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Authors

Eliatamby, André

Tieu, Lyn

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The role of definiteness in ad hoc implicatures

André Eliatamby & Lyn Tieu *

Abstract. This study investigates how ad-hoc implicatures and the definiteness presupposition of the definite determiner ‘the’ interact. Using a Truth Value Judgment Task (Crain & Thornton 2000), we examine whether English-speaking adults interpret the definite and indefinite determiner differently in sentence pairs such as: ‘Mary bought a striped sweater’ and ‘Mary bought the striped sweater’, in contexts in which there are two possible referents, one which is best described with one adjective (e.g. ‘striped’) and the other which is best described with two adjectives (e.g. ‘striped’ and ‘spotted’). We find more ad hoc implicature for ‘the’ than ‘a’; that is, uses of the definite ‘the’ are rejected more frequently than uses of ‘a’ when the purchased item would best be described with two adjectives. We take this finding to suggest that the need to satisfy the uniqueness presupposition of ‘the’ acts as an additional trigger for implicature generation. This result raises questions for both Neo-Gricean and localist models of implicature generation, which we briefly outline.

Keywords. definiteness; indefinites; ad hoc implicature; presupposition; uniqueness; semantics; pragmatics; psycholinguistics

1. Introduction. This paper is interested in how the uniqueness property of English articles influences the generation of ad-hoc implicatures (Hirschberg 1991). It is well-known that in English, the definite and indefinite articles differ from each other with respect to uniqueness. Take the sentences in (1) and (2).

- (1) Mary bought **the** striped sweater.
- (2) Mary bought **a** striped sweater.

Sentence (1) communicates that there is a unique striped sweater in the context and is therefore infelicitous in contexts in which there are *two* striped sweaters. Sentence (2), on the other hand, can be used felicitously in contexts where there are two striped sweaters. Following Heim (1991), we will treat the uniqueness property of ‘the’ as a presupposition. Consider now the use of (1) and (2) in the following contexts:

- (3) The store has a plain sweater, a sweater with stripes and spots, and a sweater that only has stripes. Mary buys one sweater, namely:
 - a. the striped and spotted sweater.
 - b. the sweater with only stripes.

Do (1) and (2) have equivalent meanings in the contexts in (3a) and (3b)? Our intuition suggests that (1) is only acceptable in (3b), while (2) is acceptable in both (3a) and (3b). This asymmetry is unexpected if both (1) and (2) generate ad-hoc implicatures at the matrix level, since in both constructions, ad-hoc implicatures should implicate that Mary bought the sweater with no stripes. In

* Authors: André Eliatamby, Rutgers University (ae644@ruccs.rutgers.edu) & Lyn Tieu, University of Toronto (lyn.tieu@utoronto.ca).

the above context, (1) and (2) have (4) and (5) as alternatives, which when treated as false yield (6) and (7):

(4) Mary bought the striped and spotted sweater.

(5) Mary bought a striped and spotted sweater.

(6) Mary didn't buy the striped and spotted sweater.

(7) Mary didn't buy a striped and spotted sweater.

Conjoining (6) with (1) and (7) with (2) yields the inference that the sweater Mary bought had stripes and did not have spots. If our intuition is attested, something must interfere with implicature computation that leads to fewer implicatures for (2) than for (1). Since the only difference between (1) and (2) is the choice of determiner, the properties of the determiner must play a role.

In this paper, we test this intuition using two Truth Value Judgement Tasks with English-speaking adults.

2. Experiment 1

Experiment 1 investigates how adult English speakers assess sentences like (1) and (2) in contexts where someone buys an item that is best described using two properties.

2.1. METHOD.

2.1.1. PARTICIPANTS. We recruited 60 English native speakers through Prolific (<https://www.prolific.com/>) and randomly assigned them to either the 'a' or 'the' condition. All participants self-identified as native speakers of English, with normal or corrected-to-normal vision. Participants were paid £1 for the task, which took on average 5m36s to complete.

