



# Semantic incorporation and discourse prominence: Experimental evidence from English pronoun resolution



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## ABSTRACT

The semantic incorporation of nouns into predicates, like *give a hug*, is not morphologically marked in English, and how syntactic incorporation strategies like light verb constructions influence the discourse-prominence structure of an utterance has not yet been studied systematically. One hypothesis is that since semantically incorporated nouns are not morpho-syntactically incorporated in English, they can function like any other noun as prominent and accessible referents for anaphora. Another hypothesis is that their semantic status and their predicative meaning influence their discourse prominence, and hence their accessibility by anaphoric means. We tested these two hypotheses in two experimental studies on different anaphoric preferences of English pronouns. Our studies demonstrate that the felicity patterns for the two different pronominal reference strategies are determined at different linguistic levels: For *it*, we found an impact of morphosyntactic form; for *that*, the semantic type of the referent (object vs. event) seems to play a role. Crucially, the degree of semantic incorporation does not affect discourse prominence and pronoun choice to the extent that we had expected. © 2021 The Author(s). Published by Elsevier B.V. This is an open access article under the CC BY-NC-ND license (<http://creativecommons.org/licenses/by-nc-nd/4.0/>).

## 1. Introduction

We have many ways to package descriptions of events in the world into linguistic form. For instance, I could describe the same scene with *Joe hugged Jill*, or with *Joe gave Jill a hug*. In both sentences, it is clear that there was an agent (Joe) and a patient (Jill) engaged in a hugging event; so the shape that these event descriptions take as cognitive representations can be one and the same (although see e.g. [Fausey and Boroditsky, 2010](#)). However, the difference in expression affects, among other things, how strongly the action ('hug') is semantically incorporated into the predicate: In the simple verb *to hug*, the action is part of the verbal meaning; in the light verb construction *to give a hug*, the nominalized action 'a hug' is a syntactic object of the verb *to give*, which lends it a Theme-like flavor ([Wittenberg and Snedeker, 2014](#); [Wittenberg et al., 2017](#)).

In this paper, we test to what extent the degree of semantic incorporation of a referent – in our example, the action ('the hug'/'to hug') – influences how easily it can be referred to later in discourse. On a general level, the discourse status of referents (and how easily they can be referred to) can be accounted for by several cognitive concepts proposed in the literature: 'salience' ([Falk, 2014](#)), 'accessibility' ([Ariel, 1990](#)), 'referential activation' ([Chafe, 1976](#); [Lambrecht, 1994](#)), and many more. Here, we follow more recent research in adopting the broad term 'discourse prominence' to account for the relevant discourse properties (e.g., [Patterson and Schumacher, 2021](#); [von Heusinger and Schumacher, 2019](#); and others). [von Heusinger and Schumacher \(2019\)](#) argue that prominence is a structure-building principle in language, in addition to linearization and hierarchical structure; that is, the

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prominence structure of an utterance is predicted to have significant impact on the kind of linguistic structure that a particular utterance can co-occur with.

One question that follows from this approach is which role different grammatical choices play for the discourse status of particular referents, and hence the prominence structure of an utterance as a whole (see, e.g., Tomlin, 1997; Kaiser and Trueswell, 2004; Bosch et al., 2007; and many more on ‘subjecthood’ and passives vs. non-passives). Here, we use the phenomenon of semantic incorporation in the grammatical structure of light verb constructions as example for how a different grammatical choice can influence the prominence structure of an utterance. To measure the impact on discourse prominence, we focus on each construction’s (in)compatibility with different kinds of pronouns.

This approach is an important step forward in recent research on the grammar–discourse interface and prominence structure because our study is the first to investigate reference to events in nominal form through light verb constructions, under the perspective of discourse prominence. We study the co-occurrences of different linguistic structures in a discourse (a referential expression occurring in different syntactic environments and relevant pronouns), and in so doing we explore to what extent a grammatical choice has an impact on non-structural phenomena, like certain types of possible readings and inferences in the domain of pronoun resolution.

Our paper is structured as follows. In the next section, we first introduce the phenomenon of semantic incorporation, how it can be diagnosed, and the role of light verb constructions in this context. In Section 1.2, we then sketch some previous empirical research on two types of pronominal reference – such reference being one of the main diagnostics for both semantic incorporation and the discourse-prominence status of antecedents. Section 1.3 concludes the introductory part of our paper by briefly summarizing the empirical goals of our experimental studies and the predictions they are based on. Section 2 reports on a production experiment testing to what extent semantic incorporation influences the use of the object-denoting pronoun *it* in English. Section 3 presents a second production experiment, which builds on the results of our first experiment and investigated in more detail the exact preferences for using the demonstrative pronoun *that* in contexts of different degrees of semantic incorporation. Section 4 summarizes and concludes the paper by pointing out how the results of our experiments open a new path for current research on the structure of discourse prominence.

### 1.1. Different types of semantic incorporation and their diagnostics

Semantically incorporated nouns are a frequent phenomenon cross-linguistically (Baker, 1988, 2014, Carlson, 1977, 2006; Dayal, 2015; Farkas and De Swart, 2004; Krifka and Modarresi, 2016; Sadock, 1980). In many languages of the world, nouns can be syntactically and morphologically incorporated into a verbal construction to form a complex predicate. These nouns can denote persons, objects, or activities, and their contribution to the shades of predicate meaning varies, within and between languages. For instance, (1a) is an example in which the complex predicate conveys a habitual book-reading that the speaker is presently engaged in (Dede, 1986), and (1b) allows the speaker to remain noncommittal as to the number of salmon that were eaten (Van Geenhoven, 1998):

- (1) a. Aytül kitab otu-yor. (Turkish; Dede, 1986, ex. 5)  
 Aytül book read-PROG  
 ‘Aytül is reading a book/books.’  
 b. Arnajaraq eqalut- tur-p-u-q. (West Greenlandic, Van Geenhoven, 1998, ex. 5)  
 A.ABS salmon-eat-IND-[-TR]-S-3SG  
 ‘Arnajaraq ate salmon.’

