



Predictability affects production: Thematic roles can affect reference form selection



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ABSTRACT

Speakers use pronouns when referring to information that is topical, recently mentioned, or salient in the discourse. Although such information is often predictable, there is conflicting evidence about whether predictability affects reference form production. This debate centers on the question of whether reference form is influenced by the predictability of certain thematic roles. While some (Arnold, 2001) argue that referents in certain thematic roles are more likely to be pronominalized, others (Fukumura & van Gompel, 2010; Rohde & Kehler, 2014) argue that predictability does not play a role in determining referential form. We tested this puzzle in three experiments, using both a richly contextualized production paradigm, and two versions of the standard story-completion paradigm. In all experiments we manipulated the predictability of pairs of characters using transfer verbs. In all three experiments, we found that speakers used more pronouns when talking about the goal referent as opposed to the source. A rating experiment revealed that participants also expect goals to be mentioned more than sources. These results show that thematic role does affect both perceived predictability and the speaker's choice of reference form.

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Introduction

The selection of an appropriate referring expression is an important component of successful communication. For example, in relating a story about a villain, you need to make multiple decisions about how to refer to him. You would likely use a descriptive expression such as *Bob* or *this creepy guy* upon first mention, and when referring to him again, might choose a more reduced expression such as *he*.

It is well established that speakers use reduced forms (pronouns) under particular discourse conditions, such as when the referent has been recently mentioned, or was in the grammatical subject position of the last sentence (Ariel, 1990, 2001; Arnold, 1998, 2008, 2010; Brennan,

1995; Givon, 1983; Gundel, Hedberg, & Zacharski, 1993). One hypothesis is that recently and prominently mentioned things tend to be topical to the current discourse segment, and that pronouns are selected on the basis of the topicality of the referent (e.g., Givon, 1983; Kehler, Kertz, Rohde, & Elman, 2008; Kehler & Rohde, 2013; van Rij, van Rijn, & Hendriks, 2012).

Yet scholars disagree about whether pronoun production is also influenced by semantic considerations. This debate concerns two inter-related questions: (1) Do speakers use pronouns more for entities that are predictable? (2) Do speakers use pronouns more to refer to entities that occurred in certain thematic roles in the previous utterance? These questions are relevant to building a comprehensive model of reference production, and yet the literature includes conflicting claims for both. These questions are linked, because thematic roles are associated with the likelihood that an entity will be re-mentioned in the next sentence.

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Given a particular discourse context, comprehenders have consistent expectations that some characters are more likely to be mentioned again, meaning that they are relatively more predictable as referents. For example, the sentences in (1) depict events in which people tend to assume that one participant is the more likely cause of the event (e.g., Brown & Fish, 1983; Hartshorne, O'Donnell, & Tenenbaum, 2015). If a causal statement includes a pronoun (“because he...”), participants tend to interpret the pronoun as coreferential with the implicit cause (Stevenson, Crawley, & Kleinman, 1994). Similarly, the sentences in (2) depict transfer-of-possession events, in which readers tend to expect that a subsequent event will mention the receiver of the object (Rohde & Kehler, 2014; Stevenson et al., 1994).

- (1a). The butler blamed the chauffeur because he... (murdered someone).
 (1b). The butler impressed the chauffeur because he... (figured out the case).
 (2a). The butler gave the threatening note to the chauffeur and he... (turned it in to the police).
 (2b). The butler received a ticking bomb from the chauffeur and he... (chucked it into the river).

In discourses like these, the predictability of a referent being mentioned is identified with its thematic role in the event. The thematic role is determined by the verb, and represents the semantic role of the participants in an event. In 1, the stimulus role is the expected continuation (the chauffeur in 1a, the butler in 1b), while the experiencer is not. In 2, the goal is the expected continuation (the chauffeur in 1a, the butler in 1b), while the source is not.