2.1.2. PROCEDURE. The task was a Truth Value Judgment Task (Crain & Thornton 2000), implemented and hosted on Qualtrics. Participants were given a back story about characters who were shopping at the store. On each trial, they saw a picture containing three items, and a shopping basket under one of the items. A puppet named Raffie described which item the character had purchased (using either a definite or an indefinite description), and participants had to indicate whether Raffie was right or wrong by clicking on 'Yes' or 'No' (see Figure 1).

2.1.3 MATERIALS. Noun phrase type (definite 'the' vs. indefinite 'a') was a between-subject variable. Critical target trials involved weak/under-informative descriptions containing one adjective, such as 'Mary bought {a/the} striped sweater' to describe a context in which there was both a sweater with stripes and a sweater with stripes and spots, and Mary had bought the one with stripes *and* spots (see Figure 1). If participants computed the ad-hoc implicature that the sweater Mary bought didn't contain spots, they were expected to reject the test sentence; if not, they would accept the test sentence on its literal meaning. The experiment also included unambiguously true and unambiguously false 1- and 2-adjective controls, in which the test sentences were clearly true or clearly false descriptions of the purchased item (see Figures 2 and 3 for examples). We also included clearly true and clearly false filler items which involved descriptions that did not contain any adjectives (e.g., 'Tara bought the carrot'). In all, each participant saw 2 training items, followed by 30 test items: 12 ambiguous target trials containing either 'a' or 'the', 6 clearly true/clearly false 1-adjective controls, 6 clearly true or clearly false 2-adjective controls, and 6 adjective-less fillers. The 2-adjective controls were presented in a second block, so as not to

interfere with participants' interpretation of the 1-adjective targets (for instance, hearing a 2-adjective description might bias people towards rejecting the 1-adjective targets for being underinformative). Within each block, all trials were presented in a completely randomized order.