English does not systematically incorporate nouns into verbal predicates in the same morphosyntactically marked way as Turkish, West Greenlandic, or many other languages do. However, there are a few cases in English that behave similarly, in the sense that they contribute the bulk of the predicative meaning. These are, for instance, bare nouns (2a, e.g., Stvan, 2009), weak definites (2b; e.g., Klein et al., 2013; Poesio, 1994; Schwarz, 2014), and, importantly in our context, light verb constructions (2c; e.g., Butt, 2010; Grimshaw and Mester, 1988):

- (2) a. Annie [went to class]<sub>i</sub>. It<sub>ij</sub> was quite boring.  
 b. Sam went to the doctor<sub>i</sub>. He<sub>i</sub> seemed competent.  
 c. Alexa [gave a hug]<sub>i</sub> to Mohit. It<sub>ij</sub> was very comforting.

Those English constructions in (2) are argued to exhibit a certain degree of semantic incorporation. For instance, observe the following diagnostics of semantically incorporated noun phrases, below discussed with weak definites and indefinites in English: First, the possibility of a distributed, ‘sloppy’ reading (3a) as opposed to strict readings with non-incorporated objects (3b); second, narrowest scope under negation (3c), as opposed to both possible scope readings with non-incorporated objects (3d); and finally, the retained possibility of pronominal reference (3e, Scholten and Aguilar-Guevara, 2010; notice that the pronoun *it* can refer to both the train and the event of taking the train in this example.)

- (3) a. Elsa took the train today, and Alan did too. → not necessarily the same train  
 b. Elsa fed the iguana today, and Alan did too. → very likely the same iguana  
 c. Charles didn’t take a train tonight.  
 i. It is not the case that Charles took a train tonight.  
 ii. #There is a train that Charles did not take.  
 d. Charles didn’t eat an apple.  
 i. It is not the case that Charles ate an apple.  
 ii. There is an apple that Charles did not eat.

- e. Barbara took the train<sub>i</sub> to Milan. It<sub>i</sub> was much nicer than a plane.

Interestingly, light verb constructions such as *give a hug* in (2c) above pattern with some of the cases of incorporated nouns in (3). Light verb constructions are complex predicates, consisting of a verb which is semantically ‘bleached’, contributing aspect, directionality or aktionsart, but little else; and an event nominal (the ‘light noun’). It has been argued that in some languages, the light noun is morphosyntactically (pseudo-)incorporated into the predicate (Grimshaw and Mester, 1988; Johns, 2009; Mohanan, 1995; Vaidya et al., 2016), and thus the line between light verb constructions and other complex predicates with incorporated nouns is hard to draw.

Light verb constructions are similar to other constructions featuring semantic incorporation because they exhibit the same features as outlined in (3) – even to a stronger degree due to the eventive nature of the noun: First, the necessity of a distributed, ‘sloppy’ reading (4a); second, narrowest scope under negation (4b); and, likely, the retained possibility of pronominal reference (4c):

- (4) a. Joe gave Jill a hug, and Stefano did, too. → not the same hug  
 b. Jeremy did not get a kiss.  
 i. It is not the case that Jeremy got kissed.  
 ii. #There exists a kiss that Jeremy didn’t get.  
 c. Joe gave Jill a kiss<sub>i</sub>. It<sub>i</sub> was very passionate.

However, there is an interesting contrast to the other cases of semantic incorporation in the domain of pronominal reference. In particular, both reference by means of a simple pronoun (*it*, 4c), and reference by using a demonstrative pronoun (*that*, 4c’) seems acceptable:

- (4) c’. Joe gave Jill a kiss<sub>i</sub>. That<sub>i</sub> was very passionate.

Intuitively, whereas *it* refers to the NP *a kiss* only, *that* seems to refer to the whole predicate *gave Jill a kiss* (see Wittenberg et al., 2021, for empirical data). However, as we sketched above, *giving a kiss* and *kiss* should have the same extension – the kissing event denoted in (4c) and (4c’).

It has long been noted that different anaphoric pronominal forms signal different prominence hierarchies of linguistic utterances (see Gundel et al., 1993 and Patterson and Schumacher, 2021 for a recent study). An open question indicated by the data in (4c) is where the incorporated nouns in light verb constructions fall on those hierarchies. To address this question, we have experimentally investigated the co-occurrence of light verb constructions with different anaphoric pronouns together with the co-occurrence of other types of semantic incorporation in the context of pronoun resolution (Sections 2 and 3). But before we turn to our experimental studies in detail, let us first provide some background on the different forms of pronominal reference we will use in our studies.

## 1.2. Two types of pronominal reference

In our paper, and building on the observations cited above, we restrict ourselves to two different English forms of anaphoric pronominal reference: the non-personal pronoun *it* and the demonstrative pronoun *that*. The hypothesis of *it* having different form-specific preferences from *that* builds on a long tradition of linguistic research on pronouns, often aided by psycholinguistic experiments (Arnold, 1998; Kaiser, 2010, 2013; Kaiser and Trueswell, 2008; and many others). These research programs have yielded valuable insights about the form-specific constraints of various referential expressions, the interactions of discourse structure, argument structure, and event structure, and the psycholinguistic mechanisms required in pronominal reference resolution.

One of these insights is that there are form-specific constraints on both a referent’s form, such as its gender and number, and its semantics, such as animacy (Kaiser, 2010; Kaiser and Trueswell, 2008.) For instance, *it* tends to quickly be resolved to singular non-personal inanimate objects (Brown-Schmidt et al., 2005), whereas the bare demonstrative *that* tends to serve as a bundler of complex conceptual structure (Çokal et al. 2016; Wittenberg et al., 2021; Loáiciga et al., 2018). These constraints are not absolute – *it* can and does refer to events, and *that* can and does refer to objects, but *ceteris paribus*, the opposite is more common.

In some instances, non-personal pronouns and demonstrative pronouns are in complementary distribution. To take only a few examples, only *it* can serve as an expletive subject (5a); only demonstratives can be used to introduce a new referent into the discourse (5b) or to express explicitly distal-proximal contrasts (5c); and simple non-personal pronouns seldom carry stress (5d):

- (5) a. It/\*This/\*That is raining.  
 b. \*It/This/?That is my friend Melissa/my new standing desk.  
 c. \*It/This/That (one) is yours, and \*it/this/that (one) is mine.  
 d. If I had known THAT/THIS/\*IT, I would have reacted differently!

