## Till Poppels\* Explaining ellipsis without identity\*

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**Abstract:** Ellipsis is a pervasive phenomenon across the world's languages, and it is easy to see why: it allows speakers to omit certain parts of their utterances while nonetheless conveying their full meaning, which contributes to making linguistic communication highly efficient. While there is broad consensus that elliptical utterances depend on the context in some way, the nature of this dependency remains controversial. In this paper, I re-evaluate the merits of two classes of ellipsis theories: identity theories, which posit that material can be elided only if it is identical to a linguistic antecedent; and referential theories, which assume that ellipsis is enabled by the same underlying mechanism that governs other forms of discourse reference. I argue that both empirical and theoretical considerations favor referential theories in this comparison, and in doing so I outline new adequacy criteria for linguistic theories aimed at explaining the nature of the linguistic and non-linguistic context and how it interfaces with context-dependent linguistic devices.

Keywords: discourse reference; ellipsis; identity theories

## **1** Introduction

The fact that languages around the world provide ways for speakers to elide certain parts of their utterances contributes to making linguistic communication highly efficient, as illustrated in (1): instead of repeating material that is redundant in the context of the surrounding discourse (shown in brackets), it can be omitted without changing the meaning of the utterance. In order for communication to succeed, comprehenders must, of course, be able to fill in the missing pieces, which they usually do effortlessly:

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- (1) a. Someone else may have solved the problem, but I did not (solve the problem).
  - b. Did you not tell your friends about the game today? -I did, but I forgot to tell them where (the game is).

Given the communicative benefits of ellipsis, one might expect it to be a simple affair: whenever some part of an utterance is redundant in some way, eliding it should be permissible if not preferred. As it turns out, however, defining the notion of redundancy that ellipsis requires is so complicated that more than five decades of linguistic research have been insufficient to describe, let alone explain, the conditions that make ellipsis felicitous. Consider the following examples, which differ only slightly from the ones in (1) but are nonetheless much less acceptable ('#' preceding the brackets indicates reduced optionality).

- (2) a. The problem may have been solved, but I did not #(solve the problem).
  - b. Did you not tell your friends about the game today? —I did, but I forgot to tell them how long #(the game is).

The central thesis of this paper is that one of the reasons that ellipsis remains elusive to date is that the literature has been experiencing an identity crisis – an overreliance on the axiomatic assumption that material can be elided only if the linguistic context provides an identical copy of it. This assumption, which is at the heart of an influential line of theories known as "identity theories," provides a straightforward explanation for the acceptability of some uses of ellipsis and the unacceptability of others. For example, the context in (1a) is expected to enable ellipsis because it provides an identical copy of the to-be-elided material, and the unacceptability of (2a) similarly follows from the fact that the antecedent has been passivized and therefore no longer satisfies the identity requirement. But there are also many counterexamples that suggest that the identity condition is neither necessary nor sufficient for characterizing the distribution of ellipsis.

This article focuses on two types of ellipsis: sluicing, a type of clausal ellipsis exemplified in (1b); and VP-ellipsis, shown in (1a). Sluicing is a cross-linguistically prevalent form of ellipsis that involves the omission of clauses that are embedded under interrogative wh-phrases. VP-ellipsis, on the other hand, involves the omission of sub-clausal material.

While it is uncontroversial that the use of ellipsis is context-dependent, theories of ellipsis differ in terms of their answer to a fundamental theoretical question that goes back at least to Hankamer and Sag (1976): What is the nature of the dependency between an elliptical utterance and its context, and which part of the language architecture is responsible for resolving it? According to the seminal work of Hankamer and Sag (1976) and Sag and Hankamer (1984), which I will jointly refer to as "H&S," there are two natural classes of anaphoric expressions, which are "interpreted by entirely different means" (Sag and Hankamer 1984, p. 338): model-interpretive ("deep") anaphora, which involves reference to a representation in the interlocutors' shared mental model of the discourse (known as the "discourse model"); and "surface" anaphora, which depends directly on a linguistic constituent known as the "antecedent," without being mediated by the discourse model. H&S argue that these different classes of anaphoric devices have distinctive diagnostic properties. First, model-interpretive anaphoric expressions can refer exophorically, i.e. in the absence of a linguistic antecedent, while surface anaphors, which depend directly on the linguistic antecedent, cannot. Based on this diagnostic, Hankamer and Sag (1976) draw on data like (3a–b) to argue that certain elliptical expressions, including VP-ellipsis and sluicing, must be forms of surface anaphora, whereas other anaphoric expressions, such as *do it* in (3c), involve model-interpretive anaphora.

(3) [Context: Hankamer produces a gun, points it offstage and fires, whereupon scream is heard]

a.	Sag: Jesus,	(Hankamer and Sag 1976, ex. 43)
	I wonder who #(has been shot).	
b.	Sag: Jorge, you shouldn't have	(Sag and Hankamer 1984, ex. 5d)
	#(fired the gun).	

c. Sag: Jorge, you shouldn't have done it. (Sag and Hankamer 1984, ex. 5e)

Secondly, H&S suggest that surface anaphors, but not model-interpretive referring expressions, are sensitive to morphosyntactic properties of their linguistic antecedents. That diagnostic also supports their conclusion that VP-ellipsis and sluicing are instances of surface anaphora, since they show sensitivity to voice mismatches between the ellipsis clause and the antecedent clause, whereas *do it*, once again, behaves differently:

(4) Maggie was made fun of, but she couldn't see...
a. ...who #(made fun of her). Sluicing
b. ...who did #(make fun of her). VP-ellipsis
c. ...who did it. do it anaphora

H&S's bipartite theory of anaphoric context dependence, which construes ellipsis as fundamentally different from other (model-interpretive) anaphoric devices, set the stage for a long-standing and influential tradition of so-called "identity theories" of ellipsis (Chung 2006, 2013; Chung et al. 1995, 2011; Fiengo and May 1994; Merchant 2001; Rudin 2019; Sag 1976, among many others). According to these theories, elliptical constructions like VP-ellipsis and sluicing are governed by an

ellipsis-specific mechanism that requires the elided material to be identical to its antecedent. By contrast, running counter to H&S's conclusion, referential approaches to ellipsis have pursued the hypothesis that ellipsis is governed by the same mechanisms of discourse reference that support other anaphoric expressions (Barker 2013; Hardt 1993; Jager 2005; Kehler 2000; Wasow 1972; Webber 1978, and many others).

The remainder of this paper will discuss both of these theoretical approaches in detail and consider arguments for and against each. Section 2 surveys different flavors of identity theories that have been proposed over time and critically evaluates the theoretical and empirical implications of this approach. Section 3 will then discuss referential theories of ellipsis by extending H&S's original argumentation to other diagnostic properties beyond exophora and mismatch facts. I will argue (i) that both VP-ellipsis and sluicing do exhibit all of the hallmark features of discourse reference, and (ii) that non-elliptical referring expressions do show the kind of sensitivity to the morphosyntactic form of their antecedents that H&S considered unique to ellipsis. Finally, Section 4 offers a comparison between identity theories and referential theories of ellipsis, including a re-evaluation of two high-stakes empirical phenomena – argument-structure mismatches and connectivity effects – and argues that referential theories offer a solution to the theoretical problems that are inherent to the identity-based approach.

## 2 The identity crisis

Starting from the consensus position that elliptical utterances depend on the context in some way, the central claim behind the class of theories that I refer to as "identity theories" can be understood as reducing that dependency to a particular part of the context:

(5) **Central claim:** the context-sensitivity of elliptical utterances is reducible to a yet-to-be-defined IDENTITY relation between the ellipsis site and its linguistic antecedent.

Some version of this assumption has served as the starting point for a large number of theoretical proposals (Chung 2013; Chung et al. 1995; Dalrymple et al. 1991; Elbourne 2008; Lipták 2015; Merchant 2001; Rudin 2019; Sag 1976; Van Craenenbroeck and Merchant 2013; Vicente 2019, among many others). In fact, it is often presupposed axiomatically and merely frames the main research question that concerns identity theories of ellipsis, which Lipták (2015) refers to as the "quest for identity": assuming that some identity relation must hold between the ellipsis site and its antecedent, how does this relation have to be defined in order to correctly classify elliptical utterances

as acceptable or unacceptable. As outlined below, this research program is complicated by the recalcitrant nature of ellipsis data, which has spurred a cottage industry of research that follows what I call an "incremental fine-tuning approach": the definition of the grammatically mandated identity condition is incrementally revised to accommodate increasingly large sets of previously problematic data. In what follows, I will illustrate this approach by introducing prototypical examples of identity theories that have been proposed over time, along with the empirical considerations that motivated them.

At first glance, the notion that ellipsis requires identity between the elided material and its antecedent is straightforward enough. Consider the following minimal pairs:

(6) a. A: Nina talked to someone.

b.

- B: Oh yeah? I wonder...
- (ii) ...who (Nina talked to)?
- (ii) ...who #(Nina had an argument with)?
- A: Nina had an argument with someone.
  - B: I'm surprised. Are you sure...
  - (i) ....she did #(talk to someone)?
  - (ii) ...she did (have an argument with someone)?

To explain the impossibility of (6a-ii) and (6b-i) in terms of identity, we start with the assumption that the meaning of the ellipsis clause is derived (in the usual way) from the elided material, and I will use strike-out notation to make that assumption explicit:

- (7) a. A: Nina talked to someone.
  - B: Oh yeah? I wonder...
  - (i) ....who she talked to?
  - (ii) # ...who she had an argument with?
  - b. *A: Nina had an argument with someone.* 
    - B: I'm surprised. Are you sure...
    - (i) # ...she did talk to someone?
    - (ii) ... she did have an argument with someone?

Since identity theories permit ellipsis only when the to-be-elided material is identical to its antecedent, the interpretations in (7a-ii) and (7b-i) can only be conveyed non-elliptically (and, in fact, there is nothing wrong with those interpretations in the absence of ellipsis). Conversely, when there is an exact match between the two, ellipsis is licensed and the corresponding interpretation becomes available. However, as we will see over the course of this section, requiring an exact match at all levels of representation is overly strict since various types of "mismatches" do not, in fact, prevent ellipsis.

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Consider the following examples, which appear to license ellipsis in spite of a lexical mismatch between the elided material and its antecedent (<u>underlined</u>):

(8) a. They arrested <u>Alex</u> , though he thought they		They arrested <u>Alex</u> , though he thought they	(Merchant 2001,
		wouldn't <del>arrest</del> <u>him</u> .	ex. 38)

b. A: <u>I</u> will call <u>my</u> sister later today.
B: When exactly <del>will you call your sister</del>?

In (8a), Principle C of binding theory (Chomsky 1986) prevents the ellipsis clause from containing the proper noun *Alex*, causing a mismatch between the elided pronoun *him* and its antecedent *Alex*, but the utterance is nonetheless acceptable. Similarly, (8b) is acceptable despite the mismatch in indexical pronouns, which is caused by the fact that the antecedent and ellipsis clauses are uttered by different people. This type of mismatch was termed "vehicle change" by Fiengo and May (1994), who proposed that the identity condition that governs ellipsis must be defined in terms of equivalence classes such that mismatches between elements in the same equivalence class are permitted. Specifically, they argue that lexical items that are co-referential, as is the case in both (8a) and (8b), are to be considered equivalent in the relevant sense, which allows them to maintain an otherwise strict syntactic identity condition for ellipsis: elided material must be syntactically identical to its antecedent *modulo* "vehicle change."

This is the first example of what I mean by the term "fine-tuning": by adding qualifications to the definition of identity, Fiengo and May succeed in "capturing" a wider range of data, but those qualifications make the theory less parsimonious because they are not independently motivated beyond the very data they are designed to capture. In Merchant's (2001, p. 25) words, "[t]o pursue a theory of [syntactic identity] while considering the cases of 'vehicle change' to have been sufficiently dealt with simply by naming them is to confuse the diagnosis with the cure."

To avoid this issue, Merchant (2001) proposes a more radical revision of the identity condition: On the basis of examples like (8) (among several other types of examples), he rejects the notion that ellipsis is governed by syntactic identity altogether. In its place, he proposes a semantic identity condition, known as "e-GIVENNESS," which remains one of the most influential theories of ellipsis to date. At its core, e-GIVENNESS is based on Schwarzschild's (1999) notion of Givenness, which is independently motivated in that it accounts for patterns of focus marking and accent placement, but Merchant's account goes beyond mere Givenness in that it also contains a "reverse entailment" requirement, underlined below, that only applies to ellipsis (hence the "e" in e-GIVENNESS):

(9) e-GIVENNESS (Merchant 2001): an expression ε is e-GIVEN iff ε has a salient antecedent A such that, modulo ∃-type shifting, A entails the existential F-closure of ε, and ε entails the existential F-closure of A.

While this formulation of identity successfully captures "vehicle change" cases like (8a–b) by virtue of the fact that the mismatching elements are semantically equivalent, it is crucial to note that the independently motivated part of e-GIVENNESS by itself – Schwarzschild's notion of Givenness – vastly overgenerates as a constraint on ellipsis: any context entails an unlimited number of propositions, but only those that are "close enough" to the antecedent can be elided. Therefore, the "reverse entailment" clause in the definition of e-GIVENNESS is crucial, yet there are to my knowledge no other linguistic phenomena that require anything like it: the notion that an antecedent element has to be entailed by the "downstream" element that depends on it is, to my knowledge, unique to e-GIVENNESS. While this raises concerns of theoretical parsimony, which will be addressed in Section 4, the proposal additionally has empirical short-comings in its predictions for both VP-ellipsis and sluicing, which we turn to next.

First, consider the following examples of VP-ellipsis from Hartman (2009):<sup>1</sup>

(10)	a.	*Mary will beat someone at chess, and John will <del>lose</del>	(Hartman 2009,
		<del>to someone at chess</del> , too.	ex. 3)
	b.	*John lives with his grandparent, and Bill also	(Hartman 2009,
		does <del>live with his grandchild</del> .	ex. 8)

Both of these interpretations are falsely predicted to be available because they contain relational opposites that ensure that the mutual entailment requirement of e-GIVENNESS is met: beating someone at chess entails that someone loses (i.e., the antecedent in (10a) entails the existential closure of the elided VP), and having lost to someone entails that someone won (i.e., the ellipsis clause entails the existential closure of the antecedent VP). Likewise, the relational nouns *grandparent* and *grandchild* in (10b) ensure mutual entailment in much the same way (i.e., John living with his grandparent entails that someone, namely his grandparent, lives with their grandchild, and vice versa), but ellipsis is again impossible.

**<sup>1</sup>** Nash-Webber (1977) makes a very similar observation that predates both Hartman (2009) and Merchant (2001) by more than two decades:

<sup>(</sup>i) \*Bruce sold a waffle iron to Wendy, and an electric wok was bought (Nash-Webber 1977, by Wendy too. ex. 22)

This example involves two independent mismatches: a voice mismatch between an active antecedent clause and a passive ellipsis clause; and a lexical mismatch between the relational opposites *sold* and *bought*, which is equivalent to Hartman's examples.

