

Saliency and the formal link

Experimental evidence for a unified NP-deletion theory of
English pronouns

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1 Introduction

Semantic theories which agree that pronouns should be analyzed as definite descriptions in some way nonetheless dispute what the referent of a pronoun is. Under one view, the intended referent of a pronoun is a linguistic antecedent, i.e. an explicitly mentioned NP, under a certain syntactic relationship with the pronoun. On another view, a pronoun refers to a discourse referent in the context, a collection of properties in the information structure, without necessarily corresponding to a previously mentioned linguistic element. On this latter contextual view, it is often assumed that a discourse referent must be salient to license a pronoun referring to it. I argue that this notion of salience has been underspecified and poorly defined, and that a linguistic theory, namely Elbourne's (2013) NP-deletion, is preferable to account for the licensing conditions of English 3rd person pronouns. I show that German personal and demonstrative pronouns differ in their ability to be licensed by contextual information without an explicit linguistic antecedent - the former can, the latter cannot - and present experimental data using Amazon's Mechanical Turk interface that English pronouns pattern like the German demonstrative. Thus, NP-deletion is a more parsimonious account of both English pronouns and the German demonstrative, which I argue to be structurally symmetrical. Following this, applying structural economy constraints from German predicts that if a 3rd person pronoun licensed by contextual discourse information existed in the English lexicon, it would surface as the preferred option in sentences which instead I show, experimentally, to be unacceptable.

2 Theoretical background

2.1 Pronouns as definite descriptions

Treating pronouns as instantiations of definite descriptions in some way has a long theoretical history, often cited as beginning with Cooper (1979). Variations of this *D-type* analysis were prominently presented by Neale (1990), Heim (1990), and Heim and Kratzer (1998), and have been adopted with varying degrees of faithfulness in many theories of definite descriptions since (Elbourne, 2013). These theories share as a basic commonality that pronouns, in their interpretation, consist of a definite article and some unpronounced element of appropriate type to combine with it, such as the very simplified LF representation in (1), abstracted from any particular theory:

$$(1) \quad [the [\emptyset_{\langle e,t \rangle}]]$$

These D-type theories are contrasted with *E-type* theories like that of Evans (1977, 1980), in which a pronoun is not a definite description but instead a rigid designator whose reference is fixed by a description extracted from the linguistic environment (Elbourne, 2005, 5), and dynamic semantic theories (Groenendijk and Stokhof, 1991; Chierchia, 1995) in which the use of NPs dynamically updates the assignment function to make referents available for pronouns, which are treated basically as variables. Here, I will not review the copious discussion in the literature contrasting these views (see Elbourne 2005, 42 for a robust defense of treating pronouns as definite descriptions), but will instead focus on the internal differences between D-type theories.

What the content of \emptyset (taken here to mean some unpronounced element, not a proper empty category) in (1) is, and whether there is additional substructure to the LF, is where D-type theories differ from each other. In particular, some theories assume a more robust descriptive content and greater amount of internal structure to the pronoun, while others assume a simpler structural content and assign greater weight to the pragmatics and presuppositions in deriving the correct patterns of pronominal behavior. (Elbourne, 2005, 7-9) categorizes D-type theories along two cross-cutting axes: semantic vs. syntactic, and linguistic vs. contextual. Semantic D-type theories ‘have pronouns merely be interpreted as definite descriptions, without their having the syntax of definite descriptions too’ (Elbourne, 2005, 7), while syntactic theories have the syntactic structure expected of definite descriptions. Along the other axis, linguistic theories require that the descriptive content of a pronoun must be retrieved from the linguistic environment (e.g. having an explicit linguistic antecedent), while contextual theories have no such restriction, merely requiring that the referent of the pronoun is retrievable from a relation which has been made contextually salient in some way. This is contrasted with E-type theories, which hold that a pronoun directly refers to a single, rigidly designated entity in the way that a proper name does, while even contextual D-type theories still hold that this unique reference is derived from presuppositions associated with definiteness.

I will be primarily concerning myself with this latter distinction, the linguistic/contextual dimension, though there will also be something to say about the internal syntactic structure of pronouns. In fact, the central claim of the theory which I will be defending necessarily implicates both of these axes and in some sense collapses the distinction.

2.2 D-type theories and salience

Contemporary contextual D-type theories share a fundamental reliance on salience. In particular, the position that the salience of an object in the discourse is sufficient for a pronoun to refer to it is commonly advanced.

- (2) A woman₁ entered from stage left. Another woman₂ entered from stage right. She_{2/*1} was carrying a basket of flowers. (Adapted from Roberts 2004, 13)

The ordering effects of salience are illustrated in (2). Because the most recently uttered NP corresponds to the most salient discourse referent, the pronoun can only refer to that latter NP.

(Elbourne, 2013, 2) marks out, as one of the contemporary semantic theories against which he argues, the view that pronouns, among definite descriptions, ‘introduce a presupposition to the effect that they have as antecedent a Heimian discourse referent that is familiar in the context’. Familiarity here goes hand-in-hand with salience, as two of the pillars on which these context-based theories rest (though the distinction between the two, I will later argue, is likely to be either superficial or irrelevant). Most notably, Heim (1982) influentially advances such a theory, as does Roberts (2003, 2004) following her. Buring (2011, 7) applies this generally argued property of definite descriptions to pronouns:

A pronoun like *her*, if unbound, will thus only be interpretable in a context that has previously introduced the discourse referent... Discourse referents can

be introduced (i.e. indices can be added to the domain an assignment) in at least two different ways: Linguistically, by the use of full DPs, in particular indefinites, and extralinguistically, by pointing to an object, or simply by virtue of that object becoming salient.

There are certainly relevant effects of salience, and I do not wish to argue that it is not a real phenomenon. Salience may be involved in deciding which, of a list of previously introduced antecedents in the context, is the most likely or naturally acceptable referent of a newly uttered pronoun, as in (2) My claim is narrower. I argue that there are no linguistic means, other than the explicit uttering of a DP, in which an object can be made sufficiently salient to license that object's status as a referent for a pronoun. That is, in Büring's (2011) summary above, I mean to do away with the 'at least'. This is to leave aside specific extralinguistic mechanisms of identification, e.g. pointing (for their account in the syntactic theory, see Elbourne 2013, 201). I am concerned in particular with the linguistic context, and showing that what have been called salience requirements are, in fact, nothing less strict than the requirement of an overt noun phrase (NP) antecedent. In the following sections, I will review two recent D-type theories which fall on opposite sides of the linguistic/contextual divide, address some theoretical issues with the contextual account's use of a salience requirement, and then review some new evidence in favor of the linguistic analysis, in which the critical distinction between definite NPs and pronouns is this formal link requirement of an NP antecedent, rather than some underspecified notion of salience. Cross-linguistic evidence suggests that neither theory can account for the behavior of all types of pronouns, but rather that linguistic explanations are more parsimonious for certain pronouns and contextual explanations for others. In this paper, I will be largely restricting my discussion to the licensing conditions of 3rd person pronouns, and in particular 3rd person gendered pronouns in English (*he* and *she*). Local, 1st and 2nd person, pronouns appear to retrieve their antecedent from the more immediate discourse context (speaker and addressee), while 3rd person pronouns are naturally more ambiguous in their reference and must invoke some other function to select an appropriate antecedent.

2.3 A contextual D-type theory: Presuppositions on discourse referents

Roberts (2004) is one of the most developed recent contextual D-type theories, which identifies the 'antecedent' of anaphoric pronouns with a contextually salient discourse referent which satisfies certain presuppositions, rather than an explicitly spelled out linguistic expression, such as a noun phrase (NP) antecedent. It is not a real entity in the world nor a linguistic expression to which pronouns refer, but instead 'bundles of information' (Roberts, 2004, 3) represented by a variable that is then appropriately interpreted, by an assignment function, as referring to some individual satisfying all the information in our discourse structure corresponding to that particular 'bundle'. The technical form of these discourse referents is then not an individual, but 'the set of permissible assignment functions' (Roberts, 2004, 3) which would achieve the correct mapping between the discourse-structured information bundle and appropriate individuals satisfying that

information (e.g. the ϕ -features of a pronoun). Thus, the more information that is specified, the smaller and more constrained the set of possible assignment functions defining a discourse referent becomes.

This theory extends her earlier work (Roberts, 2003) on definite descriptions and attempts to account for pronouns under a similar presuppositional framework. Because most of the work is done through presuppositions, the actual descriptive content of pronouns is very minimal on this theory, though they are certainly definites. Roberts (2004, 2) distinguishes between the ‘presupposed content’ and the ‘proffered content’ of an expression, the latter corresponding to our abstracted *pro* in (1). The proffered content of pronouns, on this view, is extremely impoverished. Roberts does not offer a specific structure along the lines of 1; presumably the pronoun consists of only a variable with its attendant presuppositions. By contrast, the presupposed content forms the bulk of the restrictions on pronominal felicity. Her conditions on the licit use of definite descriptions and pronouns are reproduced below, in (3) and (4) respectively:

- (3) *Presupposition requirements on NPs:* Given a context C , use of a definite NP_i presupposes that it has as antecedent a discourse referent x_i which is:
 - a. weakly familiar in C , and
 - b. unique among discourse referents in C in being contextually entailed to satisfy the descriptive content of NP_i . (Roberts, 2004, 5)
- (4) *Presupposition requirements on pronouns:* Given a context C , use of a pronoun Pro_i presupposes that it has as antecedent a discourse referent x_i which is:
 - a. weakly familiar in C ,
 - b. salient in C , and
 - c. unique in being the most salient discourse referent in C which is contextually entailed to satisfy the descriptive content suggested by the person, number and gender of Pro_i . (Roberts, 2004, 14)

We are here concerned, crucially, with the distinctions between (3) and (4), namely, the requirements that hold for pronouns and not for definite NPs. These boil down to salience: (4b) holds that the antecedent must be salient, and (4c) holds that the antecedent must be the most salient referent satisfying the pronoun’s descriptive content. Roberts summarizes this herself: ‘pronouns differ from definite descriptions in two important respects, both stemming from the fact that their descriptive content is so minimal: They do not generally give rise to uniqueness effects, which we find with some uses of definite descriptions, and they require maximal salience of their discourse referent antecedents, which is not required with definite descriptions’ (Roberts, 2004, 3). We shall concern ourselves with this notion of ‘maximal salience’. But what is meant by salience, here?

