14,15], we analyze how often the direct object from the prompt sentence is mentioned as the subject of the continuation. We also analyze how often the preceding object is mentioned *anywhere* in the continuation (see e.g. Centering Theory [16]), as a more holistic measure.

Predictions: The Animacy Hypothesis predicts that participants will mention animate objects more often than inanimates and that animacy effects in possessives will parallel those in indefinites; the Possessive Hypothesis predicts possessed objects will be mentioned more than indefinites. The Interaction Hypothesis predicts superadditive effects for possessed animates.

Results: Figure 1 shows mentions of the preceding direct object in subject position of continuations. Animate preceding objects are more likely than inanimate ones to be mentioned in subject position (glmer, $p<.001$), but, crucially, we also find an animacy:possession interaction ($p=.05$). A planned comparison shows that possessed animates are more likely than indefinite animates to be continuation subjects ($p=.03$).

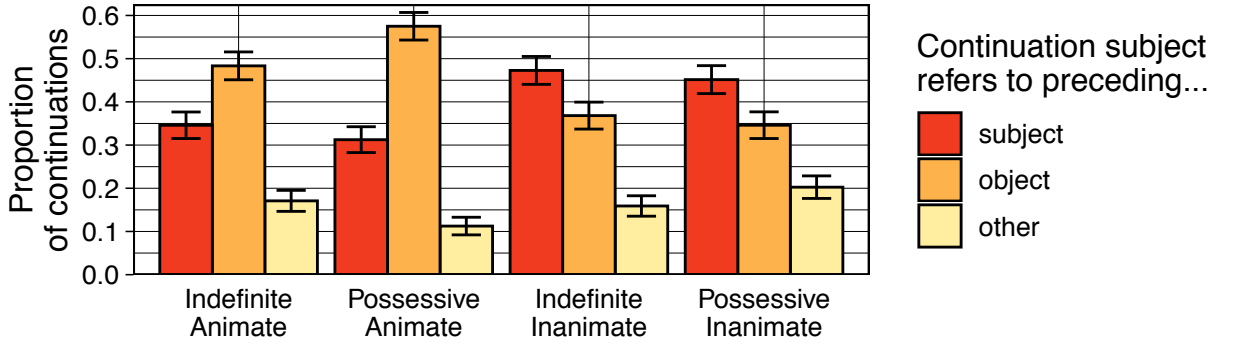

Figure 1. Which entity appears as continuation subject? (outcomes are mutually exclusive)

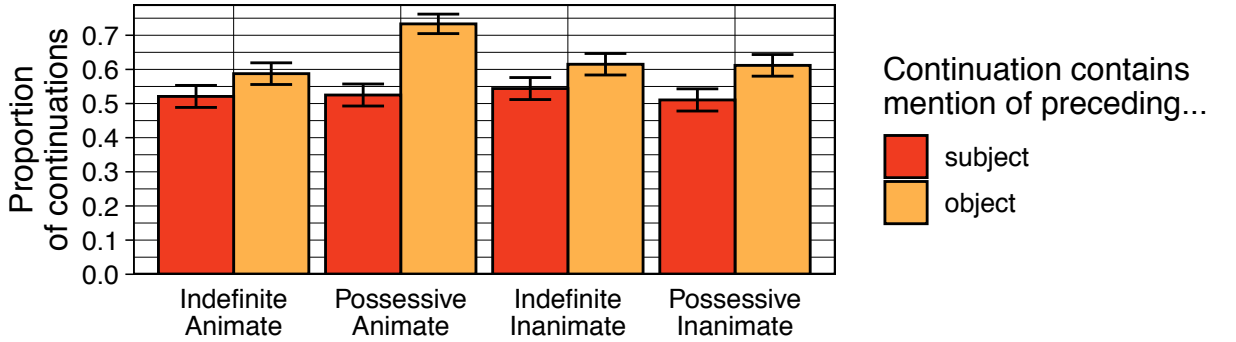

Figure 2. Which entities does the continuation mention? (outcomes are **not** mutually exclusive)**.**

Possession's special effect on animates is also demonstrated in the analysis of how often preceding objects are mentioned anywhere in continuations (Figure 2). We again see an animacy:possession interaction ($p<.01$), whereby possession boosts the likelihood of mention for animate objects more than it does for inanimates. Pronominalization patterns (not shown here) reveal a strong bias for reference to the preceding subject and support previous arguments for a dissociation between likelihood of re-mention and pronominalization [17].

The data support the Interaction Hypothesis—that possessed animates are especially prominent, as measured by their likelihood of re-mention. Their privileged status in discourse may relate to non-linguistic theories on the importance of interpersonal relationships [9,10,11]. More broadly, this work is representative of how general cognitive principles may influence the computation of linguistic meaning.

References: **[1]** Clark & Begun (1971). The semantics of sentence subjects. *Lang Speech* **[2]** Dahl (2008). Animacy and egophoricity. *Lingua* **[3]** Fukumura & van Gompel (2011) The effect of animacy on the choice of referring expression. *LCP* **[4]** Prat-Sala & Branigan (2000). Discourse constraints on syntactic processing in language production. *JML* **[5]** Gelin et al. (2018). Do animacy effects persist in memory for context? *QJEP* **[6]** Hofmeister (2011). Representational complexity and memory retrieval. *LCP* **[7]** Barker (2011). Possessives and relational nouns. *Semantics* **[8]** Ferreira & Yoshita (2003). Given-new ordering effects on the production of scrambled sentences. *J Psycholing Res* **[9]** Cacioppo & Hawkley (2009). Perceived social isolation and cognition. *Trends Cogn Sci* **[10]** Eisenberger & Cole (2012). Social neuroscience and health. *Nat Neurosci* **[11]** Nairne et al. (2013). Adaptive memory. *Psychol Sci* **[12]** Arnold (2001). The effect of thematic roles on pronoun use and frequency of reference continuation. *Discourse Process* **[13]** Hartshorne & Snedeker (2013). Verb argument structure predicts implicit causality. *LCP* **[14]** Chafe (1976). Givenness, contrastiveness, definiteness, subjects, topics, and point of view. *Subject and Topic* **[15]** Stevenson et al. (1994). Thematic roles, focusing and the representation of events. *LCP* **[16]** Walker et al. (1998) *Centering theory in discourse* **[17]** Kehler & Rohde (2013). A probabilistic reconciliation of coherence-driven and centering-driven theories of pronoun interpretation. *Theoretical Ling*