Critically, the effects of thematic roles on referential predictability are closely tied to the relationship between the two utterances (Ehrlich, 1980; Kehler, 2002; Kehler & Rohde, 2013; Stevenson et al., 1994). In the implicit causality sentences, people expect the causal character to be mentioned if they expect the speaker to produce an utterance about the cause of the first event. This expectation is created by the connector *because* in (1), but if the sentence continues with *so he...*, expectations can sometimes reverse (Ehrlich, 1980; Stevenson et al., 1994), although it depends on the verb (Hartshorne et al., 2015). In (2), the expectation of the goal reference is conditioned on the expectation that the speaker will describe the result of the first event (Stevenson et al., 1994).

The question we are concerned with here is what speakers do in production. Following sentences like (1) or (2), does the speaker choose the pronoun *he* more often for predictable thematic roles than others? Critically, this question is debated, and there is conflicting evidence in the literature. In fact, researchers debate both the question of whether thematic roles matter in particular, and whether predictability matters in general.

One view is that thematic roles do influence pronoun production, and that the reason they do is that they modulate referential predictability. Arnold (1998, 2001) proposed that entities become more accessible when they have a high likelihood of being mentioned again in the

discourse (see also Givon, 1983; Tily & Piantadosi, 2009), which increases the speaker's likelihood of using pronouns. Arnold's Expectancy Hypothesis suggests that predictability comes from numerous sources, including the fact that grammatical subjects are more likely to be mentioned again than nonsubjects, and that recently mentioned entities are more likely to be mentioned than less recent entities (Arnold, 1998, 2010). In support of this, Arnold (2001) presented results from a story-continuation experiment, in which participants were asked to invent continuations for passages. These passages included a critical transfer-of-possession prompt, e.g. *Lisa gave the leftover pie to Brendan*. Results revealed that when participants referred to the second character, they used pronouns more often for goals than sources. A corpus analysis confirmed that goals are more likely to be mentioned again than sources.

Kaiser, Li, and Holsinger (2011) also report that thematic roles influence pronoun usage, using prompts with agent and patient roles, such as *Mary slapped Lisa... As a result...*, and *Lisa was slapped by Mary... As a result...*. They found that when speakers chose pronouns, they were more likely to refer to the character in the patient role (Lisa) than the one in the agent role.¹ However, the authors also argue that thematic roles are not linked to predictability, based on the observation that the rate of the patient bias for actives and passives was not mirrored by the overall predictability of patients for actives and passives.

By contrast, several studies have reported the opposite, that thematic roles do not influence the speaker's choice of referential form (Fukumura & van Gompel, 2010; Kehler et al., 2008; Rohde & Kehler, 2014). All of these studies also used a story-continuation methodology. For example, Fukumura and van Gompel (2010) examined verbs like *scared* or *feared*, which denote emotional states. They asked participants to generate continuation prompts such as *Gary scared Anna because...*, or *Anna feared Gary because...*. They asked whether participants were more likely to continue with mention of the character in the stimulus role (Gary), which is generally considered the more likely cause of the event. They found that indeed, the stimulus was mentioned more often, supporting the conclusion that thematic roles influenced preferences about **who** would be referred to. That is, they affect the referential predictability of the character. However, in none of these experiments were pronouns produced more frequently for either stimulus or experiencer roles. Instead, participants followed the first-mentioned/subject bias, preferring pronouns when they mentioned the first character, and names when they mentioned the second. The lack of a thematic role effect has led these authors to argue that predictability has no effect on reference production. Instead, they suggest that topicality is the sole determinant of pronoun selection (Fukumura & van Gompel, 2010; Kehler & Rohde, 2013).

However, there are several reasons to reconsider the question of whether thematic roles affect referential form, and how both are related to predictability. First, pre-

¹ Note that they report their data to answer the question “Given that a pronoun is produced, what is it more likely to refer to”. They do not provide data for the rate of pronoun use overall for each thematic role/grammatical role category, which is the question we ask here.

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