Implicit objects in discourse: likelihood of reference and choice of referring expression

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Implicit objects (IOs) are the unrealized theme arguments of optionally transitive verbs (e.g., *eat, read*) in intransitive frames (*Lisa ate*.). Work on IOs' discourse status reveals that, like implicit agents [1], IOs are less available than overt objects for anaphoric reference [2]. These findings fit with implicit arguments' reputation as *discourse inert* [1,3,4]. This earlier work focused on implicit arguments' availability for subsequent anaphoric forms, using comprehension tasks. However, work on *overt referents* shows that choice of anaphoric form and likelihood of mention can diverge and need to be analyzed separately [5,6,7]. Thus, **Exp 1 and 2** use production-oriented tasks to assess *both* (i) implicit objects' likelihood of re-mention in subsequent discourse (their *'persistence'*) and (ii) which referring expression is used to refer back to IOs.

Predictions: Theoretical work suggests arguments are left implicit when they are low in discourse prominence [8]. This predicts that IOs will be re-mentioned/referred to less often than overt objects. We test this in **Experiments 1-2.** Moreover, IOs may also be less likely to be referred to with a pronoun than overt objects. We test this in **Exp2.** If these effects are a *categorical consequence of implicitness*, we do not expect other contextual factors to modulate them. However, if implicit objects can *vary* in terms of their discourse prominence (i.e. not all IOs are equally/uniformly low-prominence due to their implicitness), their discourse behavior may be modulated by their contextual salience. We test this in **Exp2.**

Exp.1 (n=32) was a forced-choice completion task that used sluicing (e.g. "…I don't know which {student/book}"). We investigated how often implicit vs. overt objects are re-mentioned (Table 1: Do people choose "which student" (subj) or "which book" (obj)?) We expect an overall object preference; sluices with overt antecedents exhibit a locality effect [9,10,11]. Finding that IOs are selected less often than overt objects would indicate IOs are less prominent. We also tested if making the object explicitly relevant to the discourse goals (with an overt question/QUD [12,13]) would boost its prominence. **Results**: All conditions yielded >50% object continuations (p's<.05): Sluices prefer objects *even when the object is implicit*. Object implicitness and the question manipulation had no effect (p's>.3): implicit objects are as likely to be mentioned as overt ones. However, Exp.1 only used sluices and '*which noun*' expressions. These constraints may mask differences in the discourse behavior of overt vs. implicit objects.

Exp.2 (n=48) used a story-continuation task to test (i) how likely implicit objects are to be mentioned in subsequent discourse, and (ii) with what kind of referring expression. We manipulated **(a)** object type (implicit/overt) and **(b)** context type ('*strong*': mention of a set containing the object vs. '*irrelevant*': mention of something unrelated to the object, Table 2). Native English speakers wrote continuations which we annotated for whether (i) the implicit/overt object from the prompt is mentioned and (ii) if yes, what referring expression is used (Table 3). **Results:** Implicit objects were (i) mentioned and (ii) pronominalized less often than overt objects (glmer, p's<.05). Crucially, the context manipulation affected referents' persistence: *implicit objects (but not overt ones) are more likely to be mentioned in conditions where a salient context set has been mentioned (strong context) than in irrelevant-context conditions (glmer, p<.02,* see Fig.1). However, the context had no significant effect on how often people used pronouns to refer back to implicit objects (Fig.2).

In sum, implicit objects' persistence in discourse is influenced not only by their implicitness but also by preceding context: contexts that allow for more specific interpretations of IOs makes them more more likely to be re-mentioned. In contrast, rate of pronoun usage referring to IOs was *not* affected by prior context. Differences between likelihood of subsequent mention (persistence) and likelihood of pronominalization suggest that persistence may be more connected to general notions of discourse prominence, whereas pronoun use may be more constrained by how the antecedent is linguistically realized. Our work is the first to identify a divergence between likelihood of mention and likelihood of pronoun use with implicit arguments.