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Second, sluicing is unacceptable when the antecedent clause and the ellipsis clause differ in voice (Chung 2006, 2013; Merchant 2013b), as illustrated by the following minimal set:

- (11) a. Joe was murdered, but we don't know by who he was murdered.
  - b. Someone murdered Joe, but we don't know who murdered him.
  - c. \*Joe was murdered, but we don't know who murdered him.
  - d. \*Someone murdered Joe, but we don't know by who he was murdered.

When the antecedent and ellipsis clauses are both in either active or passive voice, as in (11a–b), sluicing succeeds, but when there is a voice mismatch, as in (11c–d), ellipsis appears to be impossible. Since this difference in voice does not affect the truth-conditional meaning of the utterance, however, e-GIVENNESS is satisfied throughout and sluicing is predicted to be insensitive to voice mismatches (Merchant 2013b). This issue (along with other related ones) has motivated a departure from purely semantic identity conditions towards more elaborate "hybrid" conditions that reference both semantic and syntactic representations (AnderBois 2014; Barros 2014; Chung 2006, 2013; Merchant 2013a, 2013b).

A particularly influential hybrid identity proposal is due to Chung (2006), who builds on e-GIVENNESS and extends it by a lexico-syntactic requirement that she refers to as the "No New Words constraint." According to this constraint, which is sometimes referred to as "Chung's generalization," ellipsis is only permitted when the elided material contains no lexical items that are not also contained in the antecedent. By preventing the ellipsis of "New Words" (underlined), Chung's generalization correctly classifies the Hartman cases, voice mismatches, as well as other argument-structure mismatches as ungrammatical:

(12)	a.	*Mary will beat someone at chess, and John will	≈ (11a)
		<u>lose to</u> <del>someone at chess</del> .	
	b.	*John lives with his grandparent, and Bill also	= (11b)
		does <del>live with his</del> <del>grandchild</del> .	
	с.	*Joe was murdered, but we don't know who <u>mu</u>	<del>rdered</del> = (12c)
		him. <sup>2</sup>	
	d.	*Someone murdered Joe, but we don't know	= (12d)
		by who <del>he <u>was</u> murdered</del> .	
	e.	*Mary was flirting, but they wouldn't say who	(Chung 2006, ex. 19d)
		<del>she was flirting</del> <u>with</u> .	

**<sup>2</sup>** Chung (2006) explicitly treats murdered.PASSIVE and murdered.ACTIVE as non-identical in order to rule out passive-active mismatches of this kind.

While banning lexical mismatches no doubt improves on previous proposals in terms of empirical coverage, this improvement comes at the cost of exploding complexity because it ends up having to explicitly carve out several exceptions. First, syntactic traces have to be ignored in order to accommodate sluices that involve a trace with no explicit correlate in the antecedent clause (Merchant 2013a):

#### (13) John is eating, but I can't see what, he is eating t.

This type of sluicing, which Chung et al. (1995) termed "sprouting," accounts for approximately 75% of cases found in natural language corpora (Anand and Hardt 2016; Nykiel 2010), and in order to avoid falsely classifying them as ungrammatical, the elided trace must be excepted from the "No New Words" constraint.

Secondly, while e-GIVENNESS was ostensibly motivated by the desire to render arbitrary "vehicle change" equivalence classes obsolete, Chung's ban against lexical mismatches reintroduces the need for an exception for syntactically distinct but co-referential lexical elements, like *Alex* and *him* in (8a), repeated below.

(14) They arrested Alex, though he thought they wouldn't  $\frac{\text{arrest}}{\text{arrest}} = (8a)$ 

Finally, the definition of "vehicle change" must be expanded to cover mismatching elements that are syntactically co-indexed but not co-referential, as shown in the following examples:

(15)	a.	[Which person] <sub>1</sub> will win the next election	(Ginzburg 1992, ex. 302a)
		and by what margin <del>will <u>they</u> win it</del> ?	
	b.	Who <sub>1</sub> did the suspect call $t_1$ and when	(Merchant 2001, ex. 112b)
		<i>did the suspect call <u>them</u></i> ?	
	с.	I don't know who <sub>1</sub> said what <sub>2</sub> or why <del>they<sub>1</sub></del>	(Rudin 2019, ex. 19a)
		<del>said it</del> 2.	

In these examples, an elided pronoun must count as non-distinct from a wh element in the antecedent clause (or the trace it leaves behind). While Merchant (2001) claims that such examples are covered under e-GIVENNESS, Rudin (2019) argues, following Merchant (1999), that the two elements must be semantically distinct because the antecedent receives an interrogative interpretation whereas the ellipsis clause is non-interrogative. More specifically, it appears that the elided pronoun refers to an implicit answer to the question raised by the antecedent, and as long as questions are semantically distinct from their answers, mutual entailment should fail in those cases.

Despite its return to "vehicle change" and the need to carve out additional *ad-hoc* exceptions, some version of Chung's generalization has since been incorporated into various other "hybrid identity" proposals (AnderBois 2010, 2014;

Chung 2013; Merchant 2013a, 2013b, among others).<sup>3</sup> Furthermore, a similar hybrid approach, which combines syntactic and semantic identity by way of a syntactic inference mechanism, has been proposed by Thoms (2015). Following Thoms (2015), proposes to extend the definition of identity by an inferential mechanism termed "antecedent accommodation," whereby identity is evaluated against an augmented set of potential antecedents, containing both the explicitly available one as well as a set of additional, accommodated antecedents that are derived from it. Adapting machinery proposed by Katzir (2007) for generating alternative utterances to be used for deriving implicatures, Thoms (2015, ex. 51) posits the following algorithm for defining the augmented set of potential antecedents.

- (16) a. A set of additional antecedents, Ad(A), may be accommodated on the basis of the original (overt) antecedent A.
  - b. The members of Ad(A) are alternatives derived from A by
    - (i) deletion
    - (ii) contraction
    - (iii) substitution
  - c. Complexity constraint: all members of Ad(A) must be at most as complex as the overt antecedent A.<sup>4</sup>
  - d. Semantic constraint: all members of Ad(A) must be semantically identical to the overt antecedent A.

While Thoms' identity condition itself is purely syntactic in nature, the set of accommodatable antecedents is constrained by semantic identity. Together, these assumptions amount to a hybrid account that derives Chung's generalization by prohibiting additions or substitutions of semantically distinct lexical material, while allowing lexical substitutions that preserve semantic identity (and do not violate the complexity constraint either). As a result, Thoms' account correctly rules out Hartman cases on the grounds that they involve semantically non-identical lexical mismatches (e.g., *grandparent* vs. *grandchild*), while allowing "vehicle change" substitutions that do not violate semantic identity (e.g., *Alex* vs. *him*).

**<sup>3</sup>** Note that not all hybrid identity theories adopt e-givenness as the semantic component. AnderBois (2014) and Barros (2014), for example, instead propose that the ellipsis clause must address a salient Question Under Discussion (Roberts 1998, 2012).

**<sup>4</sup>** The purpose of this constraint is to explain various patterns that are immaterial for our present discussion; see Thoms (2015) for details. Note, however, that this constraint incorrectly rules out the "extended vehicle change" example in (15b), since the elided pronoun *they* is strictly more complex (according to Thoms' definition of complexity) than the syntactic trace in the antecedent that constitutes its correlate.

Since all of the examples we have seen so far are problematic for either syntactic or semantic identity theories, hybrid approaches are able to achieve improved empirical coverage by referencing both levels of representation. However, there are several remaining counterexamples in which ellipsis succeeds in spite of various types of mismatches (in finiteness, tense, modality, and polarity) that violate e-GIVENNESS, the No New Words constraint, or both, and which cannot be rescued by antecedent accommodation, either:

(17) a. The baseball player went public with his desire to be traded. He doesn't care where he will be traded.

(finiteness mismatch; Rudin 2019, ex. 21b)

- b. Your favorite plant is alive, but you can never be sure how long it will be alive. (tense mismatch; Rudin 2019, ex. 22)
- c. Sally knows that there is always the potential for awful things to happen, but she doesn't know when <del>awful things</del> <u>might</u> happen.

(modality mismatch; Rudin 2019, ex. 23a)

d. Either the Board grants the license by December 15 or it explains why <del>the</del> Board <u>did not</u> grant the license by December 15.

(polarity mismatch; Kroll 2019, ex. 30)

The underlined lexical elements violate Chung's generalization – as well as Thoms' constraint against additions and semantically non-identical substitutions – and should therefore render each of these examples ungrammatical. Based on examples like these, Rudin (2019) proposes an additional amendment<sup>5</sup> to the identity condition by restricting its domain. Specifically, he observes that the mismatches in (17) are all located above what he terms the "eventive core" of the elided material (defined as the highest elided *v*P) and concludes that the domain of identity must be restricted accordingly: only the material inside the eventive core is required to be syntactically identical to the antecedent, while all elements outside of it can be freely elided without being subject to identity. This is a rather consequential amendment, since it undermines a central intuition that is shared across all theories of ellipsis, i.e. that material can only be elided if it is provided by the context. Since the identity requirement is an attempt at defining contextual "Givenness" in

**<sup>5</sup>** While Rudin (2019) rejects e-givenness and instead advocates for a return to a purely syntactic identity condition, he ends up having to encode the same exceptions discussed above in the context of Chung's generalization: traces in sprouting cases, "vehicle change" of co-referential elements, and mismatches between lexical elements that do not co-refer but are nonetheless syntactically co-indexed are all explicitly excepted from his identity condition.

a way that captures the distribution of ellipsis, restricting it to a proper subset of the elided material leaves the elidability of the exempted material unexplained.

In addition to this theoretical concern and the additional complexity Rudin's proposal introduces compared to previous accounts, it also faces empirical challenges that come in various flavors. First, as pointed out by Kehler (personal communication), Rudin's identity condition falsely rules out the following example of sluicing, which is modeled after cases of VP-ellipsis from Kehler (2016):

(18) [All of the girls]<sub>1</sub> hope that they<sub>1</sub> will be asked to the prom by someone, but in  $Sue_2$ 's case, I can't imagine who  $she_2$  will be asked by.

The elided pronoun *she* is co-indexed with *Sue*, but *Sue* is not part of the antecedent. While *she* intuitively corresponds to *all of the girls*, that correspondence is established by the phrase *in Sue's case* in a way that does not involve syntactic coindexation (see Kehler 2016, for an analysis of *as for X* phrases in terms of the Question Under Discussion). Indeed, Rudin (2019) discusses a similar example in footnote 14 and concedes that it is falsely classified as ungrammatical under his identity condition.

Secondly, consider the following German sluice from Paape (2016) in which the elided material requires a different word order than the antecedent:

(19) Ein Sympathisant der Opposition hatte die Rebellen A sympathizer.NOM of the opposition had the rebels.ACC *laut einem Bericht* maßgeblich unterstützt, aber die Regierung konnte according to a report decisively supported, but the government could nicht nachweisen, wie der Sympathisant der Opposition die not prove, how the smypthesizer of the opposition the Rebellen unterstützt hatte. rebels. ACC supported had. 'According to a report, a sympathizer of the opposition had supported the rebels, but the government couldn't prove how.'

German main clauses require the finite verb to be in second position, as is the case in the antecedent clause in this example. Subordinate clauses (like the sluiced clause), however, require verb-final word order, which causes a word-order mismatch between the elided material and the antecedent clause. Since Rudin (2019) defines syntactic identity in terms of a "structure matching" algorithm that requires all elided syntactic heads to be dominated by the exact same sequence of syntactic nodes as their correlates in the antecedent, it is sensitive to word order mismatches and falsely classifies this fully acceptable example as ungrammatical.<sup>6</sup>

<sup>6</sup> See Merchant (2001, p. 21) for a similar argument regarding Dutch, another V2 language.

Finally, Rudin's proposal is – just like all other existing identity theories that I am aware of – vulnerable to a set of lexical mismatches that are not covered under vehicle change, syntactic co-indexing, or Chung's exception for inflectional mismatches. Consider first the following examples from Kehler (2002):

- (20) a. Mary's boyfriend gave her his school picture, just as all schoolboys do give their girlfriends their schoolpicture.
  - b. A: Bob's mother cleans up after him all the time.
    - *B: I'm surprised; most parents these days won't <del>clean up after their <u>children</u>.</del>*

In these examples there is a lexical mismatch between the elided object NPs *girl-friends* and *children* and their correlates *boyfriend* and *him*, respectively.<sup>7</sup> Similarly, the following two examples involve mismatching main verbs but are nonetheless relatively acceptable:

- (21) a. A: Can I borrow your textbook over the weekend?
  - B: I can't <u>lend</u> it to you: I'll need it myself. (Poppels and Kehler 2018)
    b. Fan: Can I please get a few autographs?

Manager: Sure, how many do you want? (Poppels and Kehler to appear)

All of the lexical mismatches in (20) and (21) are located within the "eventive core" and thus violate Rudin's identity condition.<sup>8</sup>

To summarize, the last few decades have seen a series of amendments to the basic idea that the elided material must be identical to its antecedent in order for ellipsis to be grammatical. Each amendment was motivated by otherwise problematic ellipsis data and has contributed to the incremental fine-tuning of a particular theory-internal parameter – the definition of identity – in order to maximize empirical coverage. This state of affairs is exacerbated by the fact that there are two further fine-tuning strategies that target theory-external degrees of freedom in the attempt to rescue the identity assumption from counterexamples: the re-analysis of mismatching elements as "underlyingly identical" (e.g., Johnson 2001; Lasnik 1995, 2015; Merchant 2013a); and attempts to explain certain

**<sup>7</sup>** These examples are superficially similar to the Hartman cases discussed above in that they involve relational nouns, but they afford the opposite conclusion: while Hartman's examples demonstrate that e-givenness generates interpretations that do not, in fact, arise, the examples here highlight an undergeneration problem with lexico-syntactic identity by demonstrating that interpretations that shouldn't arise, do.