In many other instances, it seems like *it*, *this*, and *that* occur in free variation (6):

- (6) a. Nobody knows how to model these data. It/This/That is an open problem.  
 b. Martin missed his flight, of course. I could have predicted it/this/that.  
 c. Let’s buy the local Chardonnay! This/That/It is a good one.

One reasonable hypothesis might thus be that apart from a few idiosyncratic pockets of restriction, the choice of one pronoun over the other may be governed by individual preferences. For instance, Ariel (2001) argued that the descriptions each of these pronouns provides for a referent are in essence identical. However, previous research has shown that there is

principled reason to believe that buried in random patterns are form-specific preferences for these different types of pronouns (Kaiser and Trueswell, 2008); and these preferences are rooted in the discourse prominence of their antecedents.

Different types of explanations have been attempted to describe these preferences. Some claim that the status of discourse prominence of a referent (accounted for in terms of topichood and saliency) drives the choice between pronouns (e.g., Gundel et al., 1993; see also Grosz et al., 1995; Grosz and Sidner, 1986; Bosch et al., 2003, for German). Crucially, however, in these discourse-centered lines of research on pronoun interpretation, there is little mention of the syntactic form of a previous referent, let alone of degree of semantic incorporation.

The psycholinguistic literature, on the other hand, has indeed found initial evidence that grammatical category and semantics of the referent may play a role in comprehending demonstrative and simple pronouns. Brown-Schmidt et al. (2005) found that people interpreted *it* to refer to the noun phrase *cup* in the sentence *Move the cup onto the saucer. Now move it onto the table*, but when the pronoun was *that*, people interpreted the referent to be the composite object *cup + saucer*, which has no clear linguistic noun phrase antecedent. A similar pattern of preference was found more recently by Çokal et al. (2016). In their eye-tracking-while-reading study, people had a similar preference to resolve simple non-personal pronouns (*it*) to noun phrases, whereas *that* was easily resolved to propositions. In a similar vein, a set of recent studies by Wittenberg et al. (2021) suggested that some form-specific constraints for *it* and *that* are rooted in the different mechanisms triggered by the pronouns to identify the referent, arguing that demonstrative pronouns access and bundle conceptual layers of representation, but simple pronouns tend to refer back to the nearest suitable noun phrase in the discourse.

Our present paper further contributes to this kind of more recent psycholinguistic studies, and it is based on the assumption that testing the felicity of the two different forms of pronominal reference (*it* and *that*) can contribute to our understanding of how exactly different degrees of semantic incorporation in the form of different grammatical choices affect the structure of discourse prominence (if such an effect can be detected at all). Given the background on both semantic incorporation (Section 1.1) and the two relevant forms of pronominal reference (this section), we now sketch the predictions and goals of our experiments.

### 1.3. Current studies and predictions

Our experiments are inspired by a study by Scholten and Aguilar-Guevara (2010) who tested the co-occurrence of different types of semantic incorporation and anaphoric pronouns in two two-way forced choice sentence completion studies in Dutch (examples presented here in their English translation). Their participants had to fill in the blank in vignettes such as (7–9), which contained weak definites (7), bare singulars (8), indefinites (9), and in a second experiment, weak definites (7), indefinites (9), and regular definites (10). Participants had to choose between a pronoun (*it*) and the same noun (i.e., *the radio* in (7)) as the critical noun phrase to fill in the blank. Scholten and Aguilar-Guevara (2010) reasoned along the lines of the accessibility hierarchy: The more prominent and thus accessible a referent in a discourse, the more likely it is referenced by an anaphoric pronoun (Ariel, 1990; Gundel et al. 1993).

- (7) Guido had listened to the radio this morning. He turned \_\_\_\_\_ up so loud that it woke up the neighbors.  
 (8) Coby went to bed early yesterday evening. She tossed about so much that she has cleaned \_\_\_\_\_ up again.  
 (9) Nienke searched for a folder yesterday. She has just found \_\_\_\_\_.  
 (10) Aniek cleaned the mat in the hall. After that she put \_\_\_\_\_ back.

Scholten and Aguilar-Guevara (2010) found that proportionally fewer pronouns were chosen to refer to weak definites (7) and bare singulars (8) than to indefinite (9) or definite noun phrases (10). The authors took this production data as evidence that semantically incorporated noun phrases are degraded in their referential status; but they also point out that their methodology was not sufficiently fine-grained to make any claims about the source of the pronoun dispreference in the comprehension or production process.

Based on these data, one reasonable prediction in the context of our studies would be that at least in English, the degree of the nouns' semantic incorporation should always affect the discourse prominence of referents. To test this claim, we use a range of semantically integrated referents in different constructions: weak definites as in (7), bare noun arguments as in (8), semantically un-integrated strong objects as in (9), and, importantly, also light verb constructions, such as *give a hug*, and their simple intransitive verb counterparts, such as *to hug*.

Thus, the two experimental studies in Sections 2 and 3 below fulfill two mutually informative goals: First, to refine our understanding of discourse prominence of semantically incorporated nouns; and second, enhancing our understanding of form-specific constraints of non-personal pronouns, which have been claimed to have a reference preference for objects, and demonstrative pronouns, which have been claimed to have a reference preference for events. By crossing these preferences with the degree of semantic incorporation of the referents, we will gain a clearer picture of how discourse prominence interacts with pronoun resolution.

We will be contrasting two types of referents (events and objects) for *it* and *that*, packaged in three different syntactic constructions: simple verbs (11a), light verb constructions, with the referent event as noun (11b), and full verbs with strong objects (11c). The referents are underlined ('VP' refers to 'verb phrase', and 'NP' refers to 'noun phrase', in this case, the syntactic object).

- (11) a. The teenager kicked his rival. (simple verb, referent: event/VP)  
 b. The teenager gave a kick to his rival. (light verb, referent: event/NP)  
 c. The teenager gave a note to his rival. (full verb/strong object, referent: object/NP)

- (12) a. **That** was rather mean.  
 b. **It** was rather mean.

The constructions in (11a–c) present a cline of semantic incorporation of an antecedent into the predicate. In (11a), the only possible referent by a subsequent non-personal pronoun (either (12a) or b) is the whole kicking event. The same is true for (11b): the only possible referent for both *that* or *it* is also the event ‘kick’ – but unlike in (11a), ‘kick’ is semantically less incorporated into the predicate, because it is packaged as an eventive noun in a light verb construction. And finally, in (11c), a *note* is a preferred antecedent for *it* – it is both semantically an inanimate object, and syntactically, a noun phrase – but the preferred antecedent for *that*, again, is the whole event of giving a note.