Roberts (2003) formalizes the weak familiarity and uniqueness presuppositions in (4a) and (4c), respectively, but does not do so for salience (understandably, given the inherent fuzziness of the term). Instead, we are given the informal explanation: ‘As long as a question is under discussion, the familiar discourse referents which pertain to that question (typically, those mentioned in discussing it) are salient.’ (Roberts, 2003, 331). Her requirements for salient discourse referents are (partially) reproduced in (5):

- (5) Salient discourse referents:
- a. must be (weakly) familiar
 - b. pertain to a current goal in the hierarchical structure of discourse goals (questions under discussion) and domain goals of the interlocutors (Roberts, 2003, 334)

Weak familiarity, crucially, is distinguished from strong familiarity in that a discourse referent does not need to have been previously mentioned to be weakly familiar. Section 4.1.2 discusses the importance of this distinction more.

The requirements in (5) are partial, only because the remainder of the requirements she give pertain only to how different already-salient discourse referents are ordered in salience, which is not relevant to the current discussion. While I would normally hesitate to assert that anything is ‘all that is said’ about a topic by an author in an expansive discussion, here, Roberts (2003, 333) does specify that these requirements ‘summarize what I have said about salience of discourse referents’, so it appears fair to assume that nothing else is meant to formally specify this notion further - certainly nothing appears to obviously do this in her theory.

The question which then arises is, if prior mention is only *typical* of salience, what more precisely defines the boundaries of salience? Are there any instances of a familiar discourse referent which has not been explicitly mentioned, but is still relevant enough to the question under discussion to be made salient through linguistic means? It does not seem that there are. (5b) is meant to distinguish salience from merely weak familiarity, and Roberts (2004) provides the following examples (citing Heim 1982, who in turn attributes them to Barbara Partee), in (6) to illustrate this distinction.

- (6)
- a. I dropped ten marbles and found only nine of them. **The missing marble** is probably under the sofa.
 - b. I dropped ten marbles and found all of them, except for one. **It** is probably under the sofa.
 - c. I dropped ten marbles and found only nine of them. **#It** is probably under the sofa.

(6a) clearly demonstrates that the first sentence is sufficient to make the missing marble weakly familiar, thus licensing a definite NP. On the other hand, (6c) shows that that same sentence is insufficient to make the missing marble salient enough to license the pronoun. So what makes the missing marble salient in (6b)? Only prior mention through an explicitly uttered NP: ‘When the missing marble is *explicitly mentioned, and hence salient*, in the first sentence of (6b), use of the pronoun is felicitous.’ (Roberts 2004, numbering changed and italics mine). No examples are given in which a pronoun is made salient through linguistic information other than explicit prior mention, but the phrasing of these characterizations of salience in terms of typicality, etc. suggests that this theory should perhaps accommodate such utterances. If not, it is reducible to prior mention, which we shall see is accounted for more parsimoniously by the syntactic linguistic NP-deletion account, which I shall turn to shortly.

However, it is worth first clarifying an important caveat to my objections here. After all, I am not so much claiming that Roberts’ characterization of salience is *wrong*, rather, that it is underspecified. It is entirely possible that what was meant is precisely what I have concluded, that is, that the only linguistic means of making a discourse referent salient is prior mention, and that this is why no examples of a linguistically salient but unmentioned referent are given. In either case, I intend to draw attention to what appears to be a more widespread failure to cleanly define an exclusive definition of salience. However, if this is the case and Roberts’ theory admits no other forms of linguistic salience, then it loses a significant theoretical advantage over the linguistic D-type account, which has a more consistent, and arguably less stipulative, way to account for the resulting pattern, but would struggle to account for broader salience effects.

2.4 A linguistic D-type theory: NP-deletion

Elbourne (2005, 2013) advances a competing D-type theory which is linguistic, rather than contextual, in how (and from where) it retrieves the referents for pronouns. Under this theory, the pronoun has as antecedent not an abstract discourse referent in the information structure, but rather a specific linguistic expression earlier in the discourse, that is, a previously uttered NP. This theory has much more syntactically encoded information in the structure of the pronoun, and limits the presupposed content to ϕ -features, along with the standard uniqueness presupposition that all definite descriptions have (Elbourne, 2013, 193). Without presuppositions of familiarity and salience, then, how does this theory account for the limitations on pronoun licensing? Straightforwardly, it is in the internal structure of the pronoun, which Elbourne (2013, 193) argues mirrors almost exactly that of any other definite description in containing a full (normally) unpronounced NP:

- (7) a. $[[the\ NP]\ s_i]$
 b. $[[it\ NP]\ s_i]$

These identical structures can be derived because Elbourne also assigns pronouns the same meaning as the definite article:

- (8) a. $[[the]] = \lambda f_{(s,t)}. \lambda s : s \in D_s \ \& \ \exists!x\ f(x)(s) = 1. \iota x f(x)(s) = 1$
 b. $[[it]] = \lambda f_{(s,t)}. \lambda s : s \in D_s \ \& \ \exists!x\ f(x)(s) = 1. \iota x f(x)(s) = 1$

The notion of identifying pronouns with articles in semantic form is originally supported by observations by Postal (1969b), who noted that the former can sometimes act like the latter, as in (9). Examples such as these also motivate the ‘normally’ qualification to ‘unpronounced NP’ above.

- (9) You troops will embark but the other troops will remain.

In most cases, however, the NP complement to a pronoun is phonologically null. Elbourne argues that this is the case because it undergoes NP-deletion, hence the title, *NP-deletion theory*. Under the Hankamer and Sag (1976) framework of ‘deep’ and ‘surface’ anaphora, then, all English 3rd person pronouns are ‘surface’ anaphora which are controlled by a syntactic process. Thus the conditions on pronouns are precisely the

conditions under which NP-deletion can occur, which captures certain important generalizations which other theories must take a difficult, somewhat stipulative road to work around (the most relevant of which is discussed in the next section). The NP-deletion theory, as it stands, is not committed to any particular theory of how NP-deletion occurs. It states only that, whatever this process is (and we know it exists, and has certain restrictions), it is the very same process occurring in pronouns, and thus we should expect to find the very same restrictions in both cases.

Before addressing the problem for which NP-deletion theory is particularly well-suited to account, which will set up the rest of my argument, it is worth going into some more detail about the precise meanings of (7) and (8), for they contain an important theoretical change adopted (though certainly not innovated) by Elbourne (2013), in the use of situation semantics. The s_i in those definitions represents a situation pronoun, which itself refers to one part of a possible world, following Kratzer (1989). Worlds consist of particulars (identified with individuals) which have properties and stand in certain relations to each other (Armstrong, 1989), and a situation, then, consists of some subset of these ingredients: ‘one or more particulars having one or more properties or standing in one or more relations at a certain time’ (Elbourne, 2013, 24). Situations are subsets of worlds, then, and can also be subsets of other situations: it need not be the case that if a situation contains a certain particular, that it must contain all properties had by that particular or all relationships it participates in.

Following Schwarz (2009, 2012), these situation pronouns are assumed to have syntactic representation as (at least) arguments of determiners, as in (7) and (8). The uniqueness requirement of the definite determiner (and, equivalently, the pronoun) thus operates over situations, such that when a statement like (10a) is uttered, it is not automatically required that one is making a claim about every boy that has existed or ever will exist, but about every boy in a relevant situation (e.g. at a particular pool party). Similarly, uttering (10b) does not presuppose global uniqueness such that there is only one man in all of existence, but only one man in the situation currently under consideration by the interlocutors in the discourse at the time.

- (10) a. Every boy swims.
 b. The man arrived.

The adoption of a situation semantics, with situation pronouns structurally introduced by determiners, allows this theory to account for covarying interpretations of definite descriptions, such as those anaphoric definite descriptions in donkey sentences:

- (11) Every man who owns a donkey beats the donkey. (Elbourne, 2013, 121)

For a full discussion of the calculations required to derive the meaning of (11), see (Elbourne, 2013, 122). Here, it will suffice to discuss somewhat informally the outcome with respect to situations. Having a situation pronoun be introduced by each determiner in (11) allows the theory to derive the correct truth conditions and account for the uniqueness presupposition of the definite determiner: in every situation s in which there is a man x , for each minimal situation $s' \leq s$ in which x owns a donkey y , there is a corresponding minimal

situation s'' such that $s' \leq s'' \leq s$ and x (= the man in s) beats y (= the donkey in s') in s'' . Thus, the denotation assigned to the definite article as in (8) derives the correct truth conditions for anaphoric definite descriptions. This same denotation being assigned to pronouns will allow the NP-deletion theory to account for a major objection to D-type theories parsimoniously, which I will turn to now.

2.5 The problem of the formal link

All theories of pronouns must provide some account for what has come to be known as *the problem of the formal link* (Kadmon, 1987). Büring (2011) summarizes the problem and provides an example: What makes the meaning ‘wife of x ’ available for the pronoun in (12a), but not (12b)?

- (12) a. Every man who has a wife should bring her along.
 b. *Every married man should bring her along.

Postal (1969a) also discusses cases like (12). Under his analysis, (12b) would be excluded by the following condition:

- (13) Lexical items are anaphoric islands with respect to outbound anaphora involving coreferential pronouns. (Postal, 1969a, 207)

Here, an *anaphoric island* is defined as ‘a sentence part which cannot contain an anaphoric element whose antecedent lies outside of the part in question and which cannot contain the antecedent structure for anaphoric elements lying outside’ (Postal, 1969a, 205). An anaphor is *outbound*, then, if it is outside of the sentence part which contains its antecedent. Thus, in (12b), the lexical item *married* is an anaphoric island with respect to the outbound anaphor *her*. While Postal (1969a) describes this and other patterns about the distribution of anaphors, his constraints do not provide a mechanical description of, or independent motivation for, *why* they exist. Whether these constraints arise due to pragmatic restrictions on contextual retrieval, or linguistic restrictions on ellipsis, is still open to be contested.

Theories which rely on retrieving the antecedents for pronouns from a set of contextually salient discourse relations struggle to provide a clean explanation for this distinction. The marriage relation is clearly made salient by *married*, and should provide enough information about the ‘bundle’ that represents the discourse referent corresponding to the second, unnamed participant in that relation to constrain the set of assignment functions sufficiently to pick out one individual. The understanding of the marriage relation that the standard listener has is at least sufficient to establish the uniqueness of the other individual (the slot in the relation not filled by *man* in (12b)), and likely to select the correct gender feature to satisfy the presuppositions about ϕ -features carried by *her*. And yet it does not seem like an appropriate discourse referent can be picked out.