**<sup>8</sup>** While Rudin (2019) is primarily concerned with sluicing, he does suggest that his identity condition may be extended to VP-ellipsis, in which the eventive core necessarily contains all of the elided material. Even if his proposal were restricted to sluicing, however, the challenge raised by (21b) remains.

mismatches as cases of "acceptable ungrammaticality" that reflect properties of the processor, rather than the grammar (e.g., Arregui et al. 2006; Frazier 2013; Grant et al. 2012).<sup>9</sup>

Collectively, these strategies exploit five sources of degrees of freedom in theorizing about ellipsis: (i) the level of representation at which identity is defined (we have seen syntactic, semantic, and hybrid conditions); (ii) ad-hoc exceptions, for example for traces or mismatches that result from "vehicle change;" (iii) the domain in which identity applies (e.g. Rudin's "eventive core" restriction); (iv) theory-external assumptions about the underlying representation of mismatching elements; and (v) the division of labor between the grammar and the processor. Despite this decades-long "quest for identity" (Lipták 2015, p. 155), numerous remaining mismatches elude even the most complex identity theories to date, giving rise to what I refer to as the "identity crisis." Aside from the remaining empirical short-comings, this approach is problematic for purely theoretical reasons: since the fine-tuning of both theory-internal and -external parameters is tailored to ellipsis-specific observations and not independently motivated, it risks "overfitting" the theory of ellipsis to the data, which undermines its explanatory value. Secondly, identity theories, following H&S (Hankamer and Sag 1976; Sag and Hankamer 1984), are based on the fundamental assumption that ellipsis is governed by a *sui generis* mechanism – the identity requirement – that does not explain any other phenomena outside the domain of ellipsis, which raises concerns of theoretical parsimony. Neither of these concerns applies to referential theories of ellipsis, which I turn to next.

## **3** Referential theories of ellipsis

In this section, I will review a class of theories that reject the notion that ellipsis is governed by an identity condition and instead analyze it as a form of discourse reference, according to the following basic assumption (Barker 2013; Hardt 1993; Kehler 1993a, 1993b, 2000; Poppels and Kehler 2019; Webber 1978, and many others).

(22) **Central claim:** Elliptical utterances contain a silent *pro*-form that completes the meaning of the ellipsis clause anaphorically by recruiting the same mechanism that governs non-elliptical forms of discourse reference.

Following Klein (1987), several referential theories of ellipsis have been formalized within the framework of Discourse Representation Theory (e.g., Bos 1993; Hardt

**<sup>9</sup>** See Poppels (2020, Sections 2.1 and 2.2) for a detailed discussion that is beyond the scope of the present paper.

1992). By contrast, I remain agnostic as to the exact nature of the mechanisms that enable discourse reference and merely assume that the ellipsis site contains an unpronounced pro-form, say  $\varphi$ , which obtains its meaning through the same mechanism that enables other discourse-referential devices:

#### (23) Luke was supposed to show up, but he didn't $\varphi$ .

Many aspects of discourse reference are poorly understood, and the processes and constraints that enable inferential reference resolution remain particularly mysterious to date. Since those aspects are of central importance to the present discussion, adopting any particular implementational framework is unlikely to yield any theoretical insights. Instead, I propose deriving predictions of referential theories of ellipsis by analogy with non-elliptical forms of discourse reference.

As we did in the context of identity theories, we will ground our discussion of referential theories of ellipsis in H&S (Hankamer and Sag 1976; Sag and Hankamer 1984). Recall that they argued that ellipsis does not engage the discourse-referential system, and instead is governed by an ellipsis-specific dependency between the ellipsis site and its antecedent. They came to this conclusion based on the observation that ellipsis differs from non-elliptical forms of discourse reference in two fundamental ways: its inability to refer exophorically to situationally evoked entities; and its sensitivity to morphosyntactic properties of the antecedent, such as voice.

In this section, I will revisit both of these arguments against a larger set of empirical data and argue that H&S's conclusion is not warranted. In Section 3.2, I will first review the evidence regarding exophoric ellipsis and extend H&S's reasoning to five other diagnostic properties of discourse reference. As we will see, both VP-ellipsis and sluicing pattern closely with other discourse-referential devices. Section 3.3 then addresses the issue of sensitivity to the morphosyntactic form of the antecedent, reviewing evidence that, contra H&S, non-elliptical forms of reference do exhibit similar behavior. This will prepare the ground for asking what factors affect the acceptability of using particular referring expressions in particular contexts and outlining open questions about the distribution of ellipsis from the perspective of referential theories. I will begin by summarizing key properties of non-elliptical forms of discourse reference.

#### 3.1 What is discourse reference?

The following utterances all contain at least one discourse-referential expression (underlined):

(24)	a.	Robert tried to	address t	he room,	but nobody	v was	listening to	) <u>him</u> .
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- b. [Context: Approaching someone else's dog in the street.] *Can I pet <u>her</u>?*
- c. [Context: Walking up to a balloon salesperson] How much is the blue one with green stripes? (adapted from Nash-Webber 1977, ex. 11)
  d. Susan called Becky to discuss their dinner plans.
  Harry themany and Communication (Drings 1001, or 12), heard on Tig.
- e. *Harry threw up and Sam* (Prince 1981, ex. 13b; based on Tic *stepped in <u>it</u>.* Douloureux 1971)
- f. When Jack was kidnapped, <u>they</u> kept him in a dark room for days. (adapted from similar examples in Clark 1975)

At least since Karttunen (1976), it has been widely assumed that referring expressions like those in (24) do not refer to entities in the world directly, but rather to representations of them in a shared representational space between interlocutors, known as the "discourse model." Each interlocutors' model of the discourse contains a repository of discourse entities that they mutually know to be available for reference.<sup>10</sup> Discourse entities can be introduced into the discourse model in three ways. First, they can be introduced explicitly by their linguistic antecedent, as, for example, in (24a) in which the definite pronoun *him* refers to the person denoted by the antecedent NP Robert. Secondly, referents can enter into the discourse model directly from the situational context the interlocutors are mutually aware of, without being mediated by a linguistic utterance, as illustrated by the pronoun her in (24b) and the indefinite pronoun one in (24c). Finally, discourse entities can be introduced inferentially, and these inferences can take a variety of forms. For example, *their* in (24d) refers to a set of two individuals that can be inferred by combining the denotations of the two separate antecedent NPs Susan and Becky. Similarly, the referent of *it* in (24e) is not introduced explicitly and instead must be inferred as the expected product of an explicitly denoted event. Finally, *they* in (24f) succeeds in referring to Jack's kidnappers although they are not mentioned explicitly and must instead be inferred from the mention of the kidnapping event.

In spite of what the term "discourse entity" might suggest, referential expressions are not restricted to individuals or sets of individuals: interlocutors can also refer to a range of other types of objects, including propositions, as in (25a–b),

**<sup>10</sup>** Mutual knowledge goes beyond merely shared knowledge in that it is recursive (Lewis 1969; Clark and Marshall 1981): Interlocutors *A* and *B* mutually know *P* iff *Q*, where *Q* is true iff both *A* and *B* know *P* and *Q*. Mutually known discourse referents are thus entities that both interlocutors know to be available for reference and for which they both know that they both know that they are potential referents, and so forth.

speech acts, as in (25c), situations evoked by potentially large stretches of discourse, as in (25d), as well as events, as illustrated in (25e).

- (25) a. *A*: I read today that coffee can have both positive and negative health implications.
  - B: I didn't know that.
  - b. You're not going to believe *it*, but I just won the Powerball.
  - c. Donald: I'm going to release my tax returns once the audit is complete. Everyone: <u>That</u>'s a lie.
  - d. [Context: Alice just finished telling Kendrick an elaborate story about all the frustrating things that happened to her this week.] *Kendrick: <u>That</u> sucks!*
  - e. There's a long history in the US of abusing scripture to advance the causes of bigotry & discrimination. Slaveholders did <u>it</u>. Segregationists did <u>it</u>. White supremacists do <u>it</u>. And <u>it</u> continues. Yet if Christ repeated himself today, they'd likely denounce him as a radical, too.<sup>11</sup>

Given the range of objects that can serve as potential referents, and the fact that even novel entities can become available for reference through inference, comprehenders are faced with the challenge of identifying the intended referent whenever they encounter a referring expression. Fortunately for them, different referring expressions come with instructions that constrain the set of possible referents in a variety of ways. For example, entity-level pronouns that are marked for gender or number, such as *he*, *she*, or *they*, are generally restricted to referents with the same gender/number properties. Those constraints can be observed with respect to entities introduced by conventionally gendered proper nouns, as in (26a), grammatically gender-marked antecedent nouns, as in (26b), and even *pluralia tantum* antecedents, as in (26c), which are grammatically marked as plural even though they denote notionally singular entities. While these constraints associated with grammatical gender/number marking may appear to be due to an agreement relation between the referring expression and its antecedent, they persist even when there is no overt linguistic antecedent and the intended referent is instead evoked situationally, as shown in (27).<sup>12</sup>

- (i) [Context: The speaker points to the addressee's glasses.]
  - a. Those look nice on you.
  - b. *#That looks nice on you.*

<sup>11</sup> This example is from a tweet by U.S. Congresswoman Alexandria Ocasio-Cortez: https://twitter. com/AOC/status/1233795153585897473?s=20.

**<sup>12</sup>** An anonymous reviewer brought to my attention that Culicover and Jackendoff (2005, pp. 261–263) make a similar observation with respect to the following example, where *those*, but not *that*, is felicitous:

(26) a. Have you seen Beth? – Nope, I haven't seen {her  $\mid \#him$ } in days.<sup>13</sup>

- Ich brauche einen neuen Computer, {*dieser.*MASC | #*diese.*FEM} b. Ι need {this-one.masc | #this-one.fem} а new computer.masc. hier ist zu. langsam here is too slow. 'I need a new computer, this one is too slow.'
- c. I haven't worn these pants in years, I even forgot {they | #it} existed.
- (27) a. [Context: after rummaging through a pile of laundry for minutes, the speaker triumphantly pulls out the pants he was looking for and announces...]*I found {them | #it}!* 
  - b. [Context: after scanning the night sky for the north star, the speaker finally points at it and says...]
    - (i) Da ist {er.MASC | #sie.FEM}, ich hab {ihn.MASC | #sie.FEM} gefunden. There is {he.MASC | #she.FEM}, I have {him.MASC | #her.FEM} found.
      'There it is, I found it.'

While constraints based on the gender/number marking of the referring expression may be relatively straightforward, other constraints are less transparent. For example, consider once more (25d), repeated below, in which Kendrick refers to a complex situation described in the preceding discourse. In this context, *that* is perfectly felicitous, but using *it* instead is not. Once the situation has been referred to by *that*, however, the pattern flips: it can now be felicitously referred to by *it*, and *that* is now marked.

(28) [Context: Alice just finished telling Kendrick an elaborate story about all the frustrating things that happened to her this week.] *Kendrick: {That | #It} sucks! Alice: {#That | It} really does.* 

Some research suggests that such differences between referring expressions can be partially explained in terms of the contextual salience of the intended referent (e.g., Gundel et al. 1993; Miller 2011), its cognitive accessibility (Ariel 1988, 1991), or the complexity of the referent (Brown-Schmidt et al. 2005). As we will see in more detail in Section 3.3, these notions remain poorly understood and do not fully capture the constraints on the use of discourse reference. For present purposes,

**<sup>13</sup>** Of course referring to Beth as him could be perfectly felicitous if Beth was mutually known to identify as male.

however, it is sufficient to highlight two important points with respect to the differences we observe in (28) and (27): first, referring expressions vary widely with respect to the types of discourse entities they can refer to and the constraints that govern their felicitous use; second, these constraints range from relatively transparent rules about gender/number features to more "nebulous" notions, such as salience, accessibility, referent complexity, and others.

The assumptions about discourse reference outlined above corresponds closely to Sag and Hankamer's (1984) characterization of model-interpretive ("deep") anaphora. I will now return to the central claim behind referential theories of ellipsis and argue that both VP-ellipsis and sluicing exhibit a series of diagnostic properties of discourse reference.

#### 3.2 Diagnostic properties of discourse reference

This section discusses six diagnostic properties of discourse reference and argues that both VP-ellipsis and sluicing exhibit all of them. This line of argumentation is an extension of the argument from exophora proposed by H&S (Hankamer and Sag 1976; Sag and Hankamer 1984): they identified the capacity for exophoric (i.e., antecedent-less) reference as a diagnostic property shared among forms of discourse reference and then argued that exophoric ellipsis is not felicitous in the same contexts that non-elliptical reference is. I will begin by revisiting the data around exophora and argue for the opposite conclusion, i.e. that exophoric ellipsis is, in fact, possible and that it furthermore appears to be constrained in much the same way as non-elliptical exophora. I will then consider five other diagnostic properties that further support the analogy between ellipsis and discourse reference: the possibility of (i) multiple "split" antecedents, (ii) non-local antecedents, and (iii) cataphoric reference; the ability to (iv) trigger "sloppy" interpretations, and (v) refer to inferentially introduced discourse entities. As we will see, both VP-ellipsis and sluicing exhibit all of these properties, which – following the same logic as H&S – supports the conclusion that they engage the same system that governs other forms of discourse reference. Besides this "argument-by-analogy," some of the data we consider below raise independent challenges for identity theories, further strengthening the argument that ellipsis should be analyzed as a form of discourse reference. Finally, I will briefly consider other types of ellipsis beyond VP-ellipsis and sluicing at the end of this section.

#### 3.2.1 Exophoric ellipsis

Recall from Section 3.1 that discourse entities can be evoked by the situational context in the absence of a linguistic antecedent:

(29)	a.	[Context: Approaching someone else's dog in the street.]	
		Can I pet her? = (24b)	
	b. [Context: A bends down to lift a 500 lb. barbell.]		
	B: With your back, do you think you should <u>do it</u> ?		
		(Sproat and Ward 1987; cited in Ward et al. 1991	, ex. 27b)

According to H&S, exophoric uses of ellipsis are infelicitous, as demonstrated by examples like the following.

(30)	[Context: Hankamer produces a gun, points it offstage and fires,				
	wh	ereupon a scream is heard]			
	a.	Sag: Jesus, I wonder who	(Hankamer and Sag 1976, ex. 43)		
		#(has been shot).			
	b.	Sag: Jorge, you shouldn't have	(Sag and Hankamer 1984, ex. 5d)		
		#(fired the gun).			

However, the picture is more complex than that. As noted in a footnote in Hankamer and Sag (1976) and later developed in Schachter (1977) in more detail, certain uses of ellipsis do succeed exophorically, as shown in (31). While Hankamer (1978) convincingly shows that many such cases are only felicitous in "illocutionarily charged" utterances (e.g., imperatives) and argues that they are therefore peripheral to the theory of ellipsis, exophoric uses of ellipsis also occur in purely assertive or information-seeking utterances and can be felicitous given sufficient contextual support, as exemplified in (32).

(31)	a.	[Context: Hankamer brandishes a cleaver,	advances on Sag]
		Sag: Don't (stab me)! My God, please	(Hankamer and Sag 1976,
		don't (stab me)!	footnote 18)
	b.	[Context: John pours another martini for M	lary.]
		Mary: I really shouldn't (have another marti	<i>ni</i> ). (Schachter 1977, ex. 4)
	c.	itting, makes as if to take one	
		of the spare chairs there]	
		John: May I (sit)?	
		Mary: Please do (sit).	(Schachter 1977, ex. 7) d.
	d.	[Context: Pouring someone a drink.]	
		Tell me when (to stop pouring).	