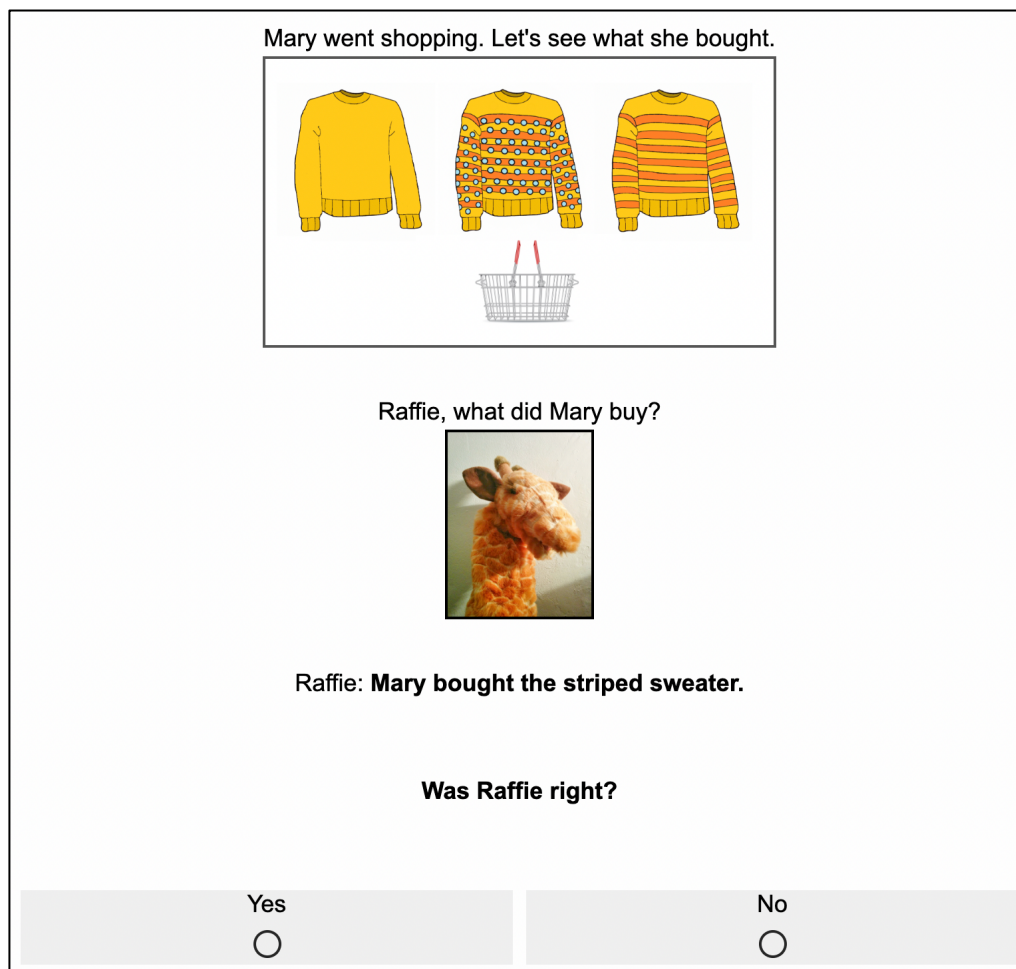


Figure 1: Screen capture of a critical target trial in the 'the' condition. In the 'a' condition, the sentence contained the indefinite determiner 'a' instead of 'the'.

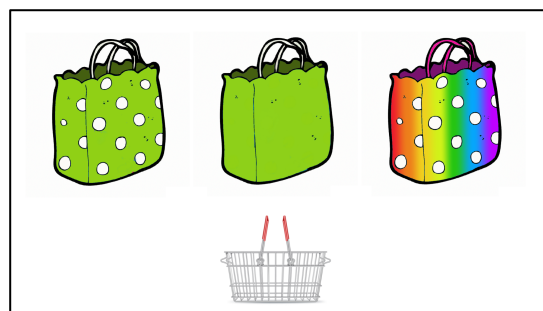


Figure 2: Image from a false 1-adjective control trial, paired with the sentence 'Bernard bought {a/the} polka-dotted bag.'



Figure 3: Image from a true 2-adjective control trial, paired with the sentence: ‘Ellie bought {a/the} rainbow-coloured and polka-dotted dress.’

2.2. RESULTS. One participant was excluded for failing to score at least 12/18 (two thirds) accuracy on the unambiguous control and filler trials, leaving a total of 59 participants for analysis (29 in the ‘a’ condition and 30 in the ‘the’ condition). For these participants, accuracy was above 92% for all unambiguous filler and control conditions. Figure 4 displays the average proportion of yes-responses in the target ‘a’ and ‘the’ conditions (dots represent individual participant means).

Mean acceptance in the indefinite ‘a’ condition was 93%, compared with 56% in the definite ‘the’ condition. We fit a mixed effect logistic regression model on responses to the target conditions, with definiteness as a fixed effect, and random intercepts for subject and item. Model comparisons revealed a significant effect of definiteness ($\chi^2(1)=16$, $p<.001$), with participants more likely to reject the underinformative target statements when they contained the definite article than when they contained the indefinite article.

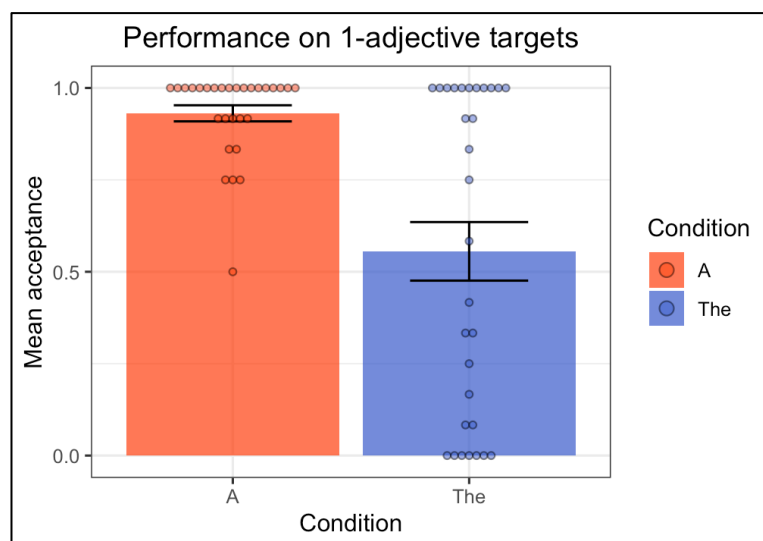


Figure 4: Mean acceptance of critical (underinformative) 1-adjective target trials for ‘a’ and ‘the’ conditions in Experiment 1.