We will present two studies using these types of contrasts, in the form of a conceptual replication and extension of Scholten and Aguilar-Guevara (2010) forced-choice production study, to understand how reference to the nouns in light verb constructions (*give a kick*) and simple verbs (*kick*) patterns in comparison with full indefinite nouns such as in (11c), and bare nouns and weak definites, as outlined in Table 1.

**Table 1**

Examples of context sentences, referring sentences, and completion options in each condition tested in the two Experiments. The first two conditions, simple verb and light verb, are unique to our studies. Matched to these conditions by only exchanging the noun (“note” in this case), we also included strong objects like Scholten and Aguilar Guevara (2010), as well as weak definites and bare noun constructions. The latter two conditions were designed independently of the simple verb and light verb constructions and were not Latin-squared.

condition	context sentence	referring sentence	completion options
simple verb	<i>The teenager kicked his rival.</i>	___ was rather mean.	<i>it</i> (Exp.I) <i>that</i> (Exp.II) <i>the kick</i> (both)
light verb	<i>The teenager gave a kick to his rival.</i>	___ was rather mean.	<i>it</i> (Exp.I) <i>that</i> (Exp.II) <i>the kick</i> (both)
strong objects	<i>The teenager gave a note to his rival.</i>	___ was rather mean.	<i>it</i> (Exp.I) <i>that</i> (Exp.II) <i>the note</i> (both)
weak definites	<i>Sam took the train this morning.</i>	___ went from San Antonio to Dallas.	<i>it</i> (Exp.I) <i>that</i> (Exp.II) <i>the train</i> (both)
bare nouns	<i>Martin plays piano every day.</i>	___ is unfortunately not very well tuned.	<i>it</i> (Exp.I) <i>that</i> (Exp.II) <i>the piano</i> (both)

Our predictions for the two studies can be summarized as follows. In Experiment I (Section 2 below), people will choose between a simple pronoun (*it*) and repeating the referent. For this study, we predict a replication of Scholten and Aguilar-Guevara (2010) data for strong objects, bare nouns, and weak definites: Pronouns should be chosen at a higher proportion for strong objects than for either bare nouns or weak definites. Furthermore, we predict the lowest percentage of pronoun choices for simple verb sentences, and that light verb constructions should pattern roughly with weak definites and bare nouns. In Experiment II (Section 3 below), on the other hand, people choose between a demonstrative pronoun (*that*) and repeating the referent. Our general prediction for Experiment II was that demonstrative use should be preferred in reference to events.<sup>1</sup>

## 2. Experiment I: semantic incorporation and the non-personal pronoun *it*

This study served as extension and English replication of Scholten and Aguilar-Guevara (2010). The aim was to see what proportion of pronominal references is triggered by light verb constructions, compared to weak definites, bare noun phrases, simple verbs, and definite and indefinite objects. This proportion was taken to be a proxy for the degree of discourse prominence of the relevant referents.

### 2.1. Methods

#### 2.1.1. Participants

We recruited 60 self-described English native speakers from Amazon Mechanical Turk with IP addresses within the United States. They participated in the experiment for monetary compensation.

<sup>1</sup> Compared to simple pronouns in Experiment I, one could also predict overall lower tendencies to choose the demonstrative pronouns, since demonstratives tend to be used as discourse-structuring and discourse-shifting devices (e.g., Cornish, 2007; Fuchs and Schumacher, 2020; Mwinlaaru and Yap, 2021), and the experimental vignettes do not indicate a need to introduce a new topic or contrastive element; we thereby wanted to ensure that the pronoun *that* in our study does not indicate prominence in the upcoming discourse (cf. von Heusinger and Schumacher, 2019 notion of ‘dynamicity’ of prominence), but rather is used as a means to indicate discourse prominence of a previously mentioned entity, analogous to the discourse function of *it* in Experiment I.

2.1.2. Materials and procedure

As in Scholten and Aguilar-Guevara (2010) study, people read sentence pairs. The first sentence contained a referent (such as ‘train’ in Fig. 1), which was either a strong object, a weak definite, a bare singular, a noun phrase in a light verb construction, or a simple verb. The second sentence contained a blank in the subject position, which the participants had to fill with either the referent in the form of a definite noun phrase (*the train*), or with a non-personal pronoun (*it*) by clicking on the option that they deemed more appropriate.

We created 18 sets of vignettes containing simple verbs, light verbs, and full verbs with a strong indefinite object such as (11) above, and referring sentences such as in (12) above, in which the pronoun was replaced by a blank (see Table 1). The context in the referring sentence was compatible with both the object and the event interpretation, as in (12). Crucially, the pronoun *it* tends to refer to the object in the strong indefinite (e.g., in (11), *a note*, not the whole event of giving a note; see Wittenberg et al., 2021, Experiment 1a, for evidence from norming data). These items were Latin-squared within subjects.

In addition, each participant also saw eight items containing bare nouns and eight containing weak definites. Importantly, the context in the referring sentence made unambiguously clear that the blank to fill in was co-referential with the object in the sentence (see Appendix; the full data set and analysis scripts can be accessed under [https://osf.io/9r64w/?view\\_only=2a656d7b123b478a8a4b8f9455dff094](https://osf.io/9r64w/?view_only=2a656d7b123b478a8a4b8f9455dff094)). All items, including 24 fillers, were presented in random order.

Given the cline of semantic incorporation in our materials, we predicted that pronouns should be chosen at a higher proportion for strong objects than for either bare nouns or weak definites, and that simple verb sentences receive the lowest proportion of pronominal reference. The proportion of pronominal reference to light verb constructions is predicted to be comparable to weak definites and bare nouns.



Sam took the train this morning. \_\_\_\_ went from San Antonio to Dallas. Which word best fills in the blank?

- 1. It
- 2. The train

Fig. 1. Example of a forced-choice question.

2.2. Results

As Fig. 2 shows, our results are similar to Scholten and Aguilar Guevara (2010): Pronouns were overall more preferred as options to fill in the blanks than full noun phrases (mean percentage of pronoun choices: 61.6%).