(32) a. [Context: soccer commentator describing an attack culminating in a shot on goal, but it isn't clear for a few seconds whether the ball will hit the target.]

*Henry is through. Valdés comes. Will it (go in)? Will it (go in)? Will it (go in)? Will it (go in)? Yes, it will (go in).*<sup>14</sup>

- b. [Context: New York Governor Andrew Cuomo in conversation with Chris Hayes on the topic of U.S. concentration camps for migrants.] They [=the U.S. federal government] don't even want to tell the state how many (children have been detained) and in what facilities (they have been detained). That's why we started the law suit.<sup>15</sup>
- c. [Context: I'm ordering in barely fluent French at a bakery in Paris. The counterperson switches to English and asks:]
   *Which country (are you from)?*

Based on similar observations in a corpus analysis of exophoric VP-ellipsis, Miller and Pullum (2013) argue what matters is not whether an elliptical expression is conventionalized or not, but rather whether its discourse conditions are met by the situational context. Following Kertz (2013), they consider two different uses of VP-ellipsis that differ with respect to the information structure of the ellipsis clause and argue that they are felicitous under different discourse conditions: auxiliary-focus VP-ellipsis, in which the subject of the ellipsis clause is deaccented (and often pronominalized); and subject-focus VP-ellipsis, in which the subject receives contrastive focus. According to Miller and Pullum, VP-ellipsis is felicitous only to the extent that the linguistic or non-linguistic context raises a question that fits the information structure of the ellipsis clause: a polar question for auxiliary-focus VP-ellipsis; and a wh-question for subject-focus VP-ellipsis.<sup>16</sup> Looking back at the example involving VP-ellipsis in (32a), this generalization holds: The non-linguistic context raises a highly salient question as to whether the ball will hit the target, and the commentator's utterance *Will it?* has exactly the information structure Miller and Pullum would predict: auxiliary focus and a pronominalized and deaccented subject. In their corpus

**<sup>14</sup>** This example naturally occurred during the commentary of a 2009 Clásico between Real Madrid and FC Barcelona. At the time of writing, it was available at https://youtu.be/RXeoU4K8UpY?t=357.

**<sup>15</sup>** This example was observed on the U.S. cable news show All in with Chris Hayes on June 21, 2018.

**<sup>16</sup>** Although Miller and Pullum (2013) do not couch their analysis in terms of the Question Under Discussion (QUD; Roberts 1998, 2012; Ginzburg and Sag 2000) explicitly, the discourse conditions they articulate can be derived from a general principle known as "Question-Answer congruence" (Roberts 1998, 2012): any utterance is interpreted as the answer to a (often implicit) QUD with the same information structure.

investigation, Miller and Pullum (2013) find that naturally occurring examples of exophoric VP-ellipsis overwhelmingly exhibit auxiliary focus, which they attribute to the fact that polar questions arise more easily from the non-linguistic context than wh-questions. The same line of reasoning also explains why even auxiliary-focus VP-ellipsis is only rarely used exophorically: since overt assertions represent an effective way of raising a polar QUD<sup>17</sup> and also provide an explicit antecedent VP, the discourse conditions of (auxiliary-focus) VP-ellipsis are most often met when a linguistic antecedent is present. On that view, then, the "requirement" for an explicit linguistic antecedent is purely epiphenomenal: even non-conventionalized elliptical utterances are felicitous as long as the nonlinguistic context provides enough support to satisfy the discourse conditions of the elliptical device in question.

While Miller and Pullum's analysis is restricted to VP-ellipsis and further research will be necessary to develop similar analyses for other types of ellipsis, it is important to note that even non-elliptical forms of discourse reference require extra contextual support to be used exophorically, as illustrated in (33).

- (33) [Context: after silently deliberating whether or not to order the house burger, I address the waiter who just came over.]
  - a. #Do you think I should do it?
  - b. *#Does it come with fries?*
  - c. #I'll have <u>one</u> medium-rare, please.

The non-linguistic context in this example does not serve up the intended referent with sufficient salience and as a result the use of *do it* anaphora, *it* or *one* is infelicitous. Furthermore, contextual support for exophora does not apply across the board: even within a context that enables the exophoric use of a certain referring expression, others may nonetheless be infelicitous. For example, in (34a), the son can use *that* felicitously to refer exophorically to his Dad's joke, whereas *it* is marked in the same context. Conversely, once the intended referent is mentioned explicitly by the phrase *this joke, that* is marked whereas *it* is now felicitous.<sup>18</sup>

**<sup>17</sup>** For example, in Ginzburg's (2012) *Dialogue Game Board* system, the assertion of p adds the polar question p? to the top of the Question Under Discussion (QUD) stack, under the assumption that asserting p is a proposal to add p to the common ground, which has to be accepted (often implicitly) by all interlocutors before moving on.

**<sup>18</sup>** I consider the reference to the joke exophoric because, even though the joke is performed linguistically, it is not mentioned linguistically. Consequently, it enters into the discourse model by virtue of the fact that both interlocutors are (mutually) aware of the joke and can thus refer to it exophorically. Alternatively, one could imagine a non-linguistically performed joke, for example in the form of a clown's performance, and the same pattern would emerge: *that*, but not *it*, is felicitous exophorically, and the reverse is true once the referent is denoted linguistically.

- (34) a. Dad: What do you call a dinosaur that's sleepy? A dino-snore. Son: {#It | That}'s not funny!
  - b. Dad: When does a joke become a "dad joke?" When the punchline is a parent.
    Son: I like this joke!
    Dad: {It | #That}'s funny, right?

Obviously, it would be a mistake to argue based on this difference that *it* is not a form of discourse reference simply because it fails a within-context comparison with another referential expression. Rather, as discussed in Section 3.1, different referring expressions are felicitous under different conditions (see (28) for differences between *it* and *that*), and (34a–b) demonstrate their ability to refer exophorically is constrained by the extent to which the non-linguistic context satisfies these conditions. In other words, Miller and Pullum's (2013) conclusions about exophoric VP-ellipsis appear to generalize to non-elliptical cases of exophora, and that generalization follows straightforwardly from referential theories of ellipsis.

To summarize, H&S argued that the possibility of exophoric reference is diagnostic of discourse reference and that exophoric ellipsis is infelicitous (with the exception of conventionalized utterances). However, it appears that both VP-ellipsis and sluicing can be used exophorically as long as the non-linguistic context provides sufficient support and meets their discourse conditions. Furthermore, the fact that exophora requires a higher degree of contextual support than cases in which the intended referent is introduced linguistically is not restricted to ellipsis: non-elliptical forms of discourse reference are also infelicitous when the non-linguistic context fails to raise the intended referent to a sufficient level of salience. Both of these parallels follow straightforwardly from analyzing ellipsis as a form of discourse reference. By contrast, the possibility of exophoric ellipsis presents a serious challenge for identity theories, which predict all cases of (non-conventionalized) exophora to be fully ungrammatical.

#### 3.2.2 Multiple "split" antecedents

Discourse referential devices all have the ability to "pick up" entities introduced by multiple "split" antecedents. When they do, the meaning the referring expression acquires anaphorically reflects all of its antecedents in some way and cannot be reduced to a single antecedent. Consider the following examples:

- (35) a. A: I've heard Susan might vote to allow witnesses at Donald's impeachment trial and Mitt said he will even vote to remove him from office.
  B: I heard the same thing, but I doubt that either of <u>them</u> is actually going to <u>do it</u>.
  - b. Jack failed chemistry and Sara had to drop out of her arts class. Neither of <u>them</u> was surprised that <u>it</u> happened, but their parents were.

In (35a), *them* refers to the set of individuals introduced separately by the NPs *Susan* and *Mitt*, and the referent of *do it* is similarly interpreted as a combination of the activities Susan and Mitt were said to be considering, distributed via a "respectively" relation. Likewise, the pronoun *it* in (35b) appears to simultaneously refer to two events: Jack failing chemistry; and Sara dropping out of arts.

Whatever inferential mechanism enables these split-antecedent interpretations (see e.g., Baker 2007; Hardt 1992; Nash-Webber 1977), the same mechanism appears to be at play in interpreting VP-ellipsis and sluicing: just like other referring expressions, ellipsis sites can felicitously acquire interpretations that depend on multiple antecedents:

- (36) a. Mary wants to go to Spain and Fred wants to go to (Webber 1978, ch. Peru, but because of limited resources only one of 4, ex. 9) them can (go to the place she or he wants to go to, respectively).
  b. Wendy is going to Spain and Bruce is going to (Nash-Webber)
  - Crete, but in neither case do I know why (Wendy is 1977, ex. 1) going to Spain and Bruce to Crete, respectively).
  - c. Rachel said she saw something, and her brother said he heard something, but neither of them could identify {it | what (they heard/saw, respectively)}.

Just as the referring expressions in (35), the ellipsis sites in (36) depend for their interpretation on multiple antecedents: the VP-ellipsis in (36a) refers to an abstraction of the meanings introduced by the two antecedent VPs (both *Spain* and *Peru* are recognized as *places*), and the sluice in (36b) questions the reasons Wendy and Bruce have for going to Spain and Crete, respectively. The context in (36c) is suitable for split-antecedent reference both by the pronoun *it*, as well as the sluiced question *what they saw/heard, respectively*.

The ability of elliptical utterances to refer to discourse entities that are inferred by combining entities introduced by separate linguistic antecedents is unsurprising on a referential theory of ellipsis. For identity theories, on the other hand, this fact raises a serious challenge: how can elided material be identical (at any level of representation) to multiple linguistic antecedents that are not identical to each other? Indeed, while discussion of split-antecedent ellipsis is largely absent from the literature, one influential attempt of explaining them from an identity perspective, due to Elbourne (2008), has to make numerous assumptions to make it work. In brief, Elbourne takes an approach that is similar to the "fine-tuning" approaches outlined in Section 2: he argues that the meaning of ellipsis clauses with multiple antecedents, like (37a), derives from an underlying syntactic structure like the one in (37b):

(37) a. Bob wants to sail around the world and Alice wants to climb Kilimanjaro, but neither of them can (sail around the world or climb Kilimanjaro, respectively).



(Elbourne 2008, ex. 45)

While everything below the auxiliary *can* is elided, Elbourne stipulates that only the nodes labeled *VP* are subject to the identity requirement, whereas the other structural elements, which are needed to derive the attested interpretations, can be elided "freely" even though they are not provided by any of the antecedents or any other part of the linguistic context. Furthermore, the semantics of  $AND^2$ ,  $R_1$ , pro<sub>2</sub>, and THE must be carefully defined so as to give rise to the "respectively reading" of the ellipsis clause.

A slightly different approach is due to Frazier and Duff (2019) who concede that split-antecedent ellipsis (they focus specifically on VP-ellipsis) does violate the identity condition. In other words, they reject the notion of re-defining the identity relation in an effort to account for split-antecedent cases, and they further argue, contra Frazier (2013), that they do not exhibit the behavioral profile of syntactic repair, either (Arregui et al. 2006; Frazier 2013). Instead, they propose that comprehenders' fleeting memory for past syntactic material (see e.g., Futrell et al. 2020) makes it impossible to retrieve the exact syntactic form of relatively distant antecedents. In contexts with multiple antecedents, ellipsis is thus exempt from identity simply because the syntactic form of the more distant antecedent is unavailable due to memory constraints. In such cases, the ellipsis clause instead derives its meaning through an inferential process Frazier and Duff term "accommodation," although explaining the mechanism behind accommodation is left as an objective for future research.

Both of these approaches are problematic for two reasons: first, they are based purely on the data they seek to explain and are thus not independently motivated. Specifically, Elbourne identifies the inferential gap between the individual antecedents and the interpretation of the ellipsis site and then designs a syntactic computation that derives this interpretation. Similarly, Frazier and Duff propose that all and only cases with multiple antecedents be excepted from the identity requirement, thus likewise tailoring their solution to the data in question. Secondly, fashioning an ellipsis-specific explanation misses the generalization that split-antecedent interpretations are not unique to ellipsis and leaves open the question how pronouns and other non-elliptical forms of reference acquire the same kinds of interpretations. Referential theories, on the other hand, naturally derive this generalization and do not need to make any special-purpose representational assumptions to explain the possibility of split-antecedent ellipsis.

#### 3.2.3 Non-local antecedents

Another characteristic of discourse reference is that referring expressions and their antecedents may, in principle, be several sentences apart. As Sag and Hankamer (1984) point out, this fact supports the notion that discourse referents are represented separately from their linguistic antecedents (in the interlocutors' discourse model) because comprehenders' memory for past linguistic material is fleeting (e.g., Futrell and Levy 2017; Futrell et al. 2020; Gibson and Thomas 1999; Jarvella 1971): once a discourse entity has been introduced into the discourse model, it can be accessed even if the antecedent itself cannot reliably be retrieved from memory. Consider the examples of non-elliptical referring expressions in (38), and of sluicing and VP-ellipsis in (39).

- (38) a. Bob hid <u>the candy</u> from his parents. They were strict and tried to make sure he didn't eat too many sweet things. But this time, he had hidden <u>it</u> well and there was no way they would find it.
  - b. Even though the suspect confessed to <u>killing the victim</u>, it wasn't a straightforward confession. She said she feared for her life and that she was only defending herself. If that's true and she didn't <u>do it</u> in cold blood, she might not end up being prosecuted for murder.
- (39) a. Cindy didn't want to <u>do her homework</u>. She was tired and not in the mood. Besides, math was her least favorite subject. She knew she had to <u>(do her homework)</u> eventually, but she was determined to delay it as much as possible.
  - b. A: Who visited your uncle in the hospital?
    - B: I did.
    - A: When was that?
    - *B: Last Thursday.*
    - A: And who else (visited your uncle)?

These examples contrast with the following comparison from Sag and Hankamer (1984; adapted from Grosz 1977), which they consider evidence that ellipsis does not involve discourse reference:

(40) E: Good morning. I would like for you to <u>reassemble the compressor</u>... I suggest you begin by attaching the pump to the platform...(other tasks).
 A: All right. I assume the hold in the housing cover opens to the pump pulley rather than to the motor pulley.

*E:* Yes, that is correct. The pump pulley also acts as a fan to cool the pump. *A:* Fine. Thank you. All right, the belt housing cover is on and tightened down. (30 minutes and 60 utterances after beginning.)

- a. E: Fine, I knew you would be able to do it. [meaning: reassemble the compressor]
- b. *E:* Fine, I knew you would be able to #(reassemble the compressor).
- c. *E:* Fine. Now you know how #(to reassemble the compressor).