Accounting for patterns like (12) in a contextual theory like Roberts’s (2004) requires some stipulation in the presuppositions. Roberts (2004, 15) argues for similar sentences that if preceding discourse context entails the existence of an entity (e.g. the wife), that is sufficient to make the entity weakly familiar, but not salient, so (12b) is illicit because the

pronoun *her* has a maximal salience presupposition on its discourse referent, while (14) is perfectly acceptable as definite NPs only have the presupposition of weak familiarity.

(14) Every married man should bring his wife along.

The question still remains, on this account, why does *married* not make the unique participant in the marriage relation salient? Of course, there are two participants in the relation, but the individual denoted by *wife* is certainly unique in being the only referent satisfying the ϕ -features of *her*, which is the requirement Roberts (2004) gives in (4c), and Condition B (Chomsky, 1981) would block the other participant (the man) from being the referent of the pronoun regardless. Given that, could any type of preceding linguistic context make any relation so contextually relevant as to make the participant salient without prior mention? One would expect that it should be able to, given Roberts' formulation of salience in (5). It certainly seems to me that the behavior of the participants in the marriage relation is one of the questions under discussion in (12b), and if no other linguistic content intervenes, likely the only and most prominent question under discussion. I will return to this question in discussing the experimental data, but not before providing some further motivation for this particular experiment.

The NP-deletion theory has a comparatively elegant explanation for the contrast in (12). Simply put, 'NP-deletion requires a linguistic antecedent' (Elbourne, 2005, 68). This antecedent is present in (12a), with *wife*, but not in (12b). I call this 'comparatively elegant' because this requirement on NP-deletion is completely externally and independently motivated; NP-deletion would behave this way regardless of whether or not it was the operative mechanism in anaphoric pronouns. The contextual theory, on the other hand, must adapt its definition of salience and familiarity to create a distinction to account for cases like these and (6), where perhaps one would otherwise not be necessary.

It should be acknowledged that much of the analysis of data like (12) and (14) relies on a certain level of heteronormativity. For the ϕ -features of *her* in (12b) to be fully determined by *married*, satisfying the gender presupposition requirement in (4c), the listener must process the sentence and make an inference based on heterosexual norms of marriage. A small number of the sentences which will end up being experimentally tested in both German and English also rely on similar assumptions, namely the *relationship*, *marriage*, and *wedding* sentences in (18) and Appendix A. It is assumed here that most readers are making these assumptions, consciously or not, in their reasoning to arrive at an antecedent for these pronouns. Working with these assumptions, while acknowledging that they are not universally applicable nor technically true, may be an unfortunate necessity to investigate these phenomena. It is difficult to generate sentences which sufficiently restrict the gender of the intended antecedent, without prior mention, without invoking some normative assumptions about gender or sexuality. Still, it is a minority of sentences being examined that have this problem; they just tend to be the most famous examples. This issue, and whether it has implications for the analysis, is discussed further in Section 3.3.3.

2.6 The formal link requirement in German

The formal link requirement is not, however, a cross-linguistically and universally inviolable restriction. Patel-Grosz and Grosz (2017) have provided some evidence recently that

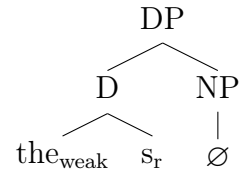
in German, the personal pronoun behaves differently from the demonstrative pronoun with respect to their adherence to the formal link. (15) shows that both are acceptable when an overt NP antecedent is provided. However, as shown in (16), the personal pronouns (*es* and *sein*) are perfectly acceptable in these contexts without an overt NP antecedent, while the demonstrative pronouns (*das* and *dessen*) are infelicitous in the same positions.

- (15) *Wenn ich ein Kind kriege, werde ich {es / das} auf jeden Fall behalten.*
 if I a child get will I it_{PER} / it_{DEM} on every case keep
 ‘If I get pregnant, I will definitely keep it_{PER} / it_{DEM} (= the baby).’
- (16) a. *Wenn ich schwanger werde, werde ich {es / #das} auf jeden Fall behalten.*
 if I pregnant become will I it_{PER} / #it_{DEM} on every case keep
 ‘If I get pregnant, I will definitely keep it / #DEM (= the baby).’
- b. *Hans hat so sehr geblutet, dass {es / #das} durch den Verband gedrunken ist und sein Hemd verschmutzt hat.*
 Hans has so much bled that it_{PER} / #it_{DEM} through the bandage soaked is and his shirt stained has
 ‘Hans bled so much that it_{PER} / #it_{DEM} (= the blood) soaked his bandages and stained his shirt.’
- c. *Manche Frauen sind schon seit mehr als zwanzig Jahren verheiratet und wissen noch immer nicht, was {sein / #dessen} Lieblingsbier ist.*
 know still always not what his_{PER} / #his_{DEM} favorite.beer is
 ‘Some women have been married for more than twenty years and still do not know what his_{PER} / #his_{DEM} (= the husband’s) favorite beer is.’

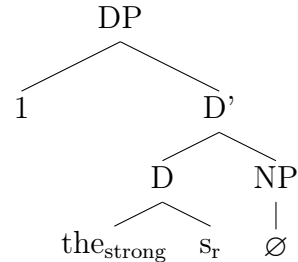
Patel-Grosz and Grosz (2017) take this contrast as evidence that the personal pronouns (PERS) contain a weak determiner which does not introduce an index (and therefore has less internal structure), while the demonstrative pronouns (DEMS) contain a strong determiner which does introduce an anaphoric index. This contrast between the weak and strong determiner follows Schwarz (2009). The anaphoric index guarantees that the pronoun refers to some specific, salient antecedent in the discourse, rather than relying on the general uniqueness presupposition as the weak determiner does. Their analysis in this form does not derive the formal link pattern through an ellipsis requirement, but rather also through this salience requirement, as enforced by the index. Patel-Grosz and Grosz’s (2017) theory of German pronoun structure is given below in (17). The uniformity of the two pronouns with respect to their internal NP is preliminarily motivated by independent evidence suggesting that they pattern alike with respect to concord with the gender and number features of the null NP, though they do concede that their evidence is stronger for just uniformity (i.e. that PERS and DEMS share the same value of $[\pm\text{NP}]$, whichever it is) rather than coming down on either $[\text{+NP}]$ or $[\text{-NP}]$. However, in light of the arguments for treating at least the English pronoun as universally a definite that is $[\text{+NP}]$ (Elbourne,

2005, 2013), assuming that Patel-Grosz and Grosz (2017) are correct in their [+NP] choice is motivated by the desire to have a unified theory when we come to English. In the following structures, s_r refers to the resource situation pronoun described in Section 2.4

(17) a. Personal pronoun (PER) structure:



b. Demonstrative pronoun (DEM) structure:



(Adapted¹ from Patel-Grosz and Grosz 2017, 14)

It is clear that the formal link requirement exists, though to varying extents, in both English and German. The question which remains is, can a unified analysis explain the patterning of pronouns in both languages? Ideally, we would like this to be the case. To that end, I will now present some experimental data comparing the behavior of English 3rd person pronouns in a case where the German pronouns display a contrast.

3 Experimental investigation

3.1 German

Before testing the English data, I expanded and reproduced the effects shown by Patel-Grosz and Grosz (2017) in (16). A list of twenty-eight sentences consisting of fourteen minimal pairs differing only on their use of the PER or DEM pronoun, shown in (18) and broadly structurally analogous to (16a), was constructed and tested informally with four native German speakers. While a full-scale experimental replication of these effects might ideally be desirable, given the relative clarity of the contrast that these judgments uncovered and how it confirmed an existing effect reported by Patel-Grosz and Grosz (2017) to be uncontroversial, it seemed unnecessary to proceed with this investigation. Participants were asked to judge the sentences on a 3-point scale, with 1 as ‘completely ungrammatical’, 3 as ‘completely acceptable’, and 2 as ‘somewhere in between’. The precise averaged judgments are given in the table below in Table 1. For readability, the sentences used are shown at the end of this section in (18) with grammaticality judgments where # corresponds to an average judgment of < 2 , and unmarked/acceptable corresponds to > 2 (no average judgments equaled 2). In all sentences, the PER pronoun is listed before the DEM pronoun.

¹In their original formulation, the DEM index is located in an additional projecting $D_{deix}P$ head, but they note that it may alternately be in the specifier of the determiner DP. The latter has been adopted for simplicity here; the choice may end up being relevant to the discussion of the index in Section 4.3.2.

Sentence	w/PER	w/DEM	Sentence	w/PER	w/DEM
a. relationship	3.00	1.00	h. duet	2.75	1.50
b. interview	2.75	1.25	i. therapy	3.00	1.25
c. marriage	3.00	1.75	j. doctor	3.00	1.25
d. pizza delivery	2.50	1.50	k. tutoring	3.00	1.25
e. tennis	2.75	1.50	l. coaching	2.75	1.50
f. wedding (kiss)	2.75	1.00	m. pregnancy	2.75	1.25
g. wedding (decor)	3.00	1.75	n. waltz	3.00	1.75

Table 1: Mean ratings for German PERs vs. DEMs

The small number of speakers reporting judgments does lead this data to appear, I suspect, more varied than the actual picture is, simply because it limits the possible step between averages to 0.25. As it is, there is still a very clear contrast which replicates Patel-Grosz and Grosz’s (2017) examples: all of the sentences are generally acceptable with the PER pronoun, and none of them are with the DEM pronoun. Only one PER sentence is judged below 2.75 (the second-highest possible value), and the speakers did report a unique ambiguity in that sentence due to the existence of another possible referent NP (the pizza) that was gender mismatched with the pronoun, and a similar effect accounts for why the first wedding sentence is slightly worse than the second. By contrast, all of the DEM sentences had judgments in the bottom half of acceptability (< 2). The increased variation in judgments on the bottom half is likely just due to differences in speaker interpretation of what a judgment of 1 means, since these sentences are, of course, largely syntactically well formed and so unlikely to elicit complete, automatic rejections. Overall, these results confirm the expected pattern predicted by Patel-Grosz and Grosz’ structural asymmetry theory of the weak PERs and strong DEMs, in which only the latter are subject to the formal link requirement of an overt NP antecedent.