Table 1. Experiment 1 example items (below)

Implicit obj., no question	*Me: I gave some students several books to read. Later, I saw **a student** reading, but I'm not sure… (65.6% object choice)*
Overt obj., no question	*Me: I gave some students several books to read. Later, I saw **a student** reading **a book**, but I'm not sure… (64.3% obj. choice)*
Implicit obj. w/ question	*Me: I gave some students several books to read.* *Friend: **Did they read them?*** *Me: Later, I saw **a student** reading, but I'm not sure… (63.7% obj. choice)*
Overt obj. w/ question	*Me: I gave some students several books to read.* *Friend: **Did they read them?*** *Me: Later, I saw **a student** reading **a book**, but I'm not sure… (70% obj. cho.)*
completion:	[ ] **which student** [ ] **which book**

Table 2. Experiment 2 example item ('story prompt' for story continuation task, below)

Implicit, strong ctx	I gave Sarah several books to read. Later, I saw her reading. …
Overt, strong ctx	I gave Sarah several books to read. Later, I saw her reading a book….
Implicit, irrelev. ctx	I went to the gym with Sarah. Later, I saw her reading. …
Overt, irrelev. ctx	I went to the gym with Sarah. Later, I saw her reading a book. …

Table 3. Experiment 2 example continuations (below)

Prompt:	Continuation (1st clause)	Coded as:
I handed Victoria several books to read. Later, I saw her reading.	I asked her if she liked **it** so far. …	Object mention: yes Form: pronoun
I sent William several melodies to play. That night, I saw him playing.	**The melody** was so soothing. …	Object mention: yes Form: definite NP
I gave Vanessa some emails to type. That evening, I saw her typing an email.	**It** looked boring. ….	Object mention: unclear; ambig. *(excluded)*
I went to the park with Albert. That night, I saw him writing.	I decided not to bother him. …	Object mention: no Form: n/a

Fig 1. Proportion of object re-mention / Fig 2. Proportion of pronoun usage / **References:**
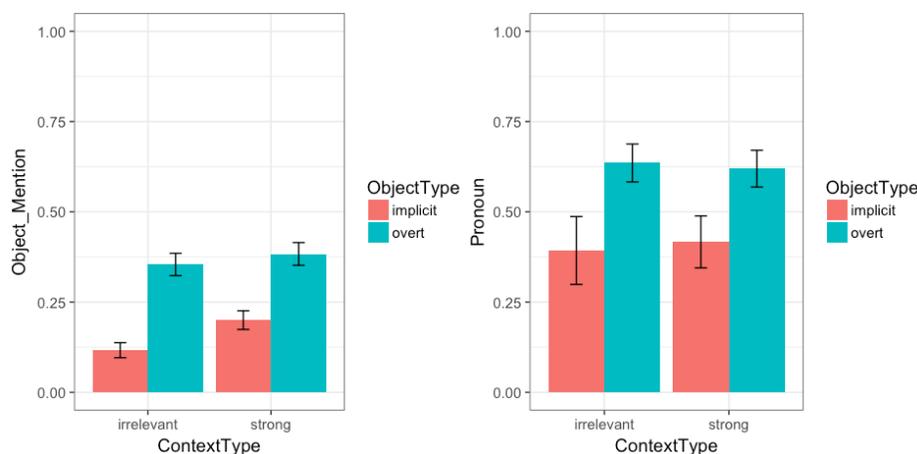
[1] Koenig&Mauner'99. A-definites and the discourse status of implicit arguments **[2]** Besserman&Kaiser'18. The discourse status of existential implicit arguments **[3]** Martí'11. Implicit indefinite objects: grammar, not pragmatics **[4]** Williams'15. Arguments in syntax and semantics **[5]** Kehler et al.'08. Coherence and coreference revisited **[6]** Fukumura&van Gompel'10. Choosing anaphoric expressions **[7]** Kaiser'10. Investigating the consequences of focus on the production and comprehension of referring expressions **[8]** Goldberg'01. Patient arguments of causative verbs can be omitted **[9]** Frazier&Clifton'98. Comprehension of sluiced sentences **[10]** Carlson et al.'09. Information structure expectations in sentence comprehension **[11]** Harris'15. Structure modulates similarity-based interference in sluicing **[12]** Ginzburg'96. Dynamics and the semantics of dialog **[13]** Roberts'98. Information structure in discourse