In this example, *do it* has no trouble referring to the event originally introduced 30 min earlier, but both VP-ellipsis and sluicing are infelicitous in the same context. However, while Sag and Hankamer (1984) interpret this within-context comparison as indicating that ellipsis with non-local antecedents is always impossible, we have seen in the context of exophora above that individual within-context comparisons may be misleading. Indeed, Hardt (1990) found that approximately 5% of cases of VP-ellipsis in the Brown corpus featured antecedents going at least two sentences back, and similarly Rønning et al. (2018) report that

about 1% of sluices in Anand and McCloskey's (2015) corpus have antecedents going three or more sentences back. Consistent with this, examples like those in (39) suggest that both VP-ellipsis and sluicing can refer to entities introduced by non-local antecedents, even though there is no guarantee that they can do so in the same contexts as other referring expressions.<sup>19</sup>

#### 3.2.4 Cataphora

It is well-known that pronouns, as well as VP-ellipsis and sluicing, can be used cataphorically, i.e. in contexts in which the referring expression precedes the antecedent, which is then referred to as the "catacedent" (<u>underlined</u> throughout this section).

- (41) a. If he wins re-election in November, <u>Donald</u> may avoid criminal prosecution because the statute of limitations will have run out by the time he leaves office.
  - b. *If you promise to do it tomorrow, I'll <u>cook dinner</u> today.*
  - c. Even though it happened too quickly for anyone else to react, the Jedi was able to parry <u>the attack</u>.
- (42) a. And I know that as much as some of you might want me to, it's 2018 and I'm a woman so you cannot <u>shut me up</u> unless you have Michael Cohen wire me \$100,000.<sup>20</sup>
  - b. Until today, [Joe Biden] had not even campaigned in 1 of the 15 Super Tuesday states in over a month. Like Hillary did, he just <u>assumed he'd be</u> <u>crowned King everywhere</u>. Hardly has offices or staff anywhere.<sup>21</sup>
  - c. *He didn't know why, for instance, but <u>when he flew at altitudes less than</u> <u>half his wingspan above the water, he could stay in the air longer, with less</u> <u>effort</u>.*

(Hinds and Okada 1975, citing Richard Bach's Jonathan Livingston Seagull)

**<sup>19</sup>** An anonymous reviewer notes that it would be desirable to understand why the use of ellipsis is less acceptable in some contexts than non-elliptical referring expressions. While a complete theory of discourse reference that could speak to this matter is beyond the scope of this paper, Miller (2011) offers an insightful discussion of this question on the basis of corpus data.

**<sup>20</sup>** This example is from Michelle Wolf's speech at the 2018 White House Correspondents Dinner, available at https://youtu.be/L8IYPnnsYJw?t=2m26s at the time of writing. Besides the use of cataphora, this example is interesting because it features an argument-structure mismatch between inchoative and causative uses of *shut up*, which should render it ungrammatical according to identity theories (Chung 2006; Chung et al. 2011; Lipták 2015).

**<sup>21</sup>** Tweet from Shaun King from March 1, 2020; available at https://twitter.com/shaunking/status/ 1234178868677771264?s=09 at the time of writing.

This parallel between ellipsis and non-elliptical referring expressions extends further to the conditions under which cataphora is felicitous. Specifically, it requires the referring expression to be embedded in a subordinate clause, as shown for both entity-level pronouns and VP-ellipsis in the following examples due to Kehler (2019):

- (43) a. If he makes a statement criticizing President Putin, <u>Obama</u> will make a fool of himself.
  - b. *#He will make a fool of himself, if <u>Obama</u> makes a statement criticizing President Putin.*
- (44) a. If McCain will (make a statement criticizing President Putin), Obama will make a statement criticizing President Putin.
  - b. Obama will #(make a statement criticizing President Putin), if McCain will make a statement criticizing President Putin.

The key intuition is that referring expressions are effortlessly interpreted as coreferential with their catacedent (*underlined*) only when they are embedded in a subordinate clause, as in (43a) and (44a). By contrast, when the referring expression is not in a subordinating environment, comprehenders may find themselves looking for another antecedent or perhaps even a situationally evoked referent. This dispreference for cataphoric co-reference in non-subordinating environments is the diagnostic that is at stake here.

(43) and (44) establish that VP-ellipsis patterns with entity-level pronouns in this regard, and the same appears to be true of sluicing:

- (45) a. Even though he remembered when, John forgot where <u>he was supposed to</u> <u>meet Bill</u>.
  - b. John forgot when #(he was supposed to meet him), and he also forgot where he was supposed to meet Bill.

Identity theories of ellipsis are consistent with the possibility of cataphoric ellipsis because the identity condition does not care where an identical antecedent is found, only that one be available. However, the fact that both elliptical and non-elliptical cases of cataphora are subject to the same subordination constraint remains unexplained under that view.<sup>22</sup> It follows straightforwardly, on the other hand, from referential theories: if the two are governed by the same mechanism, it is unsurprising that they would obey the same constraints on co-reference

**<sup>22</sup>** An anonymous reviewer suggests that this constraint could easily be encoded in the identity condition. Unless independently motivated, however, doing so would fail to explain the pattern, even if it successfully captures it.

establishment. Indeed, Frazier (2013, p. 497) concedes that the shared subordination requirement is "[p]erhaps the most persuasive of the arguments analogi[z] ing ellipsis to anaphora."

#### 3.2.5 Triggering "sloppy" readings

Another well-known fact about elliptical utterances is that they can be ambiguous between two interpretations known as "strict" and "sloppy" readings (Dalrymple et al. 1991; Fox 1999; Hardt 1993; Kehler 2016; Ross 1969; Sag 1976; Williams 1977), as illustrated in the following examples.

(46) a. Dan called <u>his</u> sister and Bill did (call his, i.e. Bill's, sister), too.
b. 5 is equal to <u>itself</u> and 7 is (equal to itself, (adapted from Rooth 1992, i.e. 7), too. ex. 5)

In both cases, the underlined expression in the antecedent clause is free to refer to a different entity in the ellipsis clause, which Ross (1969) termed "sloppy identity." While sloppy interpretations are by no means unique to ellipsis,<sup>23</sup> they are available if, and only if, the antecedent contains a discourse-referential device, such as *his* and *itself* in (46): if these pro-forms are replaced with full NPs that do not engage the referential system in the same way, the sloppy interpretation is no longer available, or at least much less so (Dalrymple et al. 1991):

(47) a. Dan called <u>Dan's</u> sister and Bill did #(call his, i.e. Bill's, sister), too.
b. 5 is equal to 5 and 7 is #(equal to itself), too.

Even though the antecedent clause has the same truth conditions as before, the absence of a referring expression in the antecedent of the ellipsis site prevents the sloppy interpretation that was previously available. This contrast can be reverse-engineered into a diagnostic for determining whether or not a particular expression engages the referential system: if a sloppy interpretation arises, the antecedent contains a referring expression, such as *his* and *itself* in (46), and if it does not, the expression in question does not engage the mechanisms responsible for discourse reference, as is the case with *Dan* and *5* in (47).

Before applying this diagnostic to ellipsis, it is helpful to state it in abstract terms, as shown in (48): the (un)availability of a sloppy interpretation for some linguistic expression, say  $\beta$ , indicates whether some other expression – let's call it  $\alpha$  – involves discourse reference by embedding it in the antecedent of  $\beta$ :

**<sup>23</sup>** See Tancredi (1992) and Kehler (1993a) for examples of "sloppy" interpretations under deaccenting, *do it* anaphora, as well as entity-level pronouns known as "paycheck pronouns" or "pronouns of laziness" (Geach 1962; Hardt 1994; Karttunen 1969).

- (48) a. ... $[...\alpha ...]_i ...\beta_i ...$ 
  - b. If  $\alpha$  is contained in the antecedent of  $\beta$ , as shown in (48a), then  $\beta$  has a sloppy interpretation with respect to  $\alpha$  if, and only if,  $\alpha$  is a form of discourse reference.

When applied to (46) and (47), this diagnostic correctly concludes that *his* and *itself* are discourse-referential, whereas *Dan* and *5* are not. Crucially for our purposes here, however, we can also apply it to cases of VP-ellipsis and sluicing (by replacing  $\alpha$  with an ellipsis site), as well as their unelided counterparts, to determine whether they engage the system of discourse reference in the same way that non-elliptical pro-forms do. Consider the following example, versions of which were first discussed by Hardt (1994) and later re-discovered by Schwarz (2000).

- (49) a. When Harry drinks, I always conceal my belief that he shouldn't (drink). But when he gambles, I often can't (conceal my belief that he shouldn't gamble).
  - b. When Harry drinks, I always conceal my belief that he shouldn't <u>drink</u>. But when he gambles, I often can't #(conceal my belief that he shouldn't gamble).

The meaning of the VP-ellipsis site in (49a) changes between the antecedent clause ("…he shouldn't drink") and the ellipsis clause ("…he shouldn't gamble"), giving rise to a "sloppy" interpretation. This suggests that VP-ellipsis engages the discourse reference system in a way that its unelided counterpart with the same meaning, as in (49b), does not.<sup>24</sup>

An analogous example can be constructed for sluicing, as shown in (50). As before, the sluicing variant in (50a) makes the sloppy reading *explain why he likes cake* available, but it disappears when the sluice is replaced with an overt variant of the same question, as in (50b). Finally, (50c) demonstrates that the pronoun *it* patterns with the sluice: it, too, allows for a sloppy reading of the subsequent VP-ellipsis.

- (50) a. Susan likes steak and Bill prefers cake. Susan can't explain why (she likes steak) and Bill can't (explain why he likes cake), either.
  - b. Susan likes steak and Bill prefers cake. Susan can't explain why she likes steak and Bill can't #(explain why he likes cake), either.
  - c. Susan likes steak and Bill prefers cake. Susan can't explain it and Bill can't (explain why he prefers cake), either.

**<sup>24</sup>** The sloppy reading re-emerges if the ellipsis site is replaced with *do it*, which further underscores the parallel between VP-ellipsis and non-elliptical referring expressions.

Since *why* sluices behave differently from other sluices in a variety of ways (e.g., Merchant 2001), it is worth emphasizing that the above pattern is not limited to *why* questions:

- (51) Billy wants a new bike for Christmas and his sister wants a new skateboard.
  - a. Billy knows exactly what type (of bike he wants), and his sister does (know exactly what type of skateboard she wants), too.
  - b. Billy knows exactly what type of bike he wants, and his sister does #(know exactly what type of skateboard she wants), too.
- (52) Donald announced that he will hold a rally in May and Melania said that she will host a charity dinner in June.
  - a. Donald didn't specify where (he will hold the rally), and Melania didn't (specify where she will host the charity dinner) either.
  - b. Donald didn't specify where he will hold the rally, and Melania didn't *#(specify where she will host the charity dinner) either.*

Both VP-ellipsis and sluicing, then, appear to pattern with other pro-forms in their ability to trigger sloppy interpretations of "downstream" anaphoric elements. Once again, this similarity is unsurprising if elliptical utterances and non-elliptical forms of discourse reference are governed by the same underlying mechanism. On the other hand, this behavior is problematic for identity theories: since elliptical utterances and their unelided counterparts are expected to be identical in all respects except phonologically, it is surprising that VP-ellipsis and sluicing sites trigger sloppy readings if unelided VPs or clauses in the exact same contexts do not (Hardt 1994, and many others following him). Acknowledging this issue, Tomioka (2008) proposes an exception to the identity condition with respect to material in embedded ellipsis sites by stipulating that the mechanism that checks identity "skips" any material in such positions. A similar proposal has been put forward by Merchant (2004) who argues that the elided material in the embedded VP-ellipsis site in cases like (49) must be *do that*, which then receives a sloppy interpretation "downstream" just like other pro-forms do. However, those analyses are problematic for obvious reasons: First, the ellipsis of *do that* in Merchant's example itself violates identity, at least at a lexico-syntactic level, and requires a novel explicit exemption. Secondly, extending this analysis to sluicing would require further stipulating the identity-free ellipsis of other material: do that cannot recover the meaning of clauses embedded under interrogative *wh*-phrases, and it is not clear to me which English expression would (except for sluicing itself, of course). Third, any identity theory of VP-ellipsis that permits "do that" to be elided identity-free will overgenerate in many other cases, including unacceptable cases of passive-active VP-ellipsis. Fourth, both Tomioka's and Merchant's proposals are entirely post-hoc, tailored specifically to the observations they purport to explain, which undermines their explanatory value. Finally, being designed specifically for ellipsis, both proposals miss the generalization that the ability to trigger sloppy readings is not limited to ellipsis, leaving the same behavior unexplained with respect to pronouns and other referential expressions.

#### 3.2.6 Inferred referents

Recall from Section 3.1 that entities can be entered into the discourse model inferentially. The following examples, repeated from (24), illustrate this point.

- (53) a. Susan called Becky to discuss their dinner plans.
  - b. *Harry threw up and Sam stepped in <i>it*.
  - c. When Jack was kidnapped, <u>they</u> kept him in a dark room for days.

While the referents in such cases are not denoted directly by any particular part of the linguistic context, they nonetheless exhibit a certain "closeness" to it. For example, *they* in (53a) cannot be interpreted as referring to any arbitrary set of individuals; instead, its meaning is restricted to the set composed of its ("split") antecedents *Susan* and *Becky*. Likewise, *it* and *they* in (53b–c) are interpreted in a way that is closely related to the puking and kidnapping events, respectively, which are introduced explicitly. Furthermore, the inferences that introduce entities into the discourse model without denoting them explicitly must be supported by (and are thus constrained by) the interlocutors' shared world knowledge. (53b), for example, requires knowledge about the product of a puking event, and the referent in (53c) is inferred by recognizing that kidnapping events necessarily involve agents.<sup>25</sup>

This provides us with a final diagnostic property, which also helps set the stage for the discussion in the next section: if VP-ellipsis and sluicing are forms of discourse reference, we should expect (i) that inferential ellipsis resolution is, in principle, possible, i.e. that there are cases in which the meaning of the ellipsis site goes beyond the meaning that is denoted by linguistic antecedent; and (ii) that the

(i)	a.	John died yesterday. <u>The murderer</u> got away.	(Clark 1975, ex. 23)
	b.	John was murdered yesterday. <u>The knife</u> lay nearby.	(Clark 1975, ex. 24)

**<sup>25</sup>** In that respect, these inferences resemble bridging inferences (e.g., Clark 1975), which serve to accommodate a definite NP referring to a discourse-new entity based on its relation to a discourse-old entity, as supported by interlocutors' shared world knowledge. For example, in (ia) *the murderer* is interpreted specifically as the person who murdered John, and *the knife* in (ib) as the weapon used in the particular event denoted by the antecedent clause.

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inferences in question are constrained by world knowledge just as they are in the case of non-elliptical reference.