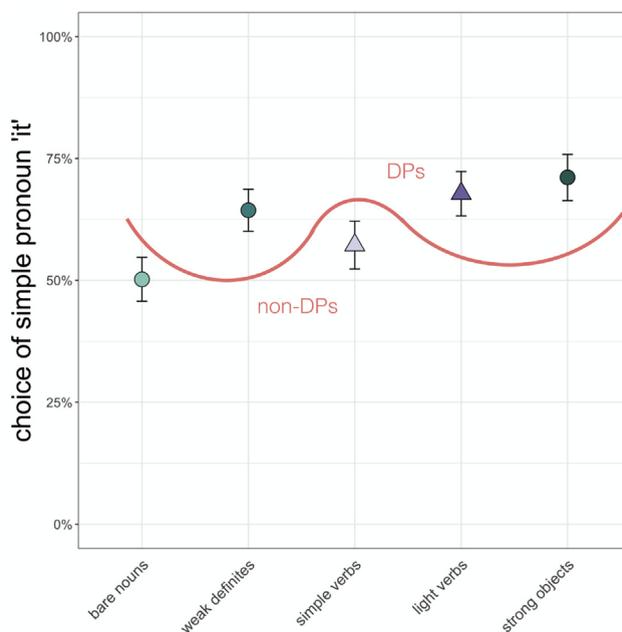


Fig. 2. Percentage of it pronoun choice, as opposed to repeating a referent, by type of semantic incorporation. Green circles represent conditions present in Scholten and Aguilar-Guevara (2010); purple triangles show added conditions here. Error bars represent standard errors based on 95% confidence intervals. Annotation to draw attention to relevant distinctions of morphosyntactic category (see Section 2.3). (For interpretation of the references to colour in this figure legend, the reader is referred to the Web version of this article.)

For data analysis, we predicted pronoun choice by condition as fixed effect, and participant and item as random factors, in a binomial generalized mixed effects model. We then used the `emmeans` package to extract the contrasts of interest and adjusted for multiple comparisons using Benjamini-Hochberg corrections. The results are summarized in Table 2:

**Table 2**  
Results of Experiment I; \* = significant after correcting for eight tests.

Contrast	$\beta$ -estimate	SE	z-ratio	p
strong objects - bare nouns	-1.27	0.40	-3.16	*0.011
strong objects - weak definites	-0.43	0.40	-1.05	0.409
weak definites - bare nouns	-0.84	0.45	-1.86	0.122
light verbs - weak definites	0.16	0.40	0.41	0.684
light verbs - bare nouns	1.01	0.40	2.52	*0.041
simple verbs - light verbs	-0.61	0.34	-1.81	0.122
light verbs - strong objects	0.26	0.34	0.77	0.517
simple verbs - bare nouns	0.395	0.397	1.00	0.427

Our a priori comparisons of interest were:

1. **Strong objects vs. weak definites vs. bare nouns.** This comparison in Scholten and Aguilar-Guevara (2010) established that referentiality was degraded for semantically incorporated nouns. As in their analysis, strong objects elicited significantly more pronoun choices (71.1%) than bare nouns (vs. 50.2%). In this study, the difference between strong objects and weak definites (64.4%), was only numerical, but not significant. In our study, weak definites also elicited more pronouns than bare nouns, although this contrast did not remain significant after correcting for multiple comparisons.
2. **Light verbs vs. weak definites vs. bare nouns.** We predicted that the degree of semantic incorporation and discourse prominence of the nominal referent should be similar between light verb constructions and weak definites, and thus expected no difference. Indeed, people chose pronouns after light verb constructions at about the same rate as after weak definites (67.8% vs. 64.4%). Also, like weak definites, light verb constructions elicited more pronoun choices than bare nouns, a contrast that was significant.
3. **Simple verbs vs. light verbs; light verbs vs. strong objects.** Finally, we had predicted that in terms of discourse accessibility, there should be a cline from simple verbs (least accessible) over light verbs to strong objects (most accessible). Indeed, rate of pronominal reference for light verb constructions was higher compared to simple verbs (although the contrast did not remain significant after correcting for multiple comparisons), but it was only numerically less than for strong objects.

Another interesting comparison, although secondary to the question, is that between simple verbs and bare nouns, which should behave similarly. In simple verbs, there is no nominal referent at all – the referent for the subsequent *it* was the event encoded within the verb (*The teenager kicked his rival*). Thus, one might have expected that discourse prominence in simple verbs is even more degraded than in bare nouns, which do have a nominal referent for *it* (*church*), but otherwise show the largest degree of semantic incorporation. However, we found that the blank was filled less often with a pronoun after bare noun sentences, repeating *church* 50.2% of the time, than after simple verbs, choosing *the kick* over a pronoun 57.2% of the time, although this trend was only numerical.

### 2.3. Discussion of Experiment I

This study served to deepen our understanding of the impact that different degrees of semantic incorporation can have on the degree of discourse prominence of antecedents. We extended previous studies by including comparisons between nouns in light verb constructions and simple verbs, thereby going beyond Scholten and Aguilar-Guevara (2010) work on bare nouns and weak definites in Dutch. Our results show that nouns in light verb constructions exhibit a similar level of discourse prominence as weak definites. This is the first psycholinguistic study investigating the discourse properties of nouns in light verb constructions, and as predicted, they pattern with weak definites in the sense that their discourse prominence and thus their accessibility by anaphoric means is degraded.

However, note that the two conditions differ in our materials at the level of semantic type: In the cases with light verb constructions, the pronoun *it* refers back to a whole event (e.g., *give a kiss*). In the examples with weak definites, on the other hand, *it* refers to an object only (e.g., *newspaper in read the newspaper*). We therefore conclude that the semantic type of the antecedent had no influence on the pronoun choice, also because we find both semantic types in the two conditions where the proportion of pronoun choice was lower (bare noun/reference to object; simple verb/reference to event).