It is also worth noting, for when we come to the analysis of the English data, that the fact that these sentences allowed the PERs suggests that this kind of event description is sufficient to entail a unique referent in the information structure of the discourse context, which is the requirement for the PER pronoun. It seems unlikely that the definition of uniqueness, or the way that unique information is represented in the discourse context, is different between English and German, even if the means of referring to these referents with specific linguistic items is different.

- (18) a. *In allen meiner ehemaligen Beziehungen, hat {sie / #die} den ersten Schritt getan.*
in all my past relationships has she_{PER} / she_{DEM} the first
move made
‘In all my past relationships, **she** made the first move.’
- b. *Gestern hatte ich ein Interview, und {er / #der} hat mir so viele komische Fragen gestellt.*
yesterday had I an interview and he_{PER} / he_{DEM} had me so many
strange questions asked

- ‘Yesterday I had an interview, and **he** asked me many strange questions.’
- c. *In meiner letzten Ehe, hat {er / #der} mir nie geholfen, das Haus zu putzen.*
 in my last marriage had he_{PER} / he_{DEM} me never helped the house to clean
 ‘In my last marriage, **he** never helped me clean the house.’
- d. *Ich habe gestern Abend eine Pizza bestellt, und als {er / #der} angekommen ist, habe ich erkannt, dass ich kein Geld hatte.*
 I have yesterday evening a pizza ordered and when he_{PER} / he_{DEM} arrived is have I realized that I no money had
 ‘I ordered a pizza yesterday, and when **he** arrived, I realized that I was out of cash.’
- e. *In jedem Spiel, das ich beim Tennisturnier gespielt habe, war {er / #der} viel besser als ich.*
 in every game that I at tennis.tournament played had was he_{PER} / he_{DEM} much better than me
 ‘In every game that I played at the tennis tournament, **he** was so much better than me.’
- f. *Mary hat viel Angst vor Keimen. Auf ihrer Hochzeit, hat sie {ihn / #den} nicht geküsst.*
 Mary has much fear for germs. At her wedding, has she him_{PER} / him_{DEM} not kissed
 ‘Mary is a germaphobe. At her wedding, she didn’t even kiss **him**.’
- g. *Mary ist sehr sorgfältig. Für ihre Hochzeit hat sie {ihm / #dem} nicht erlaubt, die Dekoration auszuwählen.*
 Mary is very meticulous. For her wedding has she him_{PER} / him_{DEM} not allowed the decoration select
 ‘Mary is very meticulous. For her wedding, she didn’t let **him** pick out any decorations.’
- h. *Ich habe ein Duett gesungen, und {er / #der} hat perfekt mit mir harmoniert.*
 I have a duet sung and he_{PER} / he_{DEM} has perfectly with me harmonized
 ‘I sung in a duet, and **he** harmonized with me perfectly.’
- i. *Bei meiner letzten Therapiesitzung, hat {er / #der} mir geholfen, viele von meinen Problemen zu lösen.*
 At my last therapy.session has he_{PER} / he_{DEM} me helped many of my problems to solve
 ‘At my last therapy session, **he** really helped me work out some of my issues.’
- j. *Bei dem Onkologetermin von Sarah, hat {er / #der} ihr erzählt.*
 at the oncology.appointment of Sarah has he_{PER} / he_{DEM} her told

dass sie besser wird.

that she better get

‘At Sarah’s oncology appointment, **he** told her that she was getting better.’

- k. *Ich habe gestern Nachhilfe gegeben, und {sie / #die} hat gar nichts verstanden.*
I have yesterday tutoring given and she_{PER} / she_{DEM} has at.all nothing understood

‘I was tutoring yesterday and **she** wasn’t understanding anything.’

- l. *Ich habe gestern Volleyball trainiert, und {sie / #die} konnte den Ball gar nicht treffen.*
I have yesterday volleyball coached and she_{PER} / she_{DEM} could the ball at.all not hit

‘I was coaching volleyball yesterday, and **she** could not hit the ball at all.’

- m. *Wenn ich schwanger werde, werde ich {es / #das} auf jeden Fall behalten.*
If I pregnant become, will I it_{PER} / it_{DEM} in every case keep

‘If I become pregnant, I will definitely keep **it**.’

- n. *Bei meinem Waltzerunterricht gestern, ist {sie / #die} vielmals über meine Füße gestolpert.*
At my waltz.lesson yesterday is she_{PER} / she_{DEM} many.times over my feet tripped

‘At my waltz lessons yesterday, **she** kept tripping over my feet.’

3.2 English, Part I

The English translations of the sentences in (18) were also tested as a pilot investigation, with a slightly larger set of twelve native English speakers as participants. The same 1-3 rating system discussed in Section 3.1 above was used. Since English lacks the PER/DEM distinction, only one version of each sentence was tested. The averaged judgments are reported below in Table 2.

Sentence	Mean Rating	Sentence	Mean Rating
a. relationship	2.250	h. duet	2.333
b. interview	2.583	i. therapy	2.250
c. marriage	2.667	j. doctor	2.083
d. pizza delivery	2.000	k. tutoring	2.500
e. tennis	1.333	l. coaching	1.583
f. wedding (kiss)	2.417	m. pregnancy	2.667
g. wedding (decor)	2.250	n. waltz	2.000

Table 2: Mean ratings for English (preliminary)

This data, collected rather informally, displayed an extremely high amount of variation, with some speakers judging every sentence as perfectly acceptable and some judging every sentence as completely unacceptable, with nearly every pattern of judgment represented. This, combined with the fact that some additional variables between the sentences themselves, motivated the more large-scale and experimentally precise investigation in the next section.

Before I review the results of that experiment, though, let us consider what the implications of this data would be. At first, it seems like overall these sentences are judged as slightly awkward, but generally acceptable, with almost all rated above the midpoint of 2. There are some variations for which natural explanations suggest themselves. First, sentences describing an event in which there is most clearly one additional unique participant perform better overall: marriage, interview, and wedding are all some of the highest-rated sentences. Perhaps most clearly illustrating this effect is the contrast between tutoring, traditionally involving two people, and coaching, almost always involving a team. Second, when the gender of the unmentioned participant can be more reliably assumed, ratings seem to improve. This is shown by the contrast by the high rating of the marriage sentence compared to other two-participant events. Marriage outperforms all the other unique events, likely due to this. Third, sentences which quantified over events performed worse than those which did not. Both the *relationship* sentence and the *tennis game* sentence involved this kind of quantification: ‘In all my last relationships...’, and ‘In every game that I played...’ This might account for the the relationship sentence underperforming the marriage sentence when they should have been conceptually equivalent with respect to the other factors, and the very low rating of the tennis game sentence. This accidental variable was corrected in the full experiment.

In the face of this data, the contextual salience hypothesis appears to do pretty well. The pronouns being licensed without an overt NP antecedent supports a salience account, and the patterns discussed in the preceding paragraph follow naturally from Roberts’s (2004) presuppositions on pronouns. When the event constrains the possible referents to a more unique individual, the uniqueness presupposition is better satisfied. When gender and number features can be more easily inferred, the ϕ -features help to constrain the referent further. And when there is only a single event being referenced, with one specific individual as the participant, that should more clearly satisfy the uniqueness presupposition than multiple individuals each in a separate situation as a result of universal quantification. If this pattern holds up to robust experimental testing, perhaps a contextual analysis with a wider notion of salience is indeed worth pursuing. I turn to this now.

3.3 English, Part II

3.3.1 Methods

In an attempt to resolve the ambiguities, high variation, and low sample size in the English data, a study was conducted using Amazon’s Mechanical Turk (AMT) interface.

Participants 103 self-reported native speakers of English participated in the AMT experiment. Both monolingual and multilingual English speakers were accepted. AMT

qualification tests to determine English proficiency were not used, but payment was not conditioned on answering ‘Yes’ to the native English speaker question. 104 total assignments were completed, and only 1 assignment was excluded from the analysis as a result of not reporting as a native English speaker. AMT qualifications were imposed to ensure that each participant was located in the United States, graduated high school in the United States, and had an overall HIT approval rate greater than 70%.

Design Design for the experiment was based largely on the *TurkTools* template designed by Erlewine and Kotek (2016). Participants were instructed to rate the naturalness of 40 English sentences, on a Likert scale ranging from 1 (‘most unnatural’) to 7 (‘most natural’). This phrasing, and most of the instructions, was carried over directly from the Erlewine and Kotek (2016) Likert survey template. In addition, because all of the target sentences were largely syntactically well-formed, participants were also given the following added instruction to attempt to motivate semantic judgments:

- (19) In this particular survey, you will be asked to evaluate the acceptability or naturalness of sentences outside of a conversational context. Specifically, you should assume that no other sentences have been spoken before these, and your task is to evaluate both whether the sentences are grammatically natural, and also whether they make sense with no other information provided.

Participants were trained on three sentences: one perfectly grammatical sentence with a reflexive pronoun, one Condition A violation, and one syntactically well-formed sentence with a pronoun that lacked an antecedent. They were trained to mark the first sentence as natural (6 or 7), the second sentence as unnatural (1 or 2), and were not given any specific ratings as suggestions for the third sentence, but were instructed to attend to the fact that the sentence may seem less natural if you cannot figure out who the pronoun refers to. The suggestion was given to participants: ‘One way to help you judge these sentences may be to imagine a context, like a friend coming into the room and beginning a conversation with the sentence.’ While this instruction may seem to bias participants against the target sentences, conversations during the pilot investigation suggested that without some instruction to this effect, participants were likely to rate purely on syntactic well-formedness, so some minimal instruction was deemed necessary.

After the 40-question survey, participants were asked two yes-or-no questions: ‘Are you a native speaker of English?’ and ‘Do you speak a language other than English?’, with the clarification that their answers would not affect payment. Payment was, however, contingent on answering all questions. Participants were paid \$1.00 for completing the survey, above the average rate ($\$0.02$ per single task \times 40 items = $\$0.80$), and the average time to complete the survey was 6 minutes, 43 seconds, with a time limit of 15 minutes.

Materials The experiment used a 2×2 design for the target sentences, crossing the presence of an event in the sentence which could potentially make a certain relation or participant salient ([\pm EVENT]) with the presence of a pronoun versus a full NP ([\pm PRONOUN]). There were 20 target sentence frames, with 4 sentences for each frame on the 2×2 condition, for a total of 80 target sentences. 40 filler sentences were also included, consisting of reflexive sentences which either violated or satisfied Condition A and sentences with pronouns that satisfied Condition B. Given that the target sentences were functionally

indistinguishable from Condition B violations syntactically, filler sentences for this condition were not analyzed. Examples of target and filler sentences are given below in (20) and (21), respectively. The full list of target sentences is given in Appendix A.