Both of those predictions seem to be borne out. First, as discussed above, the interpretation of ellipsis clauses with split antecedents, repeated in (54), exhibits a similar closeness in meaning to its antecedents as plural entity-level pronouns. Furthermore, the inferences that establish split-antecedent interpretations often involve an abstraction in line with the interlocutors' world knowledge, such as the knowledge that *Spain* and *Peru* are both places, or that *wanting to go somewhere* and *planning to do so* often come together.

(54) Mary wants to go to Spain and Fred wants to go to Peru, (Webber 1978, ch. but because of limited resources only one of them can 4, ex. 9)
(go to the place he or she is planning to go to).

Secondly, various other cases of mismatch between the meaning of the ellipsis site and its antecedent (see Section 2) appear to be facilitated by world knowledge as well. For example, the following lexical mismatches from Kehler (2002) clearly require the knowledge that *boyfriend* and *girlfriend* (and *parent* and *child*) can be understood as complementary relations, as well as other assumptions, such as that multiple "schoolboys" are unlikely to have the same girlfriend (hence the plural *their girlfriends*), and so forth.

- (55) a. Mary's boyfriend gave her his school picture, just as all schoolboys do (give their girlfriends their school picture).
  - b. A: Bob's mother cleans up after him all the time.
    - *B: I'm* surprised; most parents these days won't (clean up after their children).

Similarly, the inference in (56a) requires the recognition that Mary's role in the event of *Irv and Mary dancing together* would be to *dance with Irv*, and the sluiced question in (56b) is interpreted in accordance with the knowledge that a *when* question is relevant in the context of agreeing to have coffee.

(56) a. Irv and Mary want to dance together, but Mary can't (dance with Irv), since her husband is here.

(Webber 1978, ch. 4, ex. 8, parentheses added)
b. *Coffee sounds good. When (should we have coffee)?*(adapted from Ginzburg 1992, ex. 303a)

In all of these cases, the interpretation of the ellipsis clause is anchored to the linguistic antecedent (or some other part of the linguistic context), and the inferences that take it beyond the meaning of the antecedent are constrained and supported by the interlocutors' mutually held conceptual knowledge. Most importantly for the analogy between ellipsis and non-elliptical discourse reference are the observations (i) that VP-ellipsis and sluicing sites can be interpreted inferentially and (ii) that inferential ellipsis resolution appears to be constrained in ways similar to non-elliptical reference to inferred discourse entities. These observations support a referential approach to ellipsis while at the same time presenting challenges for identity theories.

#### 3.2.7 Beyond VP-ellipsis and sluicing

In this section, I considered six diagnostic properties of discourse reference: exophora, split-antecedent reference, non-local antecedents, cataphora, sloppy interpretations, and inferred referents. The fact that VP-ellipsis and sluicing exhibit all of those properties provides strong support for the claim that they are governed by the same underlying mechanism as other forms of discourse reference. Furthermore, several of these properties raise serious challenges for identity theories of ellipsis.

The discussion above has focused on VP-ellipsis and sluicing, but it is worth emphasizing that several other forms of ellipsis pass these diagnostics as well. In what follows, I provide examples for NP-ellipsis, Null Complement Anaphora (NCA), and Gapping; as shown in Table 1, NP-ellipsis and NCA do seem to engage the referential system.<sup>26</sup> Gapping, on the other hand, does not exhibit any of the diagnostic properties and thus serves as an informative baseline for what non-referential ellipsis may look like.

#### (57) NP-ellipsis

- a. Exophora: [Context: In a parking lot.] Where's your brother's (car)?<sup>27</sup>
- b. Split antecedents: John needs a hammer. Mary (Elbourne 2008, needs a mallet. They're going to borrow Bill's ex. 19)
   (hammer/mallet, respectively).
- c. Non-local antecedents: *Billy has been thinking about cake all week. It was a busy week and he didn't have time to go grocery shopping. Since he's going today, however, he is hopeful that he will finally be able to have some (cake).*
- d. Cataphora:

**<sup>26</sup>** Note that this conclusion is consistent with Hankamer and Sag's classification of NCA as a model-interpretive ("deep") anaphor. NP-ellipsis, on the other hand, is often analyzed as a surface anaphor that is subject to identity (e.g., Elbourne 2001, 2008; Merchant 2019), which leaves these anaphoric properties of NP-ellipsis unexplained.

**<sup>27</sup>** Khullar et al. (2020) suggest that exophoric NP-ellipsis may be very common indeed: they find 946 cases of NP-ellipsis in the *Cornell Movie Dialog* dataset, 508 of which they classified as exophoric (54%).

Phenomenon	VPE	Sluicing	NPE	NCA	Gapping	
Exophora	1	1	1	1	<u>x</u>	
Split antecedents	1	$\checkmark$	1	1	x	
Non-local antecedents	1	$\checkmark$	✓	1	x	
Cataphora	1	$\checkmark$	1	1	( <b>X</b> )	
"Sloppy" readings	1	$\checkmark$	1	1	( <b>X</b> )	
Inferred referents	1	$\checkmark$	1	$\checkmark$	x	

**Table 1:** Summary of anaphoric properties across discourse referential devices. (X) indicates that the diagnostic in question is not fully applicable.

- (i) Even though she accepted Bob's (apology), Jessie didn't accept Bill's apology.
- (ii) Jessie didn't accept Bill's #(apology), and I don't think she'll accept Bob's apology.<sup>28</sup>
- e. Triggering sloppy interpretations: Susan wants cake and Bill would love some steak. Susan isn't going to have any (cake) and Bill won't (have any steak), either.
- f. Inferred referents: When the kids all threw up, I'm the one that had to clean Johnny's (vomit) up.<sup>29</sup>

(58) Null Complement Anaphora (NCA)

- a. Exophora: [Context: Teenager comes home after curfew.] *Parent: I do not approve (of your coming home so late).*
- b. Split antecedents: Billy left through the window and Gracie snuck out through the garage. Because they were quiet, their parents didn't notice (that they left through the window/garage, respectively).
- c. Non-local antecedents:
  - A: Do you know the final score of the game today?
  - B: Which game?
  - A: The Champions League semi-final, of course.
  - B: The Liverpool game?
  - A: Yes.
  - *B: I* don't know (the final score of that game), sorry.

**<sup>28</sup>** An anonymous reviewer helpfully points out an important caveat: it's possible that these examples involve Right Node Raising rather than NP-ellipsis.

**<sup>29</sup>** I am grateful to Andy Kehler for providing this example.

- d. Cataphora:
- (i) Even though she tried (to set up the zoom meeting), Karen didn't manage to set up the zoom meeting.
- (ii) *Karen tried ?(to set up the zoom meeting), and eventually she managed to set up the zoom meeting.*
- e. Triggering sloppy interpretations: Donald was going to play golf and Melania was going to go shopping. Donald's Secret Service detail didn't approve (of his plan to play golf) and Melania's didn't (approve of her plan to go shopping), either.
- f. Inferred referents: One hostage didn't know the answer to the kidnappers' question and the other simply refused (to answer the question).
- (59) Gapping
  - a. Exophora: [Context: right after a car runs a red light.] One pedestrian to another: Yesterday, a TRUCK #(ran) a red light.
  - b. Split antecedents: *Leslie saw the first car coming and Beto heard it. Neither of them #(saw/heard, respectively) the second one.*
  - c. Non-local antecedents: *Nina called her father on Monday. On Tuesday she was busy all day. That's why her sister #(called) her mother.*
  - d. Cataphora:<sup>30</sup>
    - (i) Even though Susan #(accepted) Bob's apology, Jessie didn't accept Bill's.
    - (ii) Susan #(accepted) Bob's apology, and Jessie accepted Bill's.
  - e. Triggering sloppy interpretations: *The women all called their friends and the men texted theirs. Specifically, Susan said that she called her friends and her friends (called) theirs, and Jack did #(say that he texted his friends and his friends texted theirs), too.*<sup>31</sup>
  - f. Inferred referents: *Irv and Mary want to dance together, and Jack #(wants to dance with) Sue.*

The data in (59) highlight a series of disanalogies between Gapping on one side and sluicing, VP-ellipsis, NCA, NP-ellipsis, and non-elliptical referential devices on the other. This picture therefore casts doubt over theories of ellipsis that offer unified explanations of Gapping and other forms of ellipsis by modeling them as phenomena governed by the same underlying mechanism (e.g., Culicover and Jack-endoff 2005, 2012; Goldberg and Perek 2018): if, as the observations here suggest,

**<sup>30</sup>** The cataphora diagnostic requires subordination, which is independently prohibited for Gapping.

**<sup>31</sup>** The relevant examples are impossible to construct because Gapping sites (i) cannot be embedded and (ii) must be immediately preceded by their antecedents.

they are enabled by architecturally distinct mechanisms, then it may be a mistake to try to explain them through the same theoretical constructs.

## **3.3** Inferential reference resolution and the morphosyntactic form of the antecedent

Section 3.1 described (among other things) various ways in which the linguistic antecedent affects discourse reference. First, the semantic object it denotes is introduced into the discourse model and becomes available for subsequent reference. Secondly, its morphosyntactic properties constrain what expressions can be used to refer to the entity it introduces, leading to agreement in the morphosyntactic marking of, for example, gender and number. Third, as discussed at the end of Section 3.2, the linguistic antecedent serves to anchor inferential reference resolution, allowing interlocutors to identify and refer to discourse-new entities through their relation with the antecedent. This section expands on the latter point by showing that, contra H&S (Hankamer and Sag 1976; Sag and Hankamer 1984), the felicitous use of discoursereferential expressions does depend on the morphosyntactic properties of the antecedent in various ways, especially when referring to inferred referents.<sup>32</sup> In the context of these observations about non-elliptical forms of reference, I will then argue that mismatches between VP-ellipsis and sluicing sites and their linguistic antecedents can be analyzed analogously as a function of the accessibility of the intended referent, which in turn is affected by the morphosyntactic form of the antecedent.

Consider first the following cases of infelicitous discourse reference, taken from Ward et al. (1991):

- (60) a. #Max is an orphan and he deeply misses them (Postal 1969, ex. 3a) [= his parents].
  - b. Fritz is a cowboy. # He says they [= the cows] can be difficult to look after. (Ward et al., ex. 23a)
  - c. Dom's clothes are absolutely elephantine. # Indeed you could almost lose one [= elephant] in them.

(Ward et al. 1991, ex. 23d)

**<sup>32</sup>** In fact, this conclusion follows from the core assumption that discourse reference is grounded in a "contract" between interlocutors that requires that referents be in common ground (Nash-Webber 1977, *Abstract*, p. 0): "This contract requires that if the speaker uses an anaphoric expression whose [...] referent was inferentially derived, the listener both can and will make the same inference. Insofar as it is shown that many of these inferences rely on one of the few things explicitly available to both speaker and listener alike – i.e., the form of the utterance – the identification of a sentence's formal properties become a matter of cognitive concern."

Early analyses of such cases maintained that complex NPs are 'anaphoric islands' and impose a categorical syntactic constraint that prevents any elements embedded in them from participating in anaphoric dependencies (Postal 1969). By contrast, Ward et al. (1991) argued that reference into and out of complex NPs depends on the (gradient) accessibility of the intended referent. For example, cases like the following are perfectly felicitous:

(61) a. Do parental reactions affect their [= the parents'] children?

		(Ward et al. 1991, p. 469)
b.	Although casual cocaine use is	(Ward et al. 1991, ex. 22a,
	down, the number of people using it	originally heard on the
	[= cocaine] routinely has increased.	news)

According to Ward et al. (1991), accessibility depends on the degree to which computing the meaning of the complex NP requires comprehenders to access the meaning of the intended referent. For example, whereas *orphan*, *cowboy* and *elephantine* in (60) have conventionalized meanings, NPs like *parental reactions* and *cocaine use* in (61) are interpreted compositionally and thus require comprehenders to access the meanings of *parent* and *cocaine*, thereby making them accessible for subsequent reference.

Referent accessibility further depends on the morphological transparency of the antecedent with respect to the intended referent:<sup>33</sup> while *France* is readily accessible for reference via *there* in (62a–b), *Denmark* and *the Netherlands* appear to be less so in (62c–d) (Kehler, personal communication).

- (62) a. Jean is from France, but he hasn't been there [= in France] in years.
  - b. *?Jean is French, but he hasn't been there [= in France] in years.*
  - c. *??Jean is Danish, but he hasn't been there [= in Denmark] in years.*
  - d. *??Jean is Dutch, but he hasn't been there [= in the Netherlands] in years.*

While much research on reference has focused on entity-level reference, similar accessibility facts can be observed for referential expressions targeting events. For example, Ward and Kehler (2005) and Kehler and Ward (2007) show that *do so* can felicitously refer to events introduced by nominal antecedents, but only to the extent that the events in question are sufficiently accessible:

**<sup>33</sup>** For simplicity, I am glossing over the fact that Ward et al. (1991) further distinguish morphological transparency from "lexical relatedness" to account for the anaphoric accessibility of *two* based on the mention of *second* in the following example:

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(63)	a.	One study suggests that almost half of young female smokers do so in				
		order to lose weight.				
		(Kehler and Ward 2007, ex. 18)				

b. <i>T</i>	'he greatest teach	ners do so by example.	(Kehler and Ward 2007, ex. 38)
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c.	#Most professors will do so for hours even	(Kehler and Ward
	when no one is listening.	2007, ex. 22)
d.	#In my opinion, our governor does so better	(Kehler and Ward

#In my opinion, our governor does so better(Kehler and Warthan the last one did.2007, ex. 23)

The idea that reference resolution depends on the (gradient) accessibility of the referent is consistent with the facts around exophora and inferred referents we have seen above. In order for a referring expression to be felicitous, both interlocutors must be able to recognize the intended referent as mutually known, which is straightforward when it is denoted explicitly by an antecedent that both the speaker and the listener are (mutually) aware of. By contrast, entities that are situationally evoked or inferred (including ones that are introduced from within 'anaphoric islands') are accessible only to the extent that the non-linguistic context and interlocutors' shared world knowledge compensate for the lack of an antecedent. As a result, inferential and exophoric reference resolution is expected to be variably acceptable, and, as we will see next, this kind of gradience conditioned by accessibility is not restricted to non-elliptical reference but can also be seen in cases of VP-ellipsis and sluicing with "mismatching" antecedents, i.e. cases in which the meaning of the ellipsis site is not reducible to the meaning introduced by the antecedent.

One well-studied type of mismatch case is VP-ellipsis with nominal antecedents (Hardt 1993; Johnson 2001; Miller and Hemforth 2014, among others). While the mismatch renders such cases categorically ungrammatical according to identity theories, referential theories predict that they should be variably acceptable depending on the accessibility of the intended referent. Consistent with this prediction, Miller and Hemforth (2014) show based on corpus data and experimental data that cases of nominal-antecedent VP-ellipsis are acceptable only to the extent that the antecedent NP raises a "concealed question," as in the following examples (concealed questions in [brackets] added by me).