There is a second finding that is interesting in this context: Contrary to our predictions, there is only a numerical difference in proportion of pronoun reference to objects in light verb constructions, compared to reference to strong objects. This clearly indicates that the degree of semantic incorporation does not influence the choice of pronouns. If neither semantic type of the referent nor degree of semantic incorporation had an impact, the only linguistic level we might want to look at to explain the

data patterns we found in our study is the grammatical form of our materials. It is striking that only in cases where the referent had the form of a full determiner phrase (i.e., noun phrase + determiner), proportion of pronoun choices and thus discourse prominence was high. In the cases where proportion of pronoun choices was low, the materials either contained NP referents without a determiner (bare nouns: e.g., *church* in *go to church*) or the referent was a whole VP (e.g., *kicked his rival*) and not the nominal element. Our data could therefore be taken to show that the morphosyntactic form of the antecedent had an impact on pronoun choices and thus the discourse-prominence status of the referent.

Our Experiment I only studied discourse prominence of semantically incorporated nouns in the context of the simple pronoun *it*, following Scholten and Aguilar-Guevara (2010). Previous studies have shown, however, that different pronouns have different form-specific preferences (see Section 1.2 above and, again, Kaiser and Trueswell, 2008; Brown-Schmidt et al., 2005; Çokal et al., 2016; Wittenberg et al., 2021): While *it* tends to resolve to suitable noun phrases easily accessible and prominent in the discourse, the demonstrative *that* has two main, orthogonal, properties: First, it signals a shift in discourse; and second, it tends to be resolved to events. With this in mind, we replicate Experiment I in the following study, substituting *that* for the pronoun choice (Strauss, 2002). Crucially, our aim was to investigate the use of *that* analogous to the pronoun *it* in Experiment I. That is, we were not interested in how *that* is used when indicating prominence in an upcoming discourse (its discourse-shifting role); rather, we wanted to explore when *that* is used as a referential device to signal discourse prominence of a previously mentioned entity. Again, our question was whether the different degrees of semantic incorporation in our materials play any role in the proportion of pronoun choices and thus in the degree of discourse prominence of the antecedent.

### 3. Experiment II: semantic incorporation and the demonstrative pronoun *that*

This study served as an extension of Experiment I, in order to understand the form-specific preferences of the bare demonstrative *that* when referring back to referents in sentences containing light verb constructions, compared to weak definites, bare noun phrases, simple verbs, and strong objects. The main predictions are twofold: First, we expect lower overall rates of pronoun choice, since our materials do not indicate a shift in discourse (see our remarks above). Second, we predict that *that* is chosen more often when the likely referent is an event. In the context of our experimental materials, this specifically predicts that there should be more demonstratives chosen for simple verbs, strong definites, and light verb constructions, compared to weak definites or bare noun phrases. As in Experiment I, the general question concerning all of our materials was whether the degree of semantic incorporation is relevant for pronoun choices and thus for signaling that a particular antecedent can be referred back to as a prominent entity in discourse.

#### 3.1. Methods

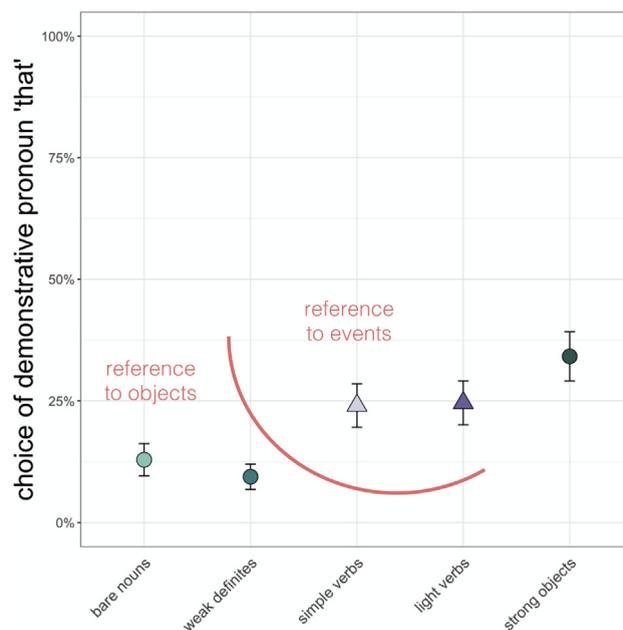
##### 3.1.1. Participants

Again, we recruited 60 self-described English native speakers from Amazon Mechanical Turk with IP addresses within the United States, participating for monetary compensation.

##### 3.1.2. Materials and procedure

The same methods and materials as in Experiment I were used, with the difference that the blank in the second sentence could be filled with either the referent in the form of a definite noun phrase (*the church*), or with a demonstrative pronoun (*that*) by clicking on the respective option (again, see Table 1 for an example, the Appendix for all stimuli. For the full data set and analysis scripts, see [https://osf.io/9r64w/?view\\_only=2a656d7b123b478a8a4b8f9455dff094](https://osf.io/9r64w/?view_only=2a656d7b123b478a8a4b8f9455dff094)).

In this Experiment, we predict an overall lower proportion of pronouns, but light verb constructions should pattern with simple verbs, yielding more pronoun choices than the other conditions. As for the impact of the degree of semantic incorporation in general, we had no specific hypothesis, given that our study is the first to explore the referential properties of *that* in this context.



**Fig. 3.** Percentage of demonstrative *that* choice, as opposed to repeating a referent, by type of semantic incorporation. Green circles represent conditions present in Scholten and Aguilar-Guevara (2010); purple triangles indicate added conditions here. Error bars represent standard errors based on 95% confidence intervals. Annotation to draw attention to relevant distinctions of reference to objects vs. reference to events (see Section 3.3). (For interpretation of the references to colour in this figure legend, the reader is referred to the Web version of this article.)

**Table 3**

Results of Experiment II; \* = significant after correction for six comparisons.

Contrast	$\beta$ -estimate	SE	z-ratio	p
light verbs - weak definites	1.30	0.55	2.34	0.029*
light verbs - bare nouns	1.38	0.57	2.45	0.029*
weak definites - bare nouns	-0.09	0.65	-0.14	0.893
simple verbs - light verbs	0.05	0.21	0.22	0.893
light verbs - strong objects	0.62	0.20	3.13	0.011*
simple verbs - strong objects	-0.57	0.20	-2.89	0.011*

### 3.2. Results

As Fig. 3 shows, our first overall prediction was confirmed: In contrast to Exp. I, demonstratives were less likely to be chosen to fill in the blanks, compared to full noun phrases (mean percentage of demonstrative choices: 19.8%). We analyzed the data as before, again correcting for multiple comparisons. Table 3 presents an overview of the statistical analysis:

Our main comparisons of interest for *that*-choices were:

- 1. Light verb constructions vs. weak definites vs. bare noun phrases.** As predicted, people tended to choose the demonstrative *that* significantly more often when referring back to the syntactic object of a light verb construction (24.6%) than to a weak definite (9.4%) or bare noun (12.9%), which were not significantly different from each other.
- 2. Simple verbs vs strong objects vs. light verb constructions.** Light verb constructions and simple verbs led to statistically indistinguishable proportions of demonstratives (24.6% vs. 24%), whereas strong objects led to significantly more demonstrative choices (34.1%) than either of the other conditions.