2.3. DISCUSSION. The results of Experiment 1 show that in contexts like (3a), adults were more likely to reject sentences like ‘Mary bought the striped sweater’ than ‘Mary bought a striped sweater’, suggesting that ad-hoc implicatures were more likely to be computed for sentences

containing the definite determiner compared to sentences containing the indefinite determiner. In fact, sentences with ‘a’ seem to rarely generate ad hoc implicatures: the majority of participants always accepted the critical ‘a’ sentences, and no participant rejected the critical indefinite sentences more than half the time. Sentences like ‘Mary bought a striped sweater’ seem to be generally acceptable when the sweater has both stripes and spots.

While we find evidence of an asymmetry, the rate of implicature generation in the definite condition is lower than our linguistic intuition predicts; adults as a group are only at chance to reject the critical sentences. We were concerned this might be due to the stimuli being presented in a written/textual form, rather than spoken. Prosodic structure is known to influence the rate at which implicatures are generated and influences the alternative set used in implicature computation (Tomlinson et al. 2017, Tomlinson & Ronderos 2021). For example, both (8) and (9) negate different alternatives, which are compatible with Mary buying a striped and spotted sweater:

- (8) Mary bought the striped sweater_F.
 $\sim$ Mary didn’t buy the striped box, the striped bag, the striped umbrella, etc.
- (9) Mary bought the striped_F sweater.
 $\sim$ Mary didn’t buy the plain sweater.

Without an explicit prosodic structure, participants might have parsed the critical sentences as in (8) or (9), or participants might have been unsure about how to parse the critical sentences, and as a result failed to strengthen their meanings.

Our design also contains a possible confound regarding the rejection of the critical sentences in the definite condition. In a context where there is a plain sweater, a sweater with stripes and spots, and a sweater that only has stripes, the unenriched denotation of ‘the striped sweater’ is undefined, since the set of striped sweaters is not a singleton set. Since participants could only give true/false (*yes/no*) responses, rejections of the critical targets might have been due to presupposition failure, rather than participants’ belief that the enriched interpretation was falsified. Since ‘a’ does not trigger a uniqueness presupposition, the asymmetry between ‘a’ and ‘the’ could simply be due to the uniqueness presupposition carried by ‘the’.

If rejections of the critical trials were due to presupposition failure, then participants should reject sentences like (1) in contexts in which Mary bought a striped sweater with no spots. In this case, an enriched interpretation of (1) (with an ad hoc implicature) is true, but the unenriched interpretation is still undefined. Rejection of such trials would be a clear indication that presupposition failure was driving the rejection of the critical trials in our definite condition in Experiment 1. In the design of Experiment 1, each participant did see one (but only one) such trial. In aggregate, participants accepted these trials 100% of the time.

In Experiment 2, we decided to address both the absence of explicit prosody and increase the number of trials testing for presupposition failure.

3. Experiment 2. In Experiment 2, we addressed the absence of explicit prosody and the lack of sufficient trials testing for presupposition failure. Rather than being presented as text, sentences were presented in pre-recorded videos, produced by a talking rabbit puppet. We also changed the distribution of trial types. The number of trials where the sentence mentioned one property, but the purchased item had two properties, was reduced from 12 to 6. The number of trials where the sentence mentioned one property, and the purchased item had that property, was increased from 1 to 6.

3.1. METHOD.

3.1.1. PARTICIPANTS. 61 participants (who had not completed Experiment 1) were recruited through Prolific; 31 were randomly assigned to the ‘a’ condition and 30 to the ‘the’ condition. All self-reported as native speakers of English, with normal or corrected-to-normal vision. Participants were paid £1.35 for the task, which took on average 8m47s to complete.