(64) a. Mubarak's survival [= whether he will survive] is impossible to predict and, even if he does (survive), his plan to make his son his heir apparent is now in serious jeopardy.

(Miller and Hemforth 2014, ex. 1)

b. The integrity of the Senate depends on her<br/>participation [= whether she participates]. If<br/>she does (participate), ...(Miller and Hemforth<br/>2014, ex. 10a)

c. The release of this information on the user's (Miller and Hemforth part depends on his consent [= whether he consents]. If he does (consent), ...

In each of these examples, processing the antecedent NP requires comprehenders to access the meaning of a concealed polar question, making it thereby accessible for subsequent VP-ellipsis in exactly the same way that 'anaphoric islands' enable non-elliptical reference (when they do) according to Ward et al. (1991): in both cases, the referent is introduced as a by-product of processing the antecedent NP.<sup>34</sup> Furthermore, the effect of morphological transparency we observed in (62) – whereby *France* was more accessible from *French* than *the Netherlands* from *Dutch* – can also be observed in nominal-antecedent VP-ellipsis. Consider the following minimal pair from Merchant (2013a).

- (65) a. That man is a robber, and when he does ?(rob places), he tries not to make any noise.
  - b. That man is a thief, and when he does #(steal things), he tries not to make any noise.

In line with the fine-tuning approach outlined in Section 2, attempts at explaining this type of contrast (as well as the fact that nominal-antecedent VP-ellipsis is possible at all) under identity theories of ellipsis typically involve assuming that deverbal nouns underlyingly contain the VP they derive from and that VP is available to serve as the antecedent for subsequent VP-ellipsis (Fu et al. 2001; Johnson 2001; Merchant 2013a). However, since this explanation is tailored specifically to VP-ellipsis, it cannot explain the fact that nominal-antecedent sluicing

**<sup>34</sup>** According to Miller and Hemforth's (2014) analysis, nominal-antecedent VP-ellipsis further requires that the information structure of the concealed question raised by the antecedent NP be the same as the information structure of the subsequent ellipsis clause. For example, while auxiliary-focus VP-ellipsis is felicitous in the context of a polar question, it is marked when the antecedent NP raises an alternative (wh-) question:

<sup>(</sup>i) That depends on her answer [= what her answer is]. If she (Miller and Hemforth 2014, does #(answer), ... ex. 12a)

This is consistent with Kertz's (2013) analysis of VP-ellipsis with voice-mismatched antecedents as well as Miller and Pullum's (2013) analysis of exophoric VP-ellipsis (where there is no linguistic antecedent). All of these cases of VP-ellipsis in the absence of a suitable antecedent VP can thus be understood in terms of the accessibility of a suitable Question Under Discussion (Ginzburg and Sag 2000; Roberts 1998, 2012). While the exact relation between a QUD and the accessibility of the VP meaning it contains remains a subject for future research, this approach is promising from the perspective of referential theories of ellipsis.

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is possible as well and exhibits a similar degree of gradience (Poppels and Kehler to appear):

- (66) a. Regarding Trump's impeachment, the only question is when (he will be impeached).
  - b. *Regarding Trump's impeachment, the only question is why #(he will be impeached).*
  - c. Regarding Trump's impeachment, the only question is who #(will impeach him).

The accessibility-based explanation of these facts, on the other hand, follows straightforwardly from the behavior of non-elliptical forms of discourse reference if we assume that both VP-ellipsis and sluicing engage the same underlying mechanism.<sup>35</sup>

While referent accessibility undoubtedly affects the felicity of discourse reference, it is unlikely to be the full story. One of the most convincing demonstrations of this fact comes from the following type of example, usually attributed to Barbara Partee:

- (67) a. I dropped ten marbles and I found all but one of them. It must be under the sofa.
  - b. *I dropped ten marbles and I found only nine of them. # It must be under the sofa.*

In (67a), the use of *it* to refer to the tenth marble is perfectly felicitous: its referent is denoted by the antecedent NP *one of them*. In (67b), on the other hand, it is not denoted by any part of the linguistic context and must instead be inferred, and as a result the use of *it* is infelicitous. Importantly, however, several aspects of the context conspire to make it maximally accessible, suggesting that referent accessibility *per se* is not enough for felicitous reference in this case: not only does

**<sup>35</sup>** Even more generally, morphological transparency further appears to affect non-referential linguistic expressions that depend on the discourse-Givenness of a certain meaning. For example, as pointed out to me by Andy Kehler (p.c.), VP preposing is only felicitous when the meaning of the VP is Given in the discourse, and the NP *rainfall* appears to satisfy this condition, whereas the near-synonymous NP *precipitation* does not:

<sup>a. The weather forecast predicted heavy rainfall, and rain it did.
b. #The weather forecast predicted heavy precipitation, and rain it did.</sup> 

An anonymous reviewer points out that the fact that elliptical and non-elliptical referring expressions appear to show similar accessibility effects does not necessarily imply that they do so for the same reason, which is, of course, true. While similarities like this do offer some evidence that the two may be governed by a common underlying mechanism, more research will be required to provide further support.

the context plausibly raise the question *Did you find the marbles you dropped?*, the focus construction *only nine of them* specifically shifts attention to the last missing marble. As a result, if inferential reference resolution were reducible to the accessibility of the intended referent, we should expect the use of *it* to be perfectly felicitous in this context, but it clearly is not.

Since many of the theoretical constructs that have been found in previous research to constrain the felicitous use of discourse reference<sup>36</sup> are themselves poorly understood, it is important to develop independent operational definitions of them in order to avoid circularity in testing the predictions of referential theories of ellipsis. Without independent grounding for the explanatory constructs referential theories draw on, they run the risk of replicating the identity crisis on the referential side. Miller and Hemforth (2014) provide an excellent example of how operationalization can help prevent circularity and yield novel theoretical insights. Their goal was to explain the gradient acceptability of VP-ellipsis with nominal antecedents, such as Mubarak's survival (see (64)), and they operationalized the extent to which such antecedents raise a concealed question through an experimental task that did not itself involve ellipsis. Participants were presented with the antecedent clause (e.g., Mubarak's survival is impossible to predict.) along with a set of paraphrases, including a "polar paraphrase" that corresponds to the relevant concealed-question interpretation (e.g., Whether or not Mubarak will survive is impossible to predict.). Participants then rated each paraphrase in terms of how closely it matched the meaning of the antecedent clause of each item, and the average rating of the polar paraphrase was then used to predict the acceptability of VP-ellipsis for each item.

The goal of this section was to discuss referential theories of ellipsis, and to provide some background on the nature of discourse reference beyond ellipsis. I followed H&S's lead in comparing the distribution of VP-ellipsis and sluicing to a number of hallmark properties of discourse reference and found, contrary to H&S's conclusion, that they exhibit all of them. I further argued that non-elliptical referring expressions do show sensitivity to the morphosyntactic form of the antecedent, which H&S and much of the literature following them assumed was uniquely associated with ellipsis. It thus appears that VP-ellipsis and sluicing do pattern with non-elliptical forms of reference in many important ways, lending support to the fundamental claim behind referential theories of ellipsis that they are governed by the same underlying mechanism.

**<sup>36</sup>** Beyond the above-mentioned notion of referent accessibility or salience (Gundel et al. 1993; Ward et al. 1991), other researchers have focused on related information-structural concepts like topichood (e.g., Kertz 2013).

# 4 Comparing referential and identity theories of ellipsis

In the previous sections, I introduced two theoretical approaches to ellipsis: identity theories, which maintain that ellipsis is governed by a special-purpose mechanism that enforces an identity relation between the elided material and its linguistic antecedent; and referential theories, which assume that ellipsis is governed by the same set of mechanisms that enable other forms of discourse reference. This distinction corresponds to H&S's (Hankamer and Sag 1976; Sag and Hankamer 1984) architectural distinction between "surface" anaphors, which depend directly on their linguistic antecedent, and "deep" anaphors, which refer to entities in interlocutors' shared model of the discourse and only indirectly depend on their antecedents. While H&S argued based on diagnostic properties of discourse reference that ellipsis is architecturally distinct (i.e., governed by a fundamentally distinct part of the language architecture), I extended their analysis in two ways, which led me to a different conclusion. First, I considered a broader range of diagnostic properties and found that both VP-ellipsis and sluicing behave exactly as one would expect under a referential theory of ellipsis. Secondly, I reviewed patterns of inferential reference resolution with respect to non-elliptical forms of reference and found that they do exhibit the kind of sensitivity to morphosyntactic properties of their antecedent that H&S argued was unique to ellipsis.

In this section, I will compare referential theories and identity theories of ellipsis directly. First, Section 4.1 will consider cases involving argument-structure mismatches, which have historically played a central role in debates between identity theorists and advocates of referential theories (Arregui et al. 2006; Chung 2006, 2013; Chung et al. 1995; Frazier 2013; Kehler 2000; Kertz 2013; Kim and Runner 2018; Kim et al. 2011; Merchant 2001, 2013b; Poppels and Kehler 2019; Ross 1969). As we will see, the empirical picture in this domain is complex and provides arguments for and against both approaches. Section 4.2 will then consider a phenomenon known as "connectivity effects." Whereas the gradient status of argument-structure mismatches has been interpreted by both camps as supporting their theory, connectivity effects are widely considered the strongest evidence in favor of identity theories (Chung et al. 2011; Lipták 2015; Messick et al. 2016). I will consider both identity-based accounts of the facts as well as referential explanations and argue that they both capture the data equally well (albeit in fundamentally different ways), undermining the notion that connectivity effects favor identity theories. Finally, I will compare referential and identity theories with respect to considerations of theoretical parsimony.

#### 4.1 Argument-structure mismatches

At first glance, VP-ellipsis appears to be infelicitous whenever the ellipsis clause and the antecedent clause involve different syntactic configurations, as shown in (68).<sup>37</sup>

- (68) a. The problem was looked into by John, and Bob did #(look into the problem), too. (Kehler 2000, ex. 34)
  - b. Even if you want me to shut up, you can't #(shut me up).

This pattern receives a straightforward explanation from identity theories: assuming that differences in argument structure are rooted in distinct lexical items (Hale and Keyser 1993), any theory that prohibits the ellipsis of lexical items not provided by the antecedent will correctly rule out those examples (e.g., Chung 2006, 2013; Rudin 2019). Furthermore, Rudin's (2019) structure-matching condition provides an additional constraint against argument-structure alternations by barring the word-order differences they incur.

While it is often assumed that the existence of such mismatch effects is problematic for referential theories (e.g., Arregui et al. 2006; Lipták 2015), we have seen in Section 3 that the existence of mismatch penalties is perfectly consistent with the mechanisms that support discourse reference, especially when they are found to exhibit gradience and vary across contexts. Indeed, that appears to be the case here as well: the following examples are appreciably more acceptable than the ones in (68), even though they involve the same kinds of mismatches.

(69) a. This problem was to have been looked into, but obviously nobody did (look into the problem).

(Kehler 2000, uttered by Vincent Della Pietra in conversation)

b. And I know that as much as some of you might want me to (shut up), it's 2018 and I'm a woman so you cannot shut me up.<sup>38</sup>

**38** Michelle Wolf during the 2018 White House Correspondents Dinner, available at the time of writing at https://youtu.be/L8IYPnnsYJw?t=2m26s.

**<sup>37</sup>** Note that matched variants of these examples are acceptable:

<sup>(</sup>i) John looked into the problem, and Bob did (look into the problem), too.

<sup>(</sup>ii) Even if you want to shut me up, you can't (shut me up).

This state of affairs has motivated a number of experimental studies with the goal of explaining the gradience associated with constructional mismatches (Arregui et al. 2006; Kim and Runner 2018; Kim et al. 2011; Poppels and Kehler 2019). Identity theorists typically aim to explain it as a by-product of processing mechanisms (e.g., following Arregui et al.'s Recycling Hypothesis) or other factors that operate above and beyond the grammatical constraints on ellipsis in order to maintain a binary grammatical classification despite the gradience in acceptability. Referential approaches, on the other hand, straightforwardly predict the possibility of gradience without the need for additional assumptions: whenever the meaning of the ellipsis site is not reducible to the antecedent-provided meaning, the intended referent must be inferred, which is often associated with reduced acceptability in utterances involving ellipsis as well as non-elliptical forms of discourse reference. Whether or not and to what extent inferential reference resolution incurs a penalty depends on a variety of factors, and two such factors have been found to play a key role in determining the gradient acceptability of voice-mismatched ellipsis (as well as other types of mismatches): coherence establishment (Kehler 1993b, 2000), and information structure (Kertz 2008, 2013; Miller and Hemforth 2014; Miller and Pullum 2013).

While the source of gradient acceptability patterns associated with cases of syntactic mismatch remains controversial in the literature, I believe that they provide *prima facie* support for referential theories because they predict their existence without additional assumptions.

#### 4.2 Connectivity effects

One key point of divergence between identity accounts and referential theories of ellipsis concerns the content of the ellipsis site. According to identity theories, it contains fully formed syntactic structure that simply remains unpronounced under ellipsis, whereas referential theories assume that it merely contains a phonologically null pro-form. As Merchant (2019) points out, questions about the nature of unpronounced linguistic material can only be addressed indirectly:

Detecting and arguing for such 'missing' structures is analogous to searching for and determining the properties of a black hole: one can tell it's there only by its effects on surrounding material. The logic of the hunt for elided structure is similar. If one finds effects that seem to be due to missing material, there is an argument that such structure exists. (Merchant 2019, p. 25)

It is therefore unsurprising that so-called "connectivity effects," exemplified in (70)–(72), have received ample attention in the literature, going back as far as

Ross's (1969) famous observations regarding Case connectivity constraints on the distribution of sluicing in German.

(70)	a.	Sie	werden	jemanden.acc	entlassen,	aber	keiner	weiß,
		They	will	someone.acc	fire,	but	nobody	knows,
		{ <i>wen</i> .acc   # <i>wem</i> .dat}.						
		{who.acc   #who.dat}.						
		'They will fire someone but nobody knows who.'						
	b.	Sie	werden	jemandem.dat	kündigen,	aber	keiner	weiß,
		They	will	someone.DAT	fire,	but	nobody	knows,
		{#wen.acc   wem.dat}.						
		{#who.acc   who.dat}.						
		'They will fire someone but nobody knows who.'						

- (71) a. Beth's wedding was in Bond Chapel, and Rachel's {was | \*were} in Rockefeller Chapel. (adapted from Merchant 2019, ex. 37–38)
  - b. Beth's nuptials were in Bond Chapel, and Rachel's {\*was | were} in Rockefeller Chapel. (adapted from Merchant 2019, ex. 37–38)
- (72) a. Mike was supposed to give a eulogy at the funeral, but he {didn't | \*wasn't}.
  b. Mike was supposed to be at the funeral, but he {\*didn't | wasn't}.