### 3.3. Discussion of Experiment II

This experiment asked whether the semantic type of an incorporated noun matters when participants are forced to choose between a demonstrative and repeating a referent. Based on this study, we could thus determine whether semantic type is relevant for different degrees of discourse prominence: If the demonstrative *that* – which is used as a pronoun referring back to prominent entities and not as a discourse-shifting device in our study – is used more often with the semantic type ‘event’ than with the type ‘object’, we would have evidence for the conclusion that semantic type can play a role in determining different degrees of discourse prominence. Note that we have not found any impact of semantic type on discourse prominence in Experiment I.

Specifically, we predicted that light verb constructions, although they patterned with other semantically incorporated nouns in Experiment I, will pattern with contexts in which the referent was an event (simple verbs and strong objects), because the semantically incorporated noun phrase in light verb constructions encodes an event (*give a kick*), whereas the nouns in weak definites (*read the newspaper*) and bare nouns (*go to school*) denote entities or objects. If the demonstrative *that* tends to prefer events as antecedents, more people should pick *that* in light verb constructions than in either weak definites or bare nouns. This prediction was borne out.

As already found in Experiment I, the degree of semantic incorporation did not play a role in the proportion of pronoun choices. In particular, we found that fully compositional phrases referring to events (*give a note*) led to even more *that*-references than either light verb constructions or simple verbs. This was not a result we had predicted, but it concurs with the findings of Experiment I: The degree of semantic incorporation seems to not play any role in determining the discourse prominence (signaled by pronoun choices) of antecedents. Rather, other linguistic levels seem to have an impact: linguistic form/morphosyntax (Experiment I) and semantic type (Experiment II). With those findings in mind, let us now turn to our general discussion of the two experimental studies.

#### 4. General discussion

This paper aimed to refine our general understanding of how opaque or transparent semantically incorporated nouns are to the discourse, while also sharpening our understanding of form-specific constraints of non-personal and demonstrative pronouns. In particular, we studied the degree to which semantic incorporation of nouns has an impact on discourse prominence of nominal referents by focusing on the (in)compatibility of different grammatical choices with different kinds of pronouns in a discourse. We thereby investigated, for the first time also involving light verb constructions, how exactly degrees of semantic incorporation of nouns into predicates can affect prominence structure in discourse pragmatics.

In particular, in our first study we replicated a result by [Scholten and Aguilar-Guevara \(2010\)](#) in a forced-choice production paradigm, and we found that pronominal reference to semantically incorporated nouns, such as in weak definites (*read the newspaper*) and bare nouns (*go to church*), is degraded, compared to reference to strong objects that were fully compositional with the verb (*give a note*). The same was true when an event referent was expressed solely by the verb (*to kick*). Light verb constructions such as *give a kick*, which ‘unpack’ the event referent into a noun phrase, make the event referent more accessible in the discourse, and are not significantly different from fully compositional expressions in this respect. Interestingly, however, we also found that nouns in light verb constructions pattern similarly to weak definites. This fits with other data on light verb constructions, which have been found to also fall in between categories in domains such as assignment of thematic roles ([Wittenberg and Snedeker, 2014](#); [Wittenberg et al., 2017](#)).

However, and contrary to our predictions, the degree of semantic incorporation seems not to be the decisive factor in determining the choice of pronoun and thus the discourse prominence of the antecedent: We found only a numerical difference in proportion of pronoun reference to objects in light verb constructions, compared to reference to strong objects of fully compositional verb phrases. Since neither semantic type (object vs. event) of the referent nor degree of semantic incorporation had an impact, we conclude that the level of morphosyntactic form might be relevant for explaining the data patterns we found in our study. In particular, in cases where the referent had the form of a full determiner phrase (i.e., noun phrase + determiner), proportion of pronoun choices and thus discourse prominence was high. On the other hand, in the cases where proportion of pronoun choices was low, the materials either contained NP referents without a determiner (bare nouns: e.g., *church* in *go to church*) or the referent was a whole VP (e.g., *kicked his rival*) and not the nominal element. Our data could therefore be taken to show that the morphosyntactic form of the antecedent had an impact on pronoun choices and thus the discourse-prominence status of the referent.

Crucially, in our second experiment, this one on the use of the English demonstrative *that*, we found that semantic type (object vs. event) is the crucial distinction determining pronoun choices and thus the prominence status of antecedents. Demonstrative pronouns were overall dispreferred, compared to repeating the referent as a whole. This is not surprising, since demonstratives are used not only for reference, but also to structure and shift a discourse, signaling that an upcoming entity is prominent in a discourse (see Footnote 1). In our studies, the sentences were designed such that there was no shift in discourse possible; any remaining pronoun choice was thus taken as a preference of demonstrative over repetition of the referent in a context where the pronoun *that* signals discourse prominence of a previously mentioned entity, and not of an upcoming one. Furthermore, the fault line of demonstrative choice was whether the demonstrative was used to refer back to the whole event, or an object. If the former, people tended to use more demonstratives; if the latter, they tended to use less. We thus found that semantic type was relevant for pronoun choices, and neither linguistic form nor the degree of semantic incorporation had any significant impact.

To our knowledge, this is the first psycholinguistic study testing the discourse properties of semantic incorporation by also factoring in light verb constructions. Our general finding was that the degree of semantic incorporation does not play a role in determining the discourse properties (signaled by pronoun choices) of antecedents. Other linguistic levels seem to influence prominence in a discourse in this context: linguistic form/morphosyntax (Experiment I, using *it*) and semantic type (Experiment II, using *that*).