3.1.2 PROCEDURE. The procedure was the same as in Experiment 1, with participants judging whether a puppet’s descriptions of the pictured scenarios were true or false. There were two differences between the two experiments. First, test sentences in Experiment 2 were presented orally (the puppet produced the sentences in pre-recorded videos). Second, we decreased the number of critical targets to add 1-adjective true controls (see Figure 5), which were presented in a second block following the critical trials.

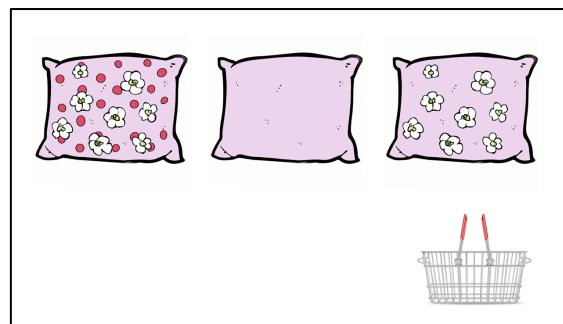


Figure 5: Example image associated with a 1-adjective true trial in Experiment 2. This image accompanied the sentence: ‘Evan bought {a/the} flowery pillow.’

3.1.3 MATERIALS. The materials for Experiment 2 were very similar to those in Experiment 1, except for the changes mentioned above. In total, participants saw two training trials, followed by 30 test trials presented in two test blocks: the first block contained a completely randomized sequence of six 1-adjective-true critical targets, 6 clearly true or clearly false controls, and 6 true/false fillers; the second block contained six 1-adjective true targets and six 2-adjective true/false controls.

3.2. RESULTS. 53 participants scored at least 2/3 accuracy on the unambiguous controls and fillers and were retained for analysis (27 ‘a’, 26 ‘the’). For these participants, accuracy on the unambiguous controls and fillers was above 92%. The left-hand side of Figure 6 displays the average proportion of *yes*-responses in the target ‘a’ and ‘the’ conditions (dots represent individual participant means). We observed greater rejection in both conditions, compared to Experiment 1. Crucially, however, the difference remained between ‘the’ and ‘a’, with uses of ‘the’ being rejected more than uses of ‘a’ (65% vs. 41%, respectively). A mixed effect logistic regression revealed this difference to be significant ($\chi^2(1)=4.7$, $p<.05$). Furthermore, as the right-hand side of Figure 6 shows, participants almost always accepted the use of ‘the’ in the 1-adjective true trials, providing further evidence that the rejection of ‘the’ in Experiments 1 and 2 was not driven by any potential infelicity associated with a presupposition failure.