In each case, the ellipsis remnants appear to depend on (i.e., be "connected" to) the antecedent in some way: in (70) the remnant wh-phrase exhibits the same case marking as its correlate *jemanden/m* 'someone' in the antecedent clause; in (71) the verb in the ellipsis clause agrees in number with the antecedent NP (*wedding* vs. *nuptials*); and in (72) the choice of the remnant auxiliary depends on the antecedent VP.

Connectivity effects follow straightforwardly from the core assumption behind identity theories of ellipsis: if the ellipsis site contains fully formed syntactic material that is identical to its antecedent, connectivity constraints on the ellipsis remnants can be analyzed as internal to the ellipsis clause, as illustrated in (73). For example, the elided verb *entlassen/kündigen* 'fire' assigns Case to the sluicing remnants *wen*.Acc/*wem*.DAT 'who' in (73a–b); the elided NP *wedding/nuptials* agrees in number with the verb *was/were* in (73c–d); and the elided phrase in (73e–f) constrains the distribution of the remnant auxiliary under VP-ellipsis.



The fact that the unelided counterparts of the elided utterances in (73) exhibit the same distribution, as shown in (74), makes the identity-based explanation particularly compelling (Merchant 2019; Van Craenenbroeck and Merchant 2013; Lipták 2015): if identity theories are on the right track, elided and unelided utterances are syntactically indistinguishable and are therefore expected to pattern together with respect to Case assignment, number agreement, and so forth.

- (74) a. Sie werden jemanden. ACC entlassen, aber keiner weiß, {wen. ACC | # wem.DAT} sie entlassen werden.
  - b. Sie werden jemandem. DAT kündigen, aber keiner weiß, {# wen. ACC | wem. DAT} sie kündigen werden.
  - c. Beth's wedding was in Bond Chapel, and Rachel's wedding {was | # were} in Rockefeller Chapel.
  - d. Beth's nuptials were in Bond Chapel, and Rachel's nuptials {# was | were} in Rockefeller Chapel.
  - Mike was supposed to give a eulogy at the funeral, but he {didn't | # wasn't} give a eulogy.
  - f. *Mike was supposed to be at the funeral, but he {# didn't | wasn't} at the funeral.*

As for the identity relation that is required for this explanation to go through, notice that any lexico-syntactic condition applied to the relevant lexical item (whichever syntactic node is responsible for Case assignment, number agreement, etc.) is sufficient (Chung 2006; Merchant 2013a, 2013b; Rudin 2019). With respect to Case, this lexical identity requirement is perhaps most explicit in Chung's (2013) "Case condition":

If the interrogative [sluicing remnant] is a DP, it must be Case-licensed in the ellipsis site by a head identical to the corresponding head in the antecedent clause.

(Chung 2013, p. 30)

It is worth noting, however, that purely semantic identity theories (e.g., Merchant 2001), are not sufficient for capturing the pattern in (73): as Merchant (2019) points out, *nuptials* and *wedding* are synonymous and differ only with respect to the grammatical number feature that produces the connectivity effect. In order for the identity condition to prevent replacing one with the other under ellipsis, it must therefore be sensitive to this feature and cannot be defined in purely semantic terms. Likewise, *entlassen* and *kündigen* both mean 'fire' and differ only with respect to Case assignment.<sup>39</sup> If the two were allowed to vary under ellipsis, we wouldn't expect to see the connectivity effect we see in (73a–b).

Because connectivity effects "fall out" naturally from the assumption that the Case-assigning elements in the ellipsis and antecedent clauses are linked via the identity condition, they are often cited as evidence that favors identity theories over referential theories (Chung et al. 2011; Lipták 2015; Messick et al. 2016), but that view is not universal among identity theorists. For example, Merchant (2019) argues that both identity theories and referential theories are, in principle, consistent with the existence of connectivity effects, since both assume some amount of silent linguistic structure at the ellipsis site. He classifies both types of theories as "structural approaches," and argues that connectivity effects merely serve as evidence against entirely non-structural approaches (e.g., Culicover and Jackendoff 2005, 2012). Indeed, Ginzburg (1992), Jäger (2001, 2005), and Barker (2013) all argue that Case connectivity can be derived from referential analyses of sluicing, and, as we will see next, that explanation naturally extends to other connectivity effects and types of ellipsis as well.

To illustrate how connectivity can be represented in a referential framework, consider the following examples in which the morphosyntactic gender or number

**<sup>39</sup>** Indeed, these two verbs are arguably also equivalent in terms of register and lexical frequency, which addresses the potential concern that the *wedding/nuptials* pair is not fully matched pragmatically.

of the antecedent determines which pro-form can subsequently be used to refer to the entity it introduces into the common ground.

- (75) a. *Esta mesa*.FEM *me encanta*. *—No* {*la*.FEM | *# lo*.MASC} *veo*. This table.FEM me delights. *—*Not {her.FEM | *#* him.MASC} see. 'I like this table. *—*I don't see it.'
  - b. *Este partido*.FEM *me encontó*. *—No* {# *la*.FEM | *lo*.MASC} *v*í. This match.FEM me delighted. —Not {# her.FEM | him.MASC} saw. 'I liked this match. —I didn't see it.'

a. I haven't worn these pants in years, I even forgot {they | # it} existed.
b. I haven't worn this shirt in years, I even forgot {# they | it} existed.

We can represent these antecedent-selection constraints as shown in (77), where subscripts on referring expressions indicate what type of antecedent they require.<sup>40</sup>

It is important to emphasize at this point that none of the examples in (77) involve ellipsis and thus demonstrate that the underlying mechanism that produces antecedent-selection effects (whatever it may be) is needed independently of ellipsis. Nonetheless, the same machinery can be leveraged to explain connectivity constraints under ellipsis, which is an idea that goes back at least as far as Ginzburg (1992) and has subsequently been formalized by Jäger (2001, 2005) and Barker (2013). According to that analysis, connectivity effects arise as the result of two constraints, as illustrated in (78): a local constraint that ensures that the proform at the ellipsis site can compose with the ellipsis remnants, and an antecedent-

**<sup>40</sup>** While we focus notationally on a subset of properties that are relevant in any particular case, note that other properties may matter as well. For example, in (76b) *she* would be infelicitous even though it matches the antecedent in number, presumably because of a mismatch in gender or animacy.

selection constraint that "connects" the ellipsis site to its antecedent in terms of the relevant properties.



The local "composability" constraint that ensures that the pro-form can compose with the ellipsis remnants applies equally to unelided variants,<sup>43</sup> and it is, in fact, entirely analogous to the local constraint identity-based explanations invoke as described above.

The explanations differ with respect to the second constraint, however, and this is where their respective architectural assumptions come into play: whereas the identity condition is a made-for-purpose constraint that only applies to ellipsis, the antecedent-selection constraint is independently motivated by the behavior of non-elliptical forms of discourse reference. In that sense, the referential explanation is more parsimonious because it avoids stipulating ellipsis-specific machinery, whereas the identity-based explanation misses the generalization that connectivity effects are not only associated with ellipsis, but also with nonelliptical referential expressions, as illustrated in (77). On the other hand, the referential explanation requires the proliferation of ellipsis pro-forms in the

<sup>41</sup> I use AKW as a short hand for *aber keiner weiß* 'but nobody knows.'

<sup>42</sup> For readability, I omit the gloss, which is identical to the one in (73)a-b.

**<sup>43</sup>** See Jäger (2001, 2005) and Barker (2013) for a formalization of this constraint within the framework of Type Logical Grammar.

lexicon: we must stipulate a separate pro-form for each relevant set of antecedent properties (e.g.,  $\sigma_{dat}$ ,  $\sigma_{acc}$ ,  $\sigma_{nom}$ , etc.).<sup>44</sup> While introducing multiple pro-forms that perform the same general function and differ only with respect to certain antecedent-selection criteria may not be problematic in principle (after all, the assumption that *he* and *she* are separate lexical items is commonplace), doing so for phonologically null elements may appear theoretically "expensive" in its own way. Nonetheless, the common assumption that connectivity effects overwhelmingly favor identity theories over referential theories of ellipsis is incorrect: both types of accounts provide empirically adequate explanations that differ only in the core architectural assumptions they are built upon, and raise certain concerns with respect to theoretical parsimony. In the following, final section of this paper, I will expand on issues of theoretical parsimony beyond connectivity.

## 5 Overcoming the identity crisis

Perhaps the most fundamental difference between identity theories and referential theories of ellipsis is that the former propose an ellipsis-specific constraint whereas the latter aim to explain ellipsis in terms of the independently motivated mechanisms behind discourse reference. Consider, as an example, Merchant's (2001) e-givenness, which remains one of the most influential proposals to date. While it is based on the notion of givenness that Schwarzschild (1999) used to explain patterns of focus marking and pitch accent, it crucially goes beyond this independently motivated one-way entailment requirement by adding an ellipsisspecific "reverse entailment" condition (hence the "e" in e-givenness). Not only does this condition by definition only apply to the use of ellipsis, there is to my knowledge no other linguistic phenomenon that requires a "downstream" element to entail its antecedent. The same is true of virtually all other identity-based proposals (e.g., Chung 2006, 2013; Elbourne 2008; Rudin 2019): they all introduce conditions and mechanisms that are specifically designed to handle ellipsis, instead of recruiting mechanisms that are independently needed to explain other phenomena. As I argued throughout this paper, the assumption that ellipsis is governed by *sui generis* mechanisms follows from H&S's (Hankamer and Sag 1976; Sag and Hankamer 1984) conclusion that elliptical phenomena are architecturally distinct from other forms of context dependency. By contrast, referential theories

**<sup>44</sup>** I am intentionally glossing over the fact that Jäger (2001, 2005) analyzes the remnants themselves as anaphoric. While this approach avoids stipulating pro-forms at the ellipsis site, it nonetheless requires the introduction of an anaphoric variant of each lexical item that can serve as an ellipsis remnant.

of ellipsis are based on the fundamental architectural assumption that ellipsis is governed by independently motivated machinery, namely the system of discourse reference, which makes referential theories inherently more parsimonious.

Beyond those considerations of theoretical parsimony, referential theories of ellipsis also have an empirical advantage over identity theories: since referent accessibility and interlocutors' beliefs about the extent of their mutual knowledge are inherently gradient in nature, the use of ellipsis is expected to be gradiently felicitous, especially when the intended referent has to be inferred because it is not reducible to the denotation of the antecedent. Identity theories, on the other hand, predict a categorical distribution and typically draw on theory-external degrees of freedom, such as the division of labor between the grammar and the processor, in order to derive gradience in acceptability. While invoking this type of competence/performance distinction to explain gradient acceptability patterns is a legitimate theoretical stance in principle, the biggest empirical challenge for identity theories lies in the fact that there is a plethora of acceptable mismatches that elude even the most recent definitions of identity that have emerged after decades of fine-tuning (see Section 2), and that are likewise outside the reach of processing explanations (Frazier and Duff 2019; Poppels 2020; Poppels and Kehler 2018, 2019, to appear).

Finally, the approach of fine-tuning theory-internal and -external parameters in order to capture more observations undermines the explanatory value of identity theories of ellipsis in a way that is reminiscent of Ptolemaic epicycles. The Ptolemaic world view was based on the axiomatic assumption that the Earth is at the center of the solar system and that all other planetary objects known at the time revolve around it. To square this theory with apparently inconsistent planetary movement as observed from Earth (now known as "apparent retrograde motion"), Ptolemy stipulated that planets follow the paths of epicycles, i.e., circles on circles. With enough epicycles in the right places, Ptolemy's model of planetary motion achieved impressive accuracy with respect to the observations made from Earth,<sup>45</sup> despite the fact that it was based on fundamentally misguided architectural assumptions about the universe. In other words, Ptolemy captured observations by adding parameters, but his model fundamentally failed to explain the observations. My concern about identity theories of ellipsis is that incrementally fine-tuning the definition of identity and exploiting theory-external degrees of freedom – in the service of maintaining the assumption that ellipsis is governed by some form of identity – will similarly fail to explain ellipsis, even if it succeeds in approximating its distribution increasingly well.

**<sup>45</sup>** With the discoveries of Joseph Fourier, it was proven centuries later that the epicycle system used by Ptolemy and many other ancient astronomers tracks a generalizable approximation system that can describe any arbitrary curve given enough parameters.

To overcome the identity crisis, it is imperative that we reconsider the fundamental assumption at its core by asking whether ellipsis really is governed by some yet-to-be-discovered identity condition. Instead of asking how to capture the distribution of ellipsis, I followed H&S's lead in this paper and reconsidered the question as to whether ellipsis behaves like other context-sensitive linguistic expressions with respect to a range of diagnostic properties. Motivated by the parallels that emerge from this high-level comparison, analyzing VP-ellipsis and sluicing as referential expressions provides a way of avoiding the epicycle dynamic that identity theories are vulnerable to: since the explanatory constructs available to referential theorists equally apply to non-elliptical discourse reference, we cannot fine-tune theoretical parameters based on ellipsis data alone. That being said, referential theories of ellipsis do face various theoretical and empirical challenges that must be addressed in future research.

Two central questions for theories of discourse reference are about the notion of referent accessibility and, relatedly, why inferential reference resolution succeeds in some cases but not others. Why, for example, is the pronoun in the Partee's marbles example discussed above and repeated in (79) infelicitous despite the fact that the intended referent is highly salient and easily recognizable as mutually known by the comprehender? Similarly, why is the Hartman example in (80a) impossible while the example in (80b) is perfectly felicitous despite involving a similar mismatch between relational opposites?

- (79) I dropped ten marbles and only found 9 of them. # It's under the sofa.
- (80) a. Billy won against someone at chess, and Susan (Hartman 2009) did #(lose to someone), too.
  - b. *Mary's boyfriend gave her his school picture,* (Kehler 2002) *just like all schoolboys do (give their girlfriends their school picture).*

These questions are not trivial. In fact, some of them may well be *AI complete* (i.e., completely answerable only in the context of a complete theory of human intelligence) because the mechanisms behind discourse reference interface with other AI complete cognitive mechanisms, such as interlocutors' conceptual knowledge and the theory-of-mind mechanisms involved in establishing and coordinating mutual knowledge. While the difficulty of answering these questions is sometimes raised as an argument against referential theories of ellipsis, it is important to emphasize that these questions exist in the context of non-elliptical reference regardless of which theory of ellipsis we adopt.

While much more research will be required to fully understand the mechanisms that govern the use of ellipsis and the constraints they impose on its distribution, my goal in this article has merely been to discuss *where* we should look for answers. Based on a range of empirical and theoretical considerations, I have come to the conclusion that any theory that is to be ultimately successful at explaining ellipsis will have to invoke the part of the language architecture that is responsible for discourse reference. Doing so will not only help us overcome the identity crisis, but it also promises to shed light on important questions about context-dependent language use far beyond ellipsis.

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