Given these findings, we extended previous work on weak definites and bare noun phrases (see [Scholten and Aguilar-Guevara, 2010](#) for Dutch; but also [Brocher et al., 2020](#) for German). For bare noun phrases and weak definites, it has been argued that the non-specificity of the referent, coupled with an institutional function of the noun, leads to an interpretation of

the verb phrase that places the focus of attention on the activity (Aguilar Guevara, 2014; von Heusinger, 2002). Unlike previously discussed, we believe that this mechanism is not restricted to a few institutionalized activities: For instance, one can say that both Andreas and Remi went to the provost last week, but since they are at different universities, ‘the provost’ receives a sloppy reading. What both provosts have in common is their function; and ‘going to the provost’ conveys a type of activity (‘provost-going’), not the specific person token (Klein et al., 2013). Crucially, this is what weak definites have in common with light verb constructions and other noun incorporations: church-going, newspaper-reading, and kiss-giving all fall under a family of constructions that convey an activity periphrastically, while reducing the prototypicality of the thematic roles expressed. For instance, in *going to church*, ‘church’ is not a typical Goal, such as in *going to Vienna*; in *giving a kiss*, ‘kiss’ is not a typical Theme (Wittenberg and Snedeker, 2014; Wittenberg et al., 2017.) Thus, when comprehending a structure that contains a semantically incorporated noun, the discourse structure that is encoded in memory should be primarily that of the activity or event, with a lower resting activation of the noun.

All in all, our experimental investigation contributes to the general question of how an entity in a given discourse can become more or less prominent (von Heusinger and Schumacher, 2019). That is, while previous research has already shown that factors as diverse as word order, grammatical role, thematic role, and information structure can all impact the prominence structure of an utterance, we here presented an investigation testing whether different degrees of semantic incorporation and the different syntactic constructions associated with those degrees can affect the structure of discourse prominence.

Of course, if our conclusions about the impact of syntactic structure on discourse prominence are on the right track, this effect should be observable in natural discourse as well. For instance, if light verb constructions are used by speakers partly because they make the event more discourse-accessible, then this tendency should be found in corpora. For instance, we should expect to find more references to an event (e.g., “shower<sub>i</sub> ... it<sub>i</sub>”) after light verb constructions (“The athlete took a shower<sub>i</sub> after the marathon. It<sub>i</sub> was very refreshing.”) than after full verbs (“The athlete showered<sub>i</sub> after the marathon. It<sub>i</sub> was very refreshing.”)

Certainly, more research is needed on how syntax, semantics, and pragmatics interact in production and comprehension. We hope to have inspired some of it with this paper, in which we provided production data illuminating the interaction of syntax and pragmatics across clause boundaries.

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## Appendix I

Sentences used in both experiments. In Experiment I, blanks could be filled in by a pronoun (“it”) or the full noun phrase (“the class”); in Experiment II, they could be filled in by a demonstrative (“that”) or the full noun phrase (“the class”).

Bare noun phrases:

1. The girl went to class by herself. \_\_\_\_ was always quite boring.
2. George went to bed late last night. \_\_\_\_ was very comfortable.
3. All the neighbors went to church on Sundays. \_\_\_\_ was almost always totally packed.
4. Martin plays piano every day. \_\_\_\_ is unfortunately not very well tuned.
5. John has been in prison since last year. \_\_\_\_ is a very cruel place.
6. The boy reluctantly went to school every morning. \_\_\_\_ is not the best educational institution in his city, but fine.
7. The twins were dropped off at daycare every morning. \_\_\_\_ only has 40 kids.
8. My father went to work every day of his adult life. \_\_\_\_ was his purpose in life.

Weak definites:

1. Claire had to go to the supermarket. \_\_\_\_ was just around the corner.
2. The victims had to be brought to the hospital. \_\_\_\_ was an old, 1940s structure in another part of town.
3. The retirees often went to the park. \_\_\_\_ was around the corner from the nursing home.
4. Sam took the train this morning. \_\_\_\_ went from San Antonio to Dallas.
5. My brother is taking the car to go to work. \_\_\_\_ needs to go through smog inspection soon.
6. Alma likes to ride the subway in the mornings. \_\_\_\_ is always full of interesting people.
7. My mom reads the newspaper daily. \_\_\_\_ is a reliable source of non-fake news.
8. Alan and Elsa went to the opera last week. \_\_\_\_ is way too expensive for students, unfortunately.

## Simple verb/light verb/full verb constructions:

1. The writer kissed/gave a kiss/gave a letter to his fiancée. \_\_\_\_\_ was quite passionate.
2. Wilma hugged/gave a hug/gave a dog to her mother. \_\_\_\_\_ was very sweet.
3. The teenager kicked/gave a kick/gave a note to his rival. \_\_\_\_\_ was rather mean.
4. The trainer punched/gave a punch/gave an amulet to the boxer. \_\_\_\_\_ was quite powerful.
5. The young man complimented/gave a compliment/gave a bouquet to his girlfriend. \_\_\_\_\_ was incredibly thoughtful.
6. The kidnapper threatened/gave a threat/gave some water to his victim. \_\_\_\_\_ was icy cold.
7. The broker assessed/gave an assessment/gave a brochure of the property. \_\_\_\_\_ was quite reasonable.
8. The neighbor congratulated/gave congratulations/gave a casserole to the new parents.
9. The priest blessed/gave a blessing/gave a gown to the baby. \_\_\_\_\_ was very pure.
10. The mayor praised/gave praise/gave a check to the nonprofit. \_\_\_\_\_ was immensely generous.
11. The mom comforted/gave comfort/gave the bottle to her baby. \_\_\_\_\_ was very reassuring.
12. The singer signaled/gave a signal/gave a shirt to the drummer. \_\_\_\_\_ was very subtle.
13. The student answered/gave an answer/gave a pen to the teacher. \_\_\_\_\_ was very considerate.
14. The physical therapist massaged/gave a massage/gave a roller to the athlete. \_\_\_\_\_ was remarkably relaxing.
15. The grumpy old man scolded/gave a scolding/gave a note to the neighbor's son. \_\_\_\_\_ was quite harsh.
16. The investor called/gave a call/gave a file to his business partner. \_\_\_\_\_ was exceedingly important.
17. The robber warned/gave a warning/gave some loot to his buddies. \_\_\_\_\_ was very stealthy.
18. The wife supported/gave support/gave medicine to her ill husband. \_\_\_\_\_ was tremendously caring.

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