(20) *Example target sentences*

- a. In my last relationship, she made the first move. [+EVENT,+PRO]
- b. In my last relationship, my girlfriend made the first move. [+EVENT,-PRO]
- c. Last time, she made the first move. [-EVENT,+PRO]
- d. Last time, my girlfriend made the first move. [-EVENT,-PRO]

(21) *Example filler sentences*

- a. Yesterday, John said that he was coming to the party. [Satisfies Condition B]
- b. *Yesterday, John said that himself was coming to the party. [Violates Condition A]
- c. Yesterday, John drove himself to the party. [Satisfies Condition A]

Eight 40-question surveys were randomly constructed from the pool of sentences. The surveys were constructed such that the questionnaire always alternated between target and filler sentences. Each survey was filled out by 13 unique participants. With some redundancy between the surveys, each target sentence was rated approximately 20 times (in a range of 18-21).

3.3.2 Predictions

The contextual and linguistic D-type analyses should predict different outcomes for this experiment. If the pattern from the first set of English data is replicated, that would be a quite strong piece of evidence in favor of the contextual analysis. It would demonstrate that making certain relations between individuals (i.e. participants in an event) highly salient, enough to pick out a unique discourse referent about whom we have a certain bundle of information suggested by the event, is sufficient to license a pronoun, and would support a presuppositional account.

If the pattern is not replicated, and these pronouns are judged unacceptable, the picture is less clear. This would not be a direct rejection of the contextual analysis, at least that advanced by Roberts (2004), because it can easily be responded that these contexts were insufficient to make the intended referent of the pronoun maximally salient. The question would still remain, however, why not? These target sentences are hypothetically designed to provide maximal contextual information to support (perhaps even entail; see Section 4.1.2) the existence of a unique discourse referent. If they fail to do so, it does seem that only prior mention may be a sufficient means of raising a referent's salience linguistically. Still, the contextual analysis can certainly define salience this way, and it by no means would collapse in the face of this outcome. However, it would arguably *force* this move to be made, when it was previously left underspecified. The NP-deletion account would be equally capable of explaining a non-replication outcome, so this outcome cannot be interpreted as a direct endorsement of either analysis without further argument.

3.3.3 Results

The results of the experiment are presented in Tables 3, 4, and 5. Table 3 shows the mean ratings received by all sentences in the corresponding condition, and the standard deviation of those ratings². Table 4 shows the results of Welch’s two-sample t-tests conducted to evaluate the significance of the differences between the means in Table 3. There is a main effect of the \pm PRONOUN condition: sentences with definite noun phrases were significantly more acceptable than sentences with pronouns overall. There was also a small but significant interaction effect of the \pm EVENT manipulation within the $-$ PRONOUN condition: definite noun phrases were judged to be slightly more acceptable in sentences with event contexts. However, there was no interaction effect of the \pm EVENT manipulation within the $+$ PRONOUN condition: the presence of an event context had no significant effect on the overall lower acceptability of sentences with pronouns which lacked explicit linguistic antecedents.

Condition	Mean Rating	Standard Deviation
+EVENT, +PRONOUN	4.18	1.75
-EVENT, +PRONOUN	4.11	1.78
+EVENT, -PRONOUN	5.98	1.26
-EVENT, -PRONOUN	5.64	1.53

Table 3: Ratings of English sentences by type

Condition	T	DF	P	95% CI
\pm pronoun	-19.853	1389.1	2.2e-16	-1.828786 -1.499883
\pm event (+pronoun)	0.51009	726.29	0.6101	-0.1896653 +0.3228190
\pm event (-pronoun)	3.2835	693.18	0.001077	+0.1380611 +0.5487343

Table 4: Significance test results

The existence of an effect of the \pm EVENT manipulation within the $-$ PRONOUN condition can be taken to reflect the uniqueness requirement of the definite article, and definite NPs in general, such as that in (3). This is distinct from the licensing conditions of pronouns, and from that of NP-deletion, so the existence of this effect should not pose a problem for the analysis developed in the next section. The claim is never that pronouns and definite NPs should share the same exact licensing conditions, but rather that pronouns share their licensing conditions with that of NP-deletion.

Table 5 breaks down the data further, displaying the mean ratings, standard deviations, and number of judgments given for each individual sentence in the $+$ EVENT, $+$ PRONOUN

²One set of sentences, the *pregnancy* sentences, ended up being excluded from the final analysis. This is because they were judged to be an outlier, substantially more acceptable than the other sentences in all conditions, which is likely due to the fact that this was the only sentence using *it* rather than a gendered pronoun. Similarly, ‘keep it’ is a much more frequent phrase that may be more likely analyzed as an idiom, rather than ‘pregnant’ being especially good at raising the salience of the implied antecedent compared to other contexts. This introduces an additional variable that was judged to skew the means.

condition. These are given in order according to the mean rating, rather than the corresponding order in the appendix, to make interpreting the data easier.

Event	Mean Rating	Standard Deviation	N
concert	5.00	1.89	20
therapy session	4.75	1.77	20
boxing match	4.67	1.85	18
school assembly	4.60	1.86	20
relationship	4.50	1.65	18
waltz lesson	4.40	1.60	20
duet	4.33	2.00	18
wedding	4.29	1.98	21
meeting	4.28	1.78	18
interview	4.15	1.81	20
volleyball coaching	4.10	1.81	21
marriage	4.05	1.72	21
sports game	4.00	1.72	18
tennis match	4.00	1.82	21
oncology appointment	3.83	1.58	18
pizza order	3.78	1.70	18
math class	3.67	1.58	18
blind date	3.62	1.47	21
tutoring	3.33	1.24	18

Table 5: Ratings of English sentences by event

The mean ratings in Table 5 contrast notably with those in Table 2, I think, in that there appears to be no clear patterning by participant uniqueness or gender, as was discussed previously. These correlations, then, seemed to be illusory and disappear in a larger data set. To my eye, there does not appear to be any logic behind the ordering - it seems much more difficult to extract a unique antecedent from the *concert* or *school assembly* contexts than from *marriage* or *blind date*, yet the latter score notably lower than the former. If there is a pattern here, it does not seem to correspond in any way to the presuppositions on pronoun usage under the contextual theory in (4), in the way that they appeared to in Section 3.2.

These results are also relevant to the discussion of the assumed heteronormative interpretations of some of these sentences, introduced in Section 2.5. Because we do not see the sentences with stronger assumed gender entailments predominating in their ratings, it is possible that participants are simply not making these assumptions. It is also possible that these assumptions exist, but are not having an effect because they are insufficient to rescue the sentences from a more substantial violation. Either possibility is consistent with the analysis developed below.

4 Discussion

4.1 Implications for the contextual theory

4.1.1 Narrowing the salience requirement

As discussed in Section 3.3.2, the results of the experiment are not an immediate falsification of the contextual D-type analysis. However, to account for the data, a contextual analysis must make certain moves, which arguably reduce any advantages in theoretical coverage that it may have over a linguistic analysis. To account for the unacceptability of these test sentences, or specifically the lack of an effect of context, the advocate for the contextual analysis must claim that the event contexts are insufficient to raise the salience of the unique individual participating in the event to the point where it satisfies the presuppositions of pronouns laid out in (4). This claim, I believe, runs into two issues.

First, the German data as reported in Table 1 suggests that these event contexts are indeed sufficient to satisfy the licensing conditions of the German personal pronoun. Under Patel-Grosz and Grosz’s (2017) analysis, the personal pronoun requires that there is a unique discourse referent with the NP property in the context. Given that the personal pronoun appears conclusively acceptable in these contexts, it can be inferred that they are sufficient to isolate a unique discourse referent in the information structure. Given this, why are these contexts not sufficient to satisfy the same presupposition in the case of English?

The natural response from the contextual theorist, is, of course, the same: these contexts do pick out the existence of a unique individual, but do not make them maximally salient. We can narrow this down further, and say that the claim must be that they do not make the individual salient *at all*, since there are no alternative discourse referents competing for salience in these contexts. This raises the second issue for the contextual analysis, which I have been returning to throughout. Given the lack of a formalized, logical definition of salience, and thus what is essentially a pragmatic notion, why does the data not exhibit gradient effects based on the degree to which the event context picks out or makes salient an individual? It seems uncontroversial to say that the *married-to* relation should call up the notion of a spouse more strongly in the listener’s mind than the *concert* event would a particular individual in the crowd, but nonetheless, the pronoun in the latter case received a higher rating. It also seems likely that pragmatic constraints like uniqueness or salience would align with a gradient effect, in which events which are more and more unique become more and more acceptable, rather than a binary syntactic requirement like the presence or absence of a linguistic antecedent, but no such gradient is observed.

This is not to say that the explanation could not be salience. In truth, I cannot say I have a good argument against the statement that these sentences do not make the discourse referent salient in the proper way. What I do have, I believe, is a question of theoretical parsimony about the claim that salience is a dichotomous notion determined linguistically only by prior mention. With the domain of linguistic salience so narrowed, what theoretical motivation remains for calling the effect one of salience at all? I cannot generate a satisfying external justification for why prior mention should be the sole

linguistic arbiter of salience; it seems like a purely stipulative move on the part of the contextual analysis to account for data like these. Salience, then, appears perpetually on the retreat, limiting the domain of contexts in which it operates until it captures no generalization. It perhaps cannot be done away with entirely, if we need to account for ordering effects like (2), but it seems increasingly arbitrary to make it a distinct presuppositional requirement. Indeed, it is possible that we could account for patterns like (2) by imposing an additional requirement on ellipsis, that it can only be done under identity with the most recently uttered NP that matches the relevant ϕ -features, and do away with salience entirely. This would require further investigation.

The linguistic D-type analysis, in my judgment, has the high ground when it comes to claims of parsimony and externally-motivated restrictions, out of which the pattern in this data happens to fall out, rather than the necessary contextual move of restricting the conditions of salience in reaction to the formal link requirement demonstrated in the data. I discuss this more in Section 4.2, but first I will address one potential contextual objection.