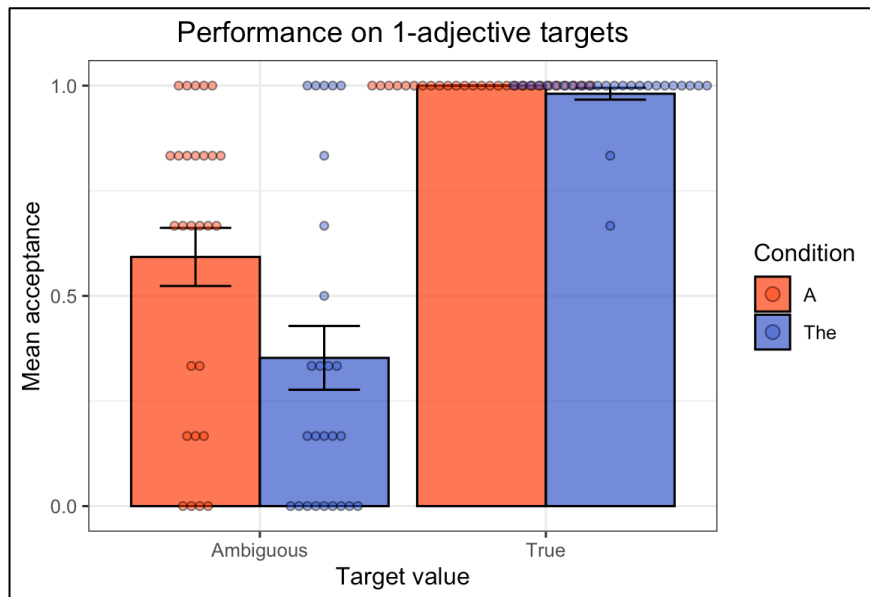


Figure 6: Mean acceptance of critical (underinformative) 1-adjective target trials and 1-adjective true trials for ‘a’ and ‘the’ conditions in Experiment 2.

4. General discussion. The results from Experiment 2 show that ad-hoc implicatures are more likely to be generated for sentences containing ‘the’ than for sentences containing ‘a’. Ad-hoc implicatures for sentences containing the indefinite are attested; unlike in Experiment 1, some participants always rejected the critical sentences containing ‘a’. Nonetheless they are still generated less frequently with indefinite sentences compared to definite sentences. The particular determiner used in the sentence influences whether ad hoc implicatures are computed.

If we assume that ‘the’ carries a uniqueness presupposition, a natural explanation for these results is that the requirement to satisfy uniqueness triggers implicature computation. Such an explanation is difficult to support, however, if implicatures are only computed at the sentential level, as suggested by Neo-Gricean models of implicature (Sauerland 2004, Geurts 2010). The issue with generating ad hoc implicatures at the sentential level is that the denotation of “*striped sweater*” is the same in both the literal and enriched interpretation of sentences like (1), meaning that the uniqueness presupposition of ‘the’ is still not satisfied in the final enriched proposition. While a global ad hoc implicature yields the entailment that Mary bought the sweater that was striped but not spotted, the set of “striped sweaters” still contains two sweaters. Thus, under a Neo-Gricean framework of implicature generation, the need to satisfy the uniqueness presupposition of ‘the’ cannot be what is driving increased implicatures.

Uniqueness can be a trigger for implicature if implicatures are computed locally (Chierchia et al. 2012, Fox 2007) within the DP:

(10) Mary bought *EXH* the striped sweater

Assuming that an alternative to ‘the striped sweater’ is ‘the striped and spotted sweater’, then the enriched DP generated in (10) is ‘the striped and not spotted sweater’. Since there is only one sweater that is striped but not spotted, the uniqueness presupposition of (10) is therefore satisfied. The issue with this idea is that the *EXH* operator attaches to propositional nodes, while definite

determiner phrases like ‘the striped sweater’ have been analyzed either as quantificational phrases or variables referring to some antecedently introduced referent; DPs do not denote functions from propositions to truth conditions. Furthermore, given their semantic type, the entailment relation involved in determining the set of alternatives used by *EXH* would need to be redefined to capture the informativity relationship between DPs. Investigating the multiplicity inferences of plural definite noun phrases, Mayr (2015) proposes an exhaustivity operator that applies at the predicate level, arguing that the definite article forces exhaustification to occur below it on the noun phrase directly. Future research could explore how our findings concerning ad hoc implicatures might be accommodated within such a proposal, and within current theories of implicature more broadly.

5. Conclusion. This study experimentally investigated the interaction between ad hoc implicatures and the definiteness property of English determiners. Our linguistic intuition suggested that sentences with the English definite article ‘the’ trigger ad hoc implicatures more strongly than sentences with the indefinite ‘a’, even though standard models of implicature generation predict no difference. We confirmed this intuition in two truth value judgment tasks; participants were more likely to generate ad hoc implicatures with ‘the’ than ‘a’, although implicatures with ‘a’ were attested and the overall implicature generation rate was mediated by whether the stimuli were presented textually or auditorily. We have suggested that this result is hard to account for using Neo-Gricean models of implicature computation, and for localist models, may require changes to the distribution of *EXH* or to the definition of the entailment relations involved in determining the sets of alternatives used by *EXH*.

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