4.1.2 Satisfying (or subverting) weak familiarity

It is also necessary to show that our test sentences are not being excluded due to some other condition in Roberts' theory, and (4) includes the requirement of familiarity, so I will briefly discuss the weak familiarity constraint specified in (4a) here. Weak familiarity here means 'that the relevant discourse referent need not have been explicitly introduced into the common ground through the utterance of an NP. Instead, it need only be the case that the common ground entails existence.' (Roberts, 2004, 5). Given this, weak familiarity should not rule out the use of the pronouns in our test sentences. First, Roberts includes examples such as (22), which closely mirror the structure of our test sentences:

(22) Joan was murdered. **The murderer** was probably an acquaintance.

In (22), we have a murdering event with two implied participants, the victim (the slot filled by Joan) and the murderer, and this is taken to be sufficient grounds for weak familiarity to license the definite NP in the second sentence. Specifically, Roberts holds that that first utterance does not only suggest but in fact *entails* the existence of the murderer: 'There is no murder without a murderer' (Roberts, 2004). It is not hard to see how this closely tracks the other events we have been examining, in which the initial clause of the utterance should similarly entail the existence of the event's necessary participant.

Secondly, Roberts holds that the familiarity requirement can be overcome by presuppositions which are made due to contextual information provided by the speaker, and in these cases 'a pronoun is felicitous despite the fact that familiarity fails'. She provides the following example and discussion:

- (23) a. [Context: The speaker is on the phone with a bank officer who she's never talked with before:] There's a problem with **my husband's** checking account.
 b. 'In (23a), though the bank officer presumably didn't know beforehand that the stranger A had a husband, he will undoubtedly conclude that she knows whether she has one, and will accommodate the familiarity presupposition

of my husband, by adding the appropriate discourse referent to the common ground up to that point and treating the result as the context of utterance.’ (Roberts 2004, numbering changed)

This process of presupposition accommodation described above seems like an ideal candidate for what would occur when a listener hears our test sentences. Consider the conceptually parallel example:

(24) #In my last marriage, **he** never helped out around the house.

One can imagine quite easily a similar logic being followed. Though the listener presumably didn’t know beforehand that the speaker had a previous husband, they will undoubtedly conclude that she had one given her reference to a prior marriage, and will accommodate the familiarity presupposition of **he** as referring to the husband, who has been added to the common ground as an available discourse referent. Roberts details the requirements for this process to take place, reproduced below in (25):

(25) *Necessary Conditions on Presupposition Accommodation:*

- a. Retrievalability: what the hearer is to accommodate is easily inferable, so that it is perfectly clear what is presupposed, and it is both salient and relevant to the immediate context, and
- b. Plausibility: the accommodated material leads to an interpretation that is reasonable and unobjectionable in the context. (Roberts, 2004)

It seems straightforwardly plausible that, in the absence of any more formal definitions of those terms, the presupposition in (24) that the speaker is using **he** to refer to a specific, unique husband is easily inferable, reasonable, and relevant to the context provided by the event clause of the utterance. It is difficult to imagine a seriously competing interpretation which would make this one objectionable or unclear.

To preempt the obvious objection, while (22) and (23a) are not pronominal usages, Roberts takes the weak familiarity requirement in both cases (definite NPs and pronouns) to be identical, with only the maximal salience requirement distinguishing them. Thus, if the pronouns in the test sentences either satisfy weak familiarity or trigger presupposition accommodation as a form of repair, which it seems they should, then it is only salience which stands in the way of their being licit.

4.2 The NP-deletion account

Accounting for the pattern in the data is notably more parsimonious under the NP-deletion theory. Here, this pattern is nothing more than an instance of the problem of the formal link, and the lack of an NP antecedent with explicit prior mention in the discourse makes NP-deletion, required for the use of the anaphor, impossible.

It is, of course, worth noting that pronouns do occur without overt NP antecedents, such as in deictic uses, and so we cannot universally assert this requirement to account for every pattern. Elbourne (2013) discusses these cases, in which there is ‘a strong visual clue in the immediate environment’: ‘Suppose that a visitor is being enthusiastically leaped upon by his host’s dog. He might nod at it and say the following:

(26) Mine does just the same.’ (Elbourne, 2013, 197-8)

Here, the NP-deletion process assigning the meaning of *my dog* to *mine* is perfectly natural. So even in Elbourne’s theory, an NP antecedent is not a universal requirement. So why could something along the lines of these deictic cases, in which something in the environment (or context) raises a possible referent to maximal salience sufficient for NP-deletion, be occurring in the data - or more accurately, we know that it does not, but under this theory, why should it not? Rather simply, it is because NP-deletion is, in fact, not available in these cases in the first place. Elbourne (2005) makes this observation:

(27) Mary is married. *And Sue’s is the man drinking the Martini. (Elbourne, 2005, 44)

In addition, consider the analogous sentences in (28), based on the experimental test sentences we have been considering:

- (28) a. In my last marriage, {my husband / #**mine**} never helped out around the house.
b. In my last relationship, {my girlfriend / #**mine**} made the first move.
c. I had an interview yesterday, and {my interviewer / #**mine**} kept asking me strange questions.

While the visual cue in the environment is clearly sufficient to license NP-deletion in (26), I believe the judgment is quite stark that NP-deletion is not acceptable in any of the sentences in (27) or (28) without prior mention earlier in the discourse, despite the clear salience of the relevant relation (e.g. marriage). It is unclear whether any amount of prior discourse making the married-to relation salient could ever be sufficient to license NP-deletion without an antecedent, though this is potentially an experimental question. This pattern mimics precisely what we have seen with pronouns: extralinguistic cues can license them without prior mention, but no linguistic context absent prior mention can do the same. Here, then is the clear theoretical advantage of NP-deletion: it unifies the requirements for two related phenomena, rather than stipulating an extra, internally-motivated requirement for the pronominal case (i.e. salience).

Of course, there is the open question, Elbourne acknowledges, of why NP-deletion behaves as it does, what motivates its particular conditions, and what the procedure for it is. I have little to say about this here. The necessary sidelining of this question may at first appear theoretically unsatisfactory, but it is not as if the NP-deletion theory of pronouns has created any new questions, here. Finding independent motivations for the conditions of NP-deletion was an inevitable necessity, whether they impacted pronouns or not. All that has been done is collapse two questions into one which already exists.

4.3 The structure of the English pronoun

4.3.1 Unifying the +NP approaches

In this section, I will review the approach to German pronouns taken by Patel-Grosz and Grosz (2017) and pursue a unification of their theory with Elbourne (2013). The data

in Sections 3.1 and 3.3 show that the English pronoun patterns along with the German demonstrative pronoun, and that the function of the German personal pronoun appears unavailable in English (at least, in these target sentences). Because of this, I intend to build an analysis which pursues structural symmetry between the German DEM and the English pronoun, locating the behavior of the English pronoun in these experimental conditions as a result of its distinction from the German PER-type pronoun.

Recall that Patel-Grosz and Grosz (2017) argue in favor of a uniform [+NP] approach to the German PER and DEM pronouns, in which the core difference is the presence of an additional functional projection containing an anaphoric index in the DEM structure:

If this view is to be reconciled with the Elbourne-style NP-deletion theory of English pronouns, in which it is the conditions for NP ellipsis which determine the licensing conditions of a pronoun, and salience is to be demoted in theoretical significance, two issues immediately present themselves. First, under the Patel-Grosz and Grosz (2017) view, both the PERs and DEMs contain a null NP, yet the PERs are acceptable in contexts where NP-deletion is not. If NP-deletion is the crucial operation at play, and specifically the reason why the target sentences in the present experiment were not improved by preceding context, why should such contexts license PERs? The second issue concerns the presence of the anaphoric index in the DEM structure (example above). Patel-Grosz and Grosz (2017, 14) take it that this index ‘imposes identity of the pronoun’s referent with a salient discourse referent.’ For my view, which purports to eliminate the need to invoke salience as a licensing condition but also claims that the English pronoun is structurally identical to German DEMs, this is an obvious contradiction. Let us take these problems one at a time.

Patel-Grosz and Grosz (2017) forward two arguments for [\pm NP] uniformity between PERs and DEMs. First, they review corpus data to falsify Wiltschko’s (1998) claim that ‘DEMs must match an antecedent’s grammatical gender... By contrast, PERs exhibit gender mismatch’ (Patel-Grosz and Grosz, 2017, 4). A review of corpus data demonstrates that, in fact, this kind of gender mismatch is equally possible with both pronouns. Secondly, they conduct an AMT experiment testing the effect of overtness of an NP antecedent. The uniform [\pm NP] analysis would predict that, in sentences like (29a) where the NP antecedent of a pronoun is a subpart of a word, both the PER and DEM would be equally degraded, compared to the overt condition in (29b).

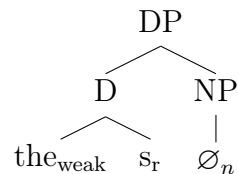
- (29) a. *Wenn eine Studentin **Führerschein**besitzerin ist, dann trägt sie {ihn / den} meist im Geldbeutel mit sich.*
 if a student drivers.license.owner is then carries she it /
 DEM usually in wallet with self
 ‘If a student is a driver’s license owner, then she usually carries {it / DEM} around in her wallet.’
- b. *Wenn eine Studentin **Besitzerin eines Führerscheins** ist, dann trägt sie {ihn / den} meist im Geldbeutel mit sich.*
 if a student owner of.a drivers.license is then carries she
 it / DEM usually in wallet with self

‘If a student is an owner of a driver’s license, then she usually carries {it / DEM} around in her wallet.’

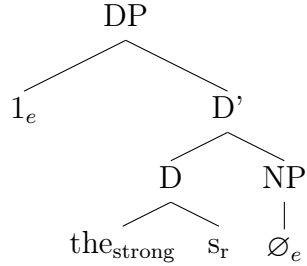
This prediction is confirmed by their experiment, and thus, they conclude in favor of $[\pm\text{NP}]$ uniformity. Secondly, they argue that out of the two uniform options, the pronouns in fact share the $[\text{+NP}]$ feature. This argument comes from Sauerland (2007), who shows that pronouns surface with the grammatical gender features of their antecedents even when the antecedent is inanimate. $[\text{+NP}]$ uniformity is a simple solution to this issue: ‘if we assume that all pronouns contain an NP, grammatical ϕ -features on pronouns simply reflect concord between a determiner and a null NP.’ (Patel-Grosz and Grosz, 2017, 10). Elbourne (2013, 201) forwards a similar argument from French. This leads them to adopt the view that both types of pronouns contain a structurally represented NP.

What remains unspecified in the Patel-Grosz and Grosz (2017) theory is the mechanism by which identity of this NP with the proper referent is picked out in the case of PERs. They remain agnostic as to whether it selects a strictly linguistic antecedent or a discourse referent in the context (Patel-Grosz and Grosz, 2017, 3), holding only that the NP is structurally represented. In the present proposal, I forward that we can take advantage of this underspecification to draw the relevant distinction between PERs and DEMs while preserving $[\text{+NP}]$ uniformity in a broad sense, while also eliminating the issue of salience from the DEM structure. The proposal is as follows: PERs and DEMs do share a $[\text{+NP}]$ feature, in that a nominal element is structurally represented as an argument of the definite article within the pronoun. However, only the DEM NP is an elided copy of a previously uttered NP antecedent, in the traditional sense of ellipsis. By contrast, the PER NP is an automatically null nominal element, rather than being null as a result of ellipsis, that represents the relevant ϕ -features of the intended referent, and identity with a specific linguistic antecedent is not imposed, but rather an appropriate antecedent is picked out from the context via a uniqueness presupposition encoded by the weak article (following Schwarz 2009). The index is still structurally represented in the DEMs, but is not a marker of the salience of the discourse referent, but an ellipsis marker that serves to coindex the elided NP with its antecedent. The English pronoun is then, as intended, structurally identical to the DEM. The proposed structures, shown in (30), are largely parallel to the original Patel-Grosz and Grosz (2017) structures shown in (17) in terms of projections, with slight modifications to content. Here, \emptyset_n represents an unpronounced NP which is fundamentally null, while \emptyset_e represents an NP which has undergone ellipsis. 1_e is used to distinguish the ellipsis-marker index from the original salience-marker index.

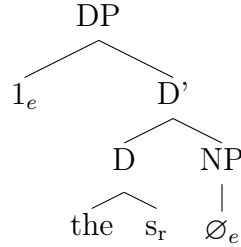
(30) a. German PER structure:



b. German DEM structure:



c. English pronoun structure:



While in the original Elbourne (2013) analysis, the definite article takes the NP as its first argument and the situation pronoun as its second (as shown in (7)), nothing of substance rides on this decision, and so it is here changed to match the Patel-Grosz and Grosz (2017) structure. I suspect that they could all be represented in the opposite order, as well, with no consequence. Either way, this preserves the structure required for the rest of Patel-Grosz and Grosz’s (2017) analysis to function, as will be seen in the next section, and correctly derives the patterns in the experimental data. The English pronoun and German DEM fail to be licensed in these contexts, as there is no linguistic element that can serve as antecedent and license ellipsis of their internal NP. The German PER, on the other hand, is accepted, as these contexts render an antecedent, which matches the ϕ -features on the null NP (demonstrated by the preference for contexts where there is no gender confound), sufficiently unique (Patel-Grosz and Grosz, 2017, 17).

This theory carries over [+NP] uniformity, and locates the key difference between German pronoun types in the type of NP they contain. The DEM case is straightforward - it is an elided NP, presumably under identity with a linguistic antecedent. But a natural question is, what exactly is the nature of the NP in the PER case? It is not something which undergoes ellipsis, but is instead null from the start. It is not identical to a linguistic antecedent, but instead minimally represents some or all of the ϕ -features of the unique individual in the discourse to which it refers, via a process of pragmatic rather than syntactic control. Other than these facts, the exact nature of this NP element could take on a few forms. Here, I would like to draw attention to some possible candidates, or analogous null elements which have been posited for similar situations.

Patel-Grosz and Grosz (2017, 12) themselves posit a possible null ‘dummy’ pronoun which could be occurring here, that encodes only the gender features of the referent:

- (31) $\llbracket [\text{NP } \emptyset_{\text{FEM}}] \rrbracket = \lambda x. \lambda s. x$ is one or more females in s
 (based on Kratzer 1989, 221)

Silent NP-like elements as complements to pronouns have also been invoked by Kayne (2007) to account for the behavior of what have been called ‘r-pronouns’ (Riemsdijk,

1978), such as *there*, *where*, and *here*. Similarly, he posits that these r-pronouns take a silent argument which refers to a generalized spatial entity. Thus, sentences like ‘John went there’ should in fact be analyzed as in (32), with *there* as a determiner-like pronoun along the same lines we have been pursuing for pronouns here.

(32) John went there PLACE.

We might reasonably imagine a parallel construction arising for the German PERS:

(33) *In meine letzte Beziehung, hat {sie FEMALE} den ersten Schritt getan.*
 in my last relationship has {she FEMALE} the first move made
 ‘In my last relationship, she made the first move.’

In (33), then, analogous to (32), the unpronounced element FEMALE represents some generalized, unspecified entity matching the correct gender features and little else, for which the possible referents are then narrowed down to a sufficiently unique individual by the information in the linguistic context.

Finally, Hankamer and Sag (1976) discuss the related phenomena of sentential and VP anaphora. They show that in some instances, such as *do so* or *do it* anaphora, the null complement must be syntactically controlled, and is analyzed as an instance of deletion which is not subject to pragmatic control (Hankamer and Sag, 1976, 403, 415). They contrast these with Null Complement Anaphora, as in (34), in which ‘the understood sentential or VP complement of the verb must be interpreted from context’ (Hankamer and Sag, 1976, 411). These, they interpret as not deletion (as they show none of the syntactic evidence, the argument for which I will not reproduce here) but rather as controlled by the pragmatic environment, as seen in (34b) (Hankamer and Sag, 1976, 414).

(34) a. I asked Bill to leave, but he refused.
 b. [Context: Indulgent father feeds baby chocolate bar for dinner]
 Mother: I don’t approve. (from Hankamer and Sag 1976, 411)

This contrast between syntactically controlled VP anaphora which are the result of deletion, and null complement anaphora which are the result of pragmatic inference, appears parallel to the contrast between DEMs and PERS here. There is one piece of data that Patel-Grosz and Grosz (2017) cite as a potential complication for their theory, which ends up being evidence in favor of this analysis. They observe that ‘DEMs differ from PERS in that only DEMs seem to be able to strand complement PPs of their elided NPs’ (Patel-Grosz and Grosz, 2017, 18).

(35) *Der Vater von Otto ist gekommen, aber {der / *er} von Maria nicht.*
 the father of Otto is come but DEM / PER of Maria not
 ‘Otto’s father came, but Maria’s [father] didn’t.’

Patel-Grosz and Grosz (2017, 18) admit that ‘Nothing that we have said so far derives this generalization’, and conjecture an additional rule that PERS impose a deficiency requirement on their NP complements to force them to be null. Under the present analysis,

however, this generalization falls out from the inherently null nominal element in the PER, and is in fact predicted by analyzing the PER as equivalent to Hankamer and Sag’s (1976) null complement anaphora. Following their argument, we should interpret the pattern in (35) to mean that NP-deletion has not taken place: ‘Because the entire complement is missing, there is nothing left behind to show that any syntactic operations ever took place within a real complement underlying the null complement. Furthermore, there is no evidence that a real complement was ever present to undergo any syntactic rules in the matrix clause’ (Hankamer and Sag, 1976, 412). From this, they conclude in favor of an inherently null complement subject to pragmatic control. The same logic applies here.

4.3.2 Defending the analysis

As I see it, four questions arise from this approach. I shall try to address each in turn.

First, the motivation for $[\pm\text{NP}]$ uniformity is the uniform overtiness effect shown in (29). Does this analysis still account for this? I think it does. Patel-Grosz and Grosz’s (2017) lack of stance on the content of the NP based on the results of that experiment suggests that they believe either formulation (a generalized NP property and uniqueness presupposition as in the PERs, or an elided NP as in the DEMs) would account equally well for this degradation. Both ellipsis and the presence of a unique referent in the discourse are problematized to some degree by the lack of an overt NP antecedent, as will be seen in Section 4.3.4. I see no reason why the two pronouns cannot both be degraded but due to distinct issues, i.e. the availability of an ellipsis antecedent versus the availability of a unique referent. It is also worth noting that the data in Section 3.1 complicate the notion that PERs and DEMs really do behave exactly alike with respect to antecedent overtiness, and so perhaps a symmetry with respect to having a nominal element but an asymmetry in the content of that element is the most desirable approach to reflect this pattern.

Second, this formulation maintains the index in the DEM structure but claims it has a different function, again abandoning salience as an operative term. Does this complicate any explanations for the behavior of the DEM pronoun, ignoring English for the time being? Nothing comes to mind. The only effect that Patel-Grosz and Grosz (2017) attribute to this salience requirement is the restriction on prior mention, which I have already argued is better accounted for by NP-deletion than salience. They provide no examples of a use of the DEM in which the pronoun’s antecedent is salient but not previously mentioned, and so I suspect the salience requirement here is really included as a theoretical holdover that is not shouldering any of the work itself, and can thus be dispensed with once ellipsis is invoked.

While I think it is straightforwardly easier to capture the behavior of the DEM with ellipsis, precisely how this ellipsis-marking index is implemented is another question. There is motivation to keeping it in the structure - Schwarz (2009) has independent arguments for the necessity of an index in the strong determiner, none of which appear to be wedded to a salience account, and the structural economy analysis of Patel-Grosz and Grosz (2017) relies on its presence. Dispensing with the index entirely is another option which is equally well supported by the data and analysis within this paper; its inclusion must be motivated elsewhere. But it does not seem without basis. The relationship between conditions for ellipsis and elements requiring indices has received some recent attention

(Jenks, In Press). Exactly how it functions into this structure is something I must admit to remaining ambiguous on, partially because it is tangential to the core argument, and partially because I do not have a persuasive stance on either position. Under one view, the presence of an index in the DP could be seen as a licensing condition for ellipsis, imposing identity of the elided NP with the linguistic antecedent, similar to how the previous index did with a discourse antecedent. Under another view, the index is inserted into the DP structure as a result of the ellipsis operation. Potentially this occurs at the site of ellipsis and then undergoes raising to the spec-DP position. For now, as Patel-Grosz and Grosz (2017, 14) admit, nothing in the analysis hinges on anything other than it occupying an extra structural projection.

Third, this analysis also changes Elbourne’s (2013) described pronoun structure to include the index. Does this have any consequences for the theory? Certainly, it is a mark against it on parsimony, if Elbourne can capture the same patterns in English without the addition of extra structure. However, I believe that the theoretical consistency gained by achieving a uniform cross-linguistic explanation is greater. Additionally, the index in this formulation is not so much an additional functioning argument so much as it is a specification of how NP-deletion happens. Thus my claim is not so much about changing Elbourne’s structure, but a claim about what is required for ellipsis, and Elbourne is consistently and purposefully agnostic about what the theory of ellipsis he invokes is. So I imagine this change would not bother him much; in fact, the earlier version of his theory (Elbourne, 2005) contained an index of just this kind, and it is unclear to me how the persistence of the index would problematize the explanatory power of the current theory in any of the areas where they differ.

Fourth, the inability to appear in contexts without an explicit linguistic antecedent is not the only identifying behavior of the German DEM. Why is it, then, that the English pronoun does not share its other restrictions? If the English pronoun can be used in contexts where the German DEM cannot be, should we not posit an equivalent to the PER in English as well, perhaps homophonous? To answer this question, let us turn to the remaining facet of Patel-Grosz and Grosz’s (2017) analysis in the next section.

4.3.3 Predictions from structural economy

A major prediction of Patel-Grosz and Grosz’s (2017) theory of PER-DEM structural asymmetry is that ‘distribution of the two pronoun types reflects structural economy constraints’ (Patel-Grosz and Grosz, 2017, 21). They formalize the following constraint:

(36) *Minimize DP!*

An extended NP projection α is deviant if α contains redundant structure, i.e. if:

- a. there is an extended NP projection β that contains less syntactic nodes than α ,
- b. β is grammatical and has the same denotation as α (= Referential Irrelevance), and
- c. using α instead of β does not serve another purpose (= Pragmatic Irrelevance) (from Patel-Grosz and Grosz 2017, 22)

The precise nature of ‘another purpose’ in (36c) may be unclear, though they take it to mean the same as in Schlenker’s (2005) formulation of a similar constraint, *Minimize Restrictors!* Similarly, ‘denotation’ in (36b) here must mean meaning in the sense of something like truth conditions or picking out the same individual; obviously, the PER and DEM structures have different logical structures corresponding to the weak and strong determiners. In any case, this *Minimize DP!* constraint is invoked to explain the distribution of PERs and DEMs with the observation that DEMs appear to be a more marked case, licensed less often and with certain stronger restrictions. In particular, the DEM pronoun is deemed unacceptable when there is only a single possible unique antecedent for the pronoun, unless it signals some emotive emphasis (Hinterwimmer, 2015). It also displays anti-topicality, in that it cannot refer to the aboutness topic when there are two possible antecedents, and must refer to the less prominent of the two, unless it is being used in a disambiguating function (Patel-Grosz and Grosz, 2017, 23). Under the structural asymmetry hypothesis, this markedness behavior is due to *Minimize DP!*, under which the DEM is ruled out by default unless there is a pragmatic effect.

The English pronoun, clearly, displays neither of these restricted behaviors. It is perfectly acceptable both when there is a single possible antecedent, whether there is emotivity or not, and also can refer to the topic, whether it is serving to disambiguate the referent or not. Is this an issue for claiming that it is structurally symmetrical with the German DEM? Not necessarily. Crucially, there is no restriction that bans DEMs from the situations described above *a priori* - it is merely that the existence of an option with less redundant structure, the PER, which renders the DEM option deviant. It is enough, then, to simply say that English lacks an equivalent of the PERs which would compete with the DEM-like pronoun in these contexts.

The fact that *Minimize DP!* operates the way it does allows the present experimental results to serve as evidence against the existence of a PER-like pronoun in English, which simply happened to be homophonous with the DEM-like pronoun as a result of some surface phonological merging. If one existed, the test sentences which license the PER in German should be acceptable in English. Not only would the PER-like pronoun be licensed, it would be the default and preferred option, per *Minimize DP!* In fact, whether *Minimize DP!* exists in English or not is rather a moot point - it could exist as an ineffectual rubber stamp, and simply always, if reluctantly, select the only option of the DEM-like pronoun, or it could not, with the same effect. What is crucial is simply that some opposite constraint, a hypothetical *Maximize DP!*, is exceedingly unlikely, has no motivation from a structural economy perspective, and even if it did exist, would likely still allow the hypothetical PER-like English pronoun to surface in these contexts, if it obeyed similar exceptions to (36b) and (36c).

4.3.4 The problem of variability in the formal link

Before concluding, I would like to address one additional set of experimental data that potentially poses a problem for an NP-deletion D-type account that enforces a strict overt NP antecedent requirement. Grosz et al. (2014) conducted a Mechanical Turk study in which they tested donkey sentences both on the effect of overtness and what they call the *Salient Position Condition* (following Ward et al. 1991), defined in (37).

(37) *Salient Position Condition*

- a. an intended antecedent for a pronoun that is contained in another word (thus violating the Overt NP Constraint) is more acceptable in a more salient syntactic position than in a less salient syntactic position;
- b. the predicate position of a copula verb is more salient than the position of a pre-nominal attributive modifier to a noun phrase. (Grosz et al., 2014, 5)

This predicts that the embedded antecedent in (38a) is more salient than its equivalent in (38b):

- (38) a. ? Every child who was **father**less had lost him in the war.
b. ?* Every **father**less child had lost him in the war. (Grosz et al., 2014, 5)

Their results demonstrate that there is an effect of the Overt NP Constraint, but also that there is an effect of the Salient Position Condition even when the Overt NP Constraint is violated. That is, though both (38a) and (38b) suffer degraded ratings due to the non-overt antecedent, (38a) is less degraded due to the salient position of the word of which intended antecedent is a subpart. This implicates the nature of the overtness constraint: ‘It indicates that overtness as a violable constraint and salient position as a violable constraint are independent constraints, which apply in an additive manner; i.e. in conditions that violate overtness, violations of the salient position constraint can incur a further decrease in acceptability.’ (Grosz et al., 2014, 24). This effect is surprising in light of Postal’s (1969a) constraint on lexical items as anaphoric islands in (13), and shows that the positioning of the lexical item contributes to the gradient nature of that constraint.

The existence of a salience effect is not, on its own, extremely problematic for the linguistic D-type analysis. As I have said throughout, I do not intend to do away with the concept of salience altogether, since it plays a key role in ordering effects, but merely claim that it is not an essential part of the presuppositions conditioning whether a pronoun can be licensed in the first place. However, the weakening of the Overt NP Constraint to one violable constraint among multiple is potentially a concern to a linguistic D-type theory. I do not have a comprehensive response to this worry, which would certainly require data beyond what was collected in the present experiment. One move would be to deny that the difference between (38a) and (38b) is truly one of salience, and pursue a syntactic explanation concerning the accessibility of one position over the other for certain structural operations. In the meantime, however, I suggest that while the contrast in (38) does pose a question, it is in fact not a question for a D-type theory of pronouns to answer. Consider the analogous sentences in (39):

- (39) a. ? Every daughter who was **father**less had lost hers in the war.
b. ?* Every **father**less daughter had lost hers in the war.

With *daughter* chosen to eliminate gender confounds in determining the referent of the possessive pronoun, the sentences in (39) do not seem particularly better or worse to me than those in (38). Of course, this would ideally be tested experimentally and I would

not be satisfied with this response until they are, but for the present discussion, both sets feel middlingly awkward in the appropriate way. Certainly, I do not think that (39) is clearly better. Why is this relevant? Both of (39) are cases of NP-deletion - the pronoun *her* is obviously perfectly natural, and the slightly degraded judgment appears to arise from the conditions for the deletion of the NP possessum. Recall that Elbourne (2013) commits the NP-deletion theory to no particular assumptions about how NP-deletion works, but merely requires that the conditions for pronoun usage are the same as those for NP-deletion. The Overt NP Constraint is not an independently held requirement on this view, but merely an outcome of the assumed conditions of NP-deletion. If it is shown that NP-deletion under certain cases exhibits additional constraints which result in further degradation even when overtness is already violated, then it is perfectly in line with the NP-deletion theory that pronouns would do so as well. My informal judgments seem to suggest that the former is true enough to forestall this concern for the time being.

4.4 Discussion of the methodology for experimental semantics

This paper comes at a time when the importance of experimentally precise and large-scale studies to evaluate grammaticality judgments in syntax and semantics is increasingly recognized. Gibson and Fedorenko (2013) highlight some cases in which a data point in the syntactic/semantic literature, based on presumably informal judgments by a single author or their colleagues, have been falsified by AMT studies like the present one, and not before notable theoretical developments were made relying on the incorrect data. They point to the small number of experimental stimuli, participants, and the potentially confounding effects of context as a result of lacking controlled experimental design as major issues that should cast doubt on traditional methods of data collection (Gibson and Fedorenko, 2013, 3). My point in including Section 3.2, despite immediately contradicting it in the following section and negating my own interpretation, is to raise precisely this concern. It was all too straightforward to interpret the data from a smaller, relatively informal set of judgments as clear evidence for one theory. However, as the field continues to move to more complex phenomena and develop more nuanced explanations for less-than-obvious contrasts, precisely controlling the variables and presentation of our data will become more and more essential.

Nonetheless, there is a tension here. While the advent of techniques like AMT has made large-scale data collection easier and more accessible, the phenomena that we need them to test are also perhaps the least well-suited to be tested in such a medium. Collecting large amounts of accurate data on straightforward syntactic phenomena, such as Condition A violations, is easy on these systems, but less needed. As more complex semantic and pragmatic questions are introduced, which rely on specific contexts (or lack thereof) in which the judgments must be made, ensuring reliable judgments on AMT becomes more difficult. This problem is clear in Section 3.3.1, in the difficulty of getting participants to attend to semantic unnaturalness such as confusion as to the referent of a pronoun, and not judge purely on syntactic well-formedness, without biasing them to judge a certain type of violation too harshly. Just as there are concerns with the reliability of traditional data collection methods (though this is disputed; see Sprouse and Almeida 2012, 2013 for a defense), in part based on the way that being part of the process of

linguistic analysis may bias the judgments of linguists, there are also concerns in the way our instructions bias naive participants, concerns which are more difficult to alleviate the more precise our contexts must be.

There is thus a natural impulse to suspicion in the case of semantic judgments via AMT and comparable data collection methods. But these should be controllable, through a combination of independently tested instructions, comprehension tasks, careful context construction, and sheer sample size evening out irregularities arising from differences in interpretation of tasks. It is not as if these techniques lack prior support; Sprouse (2011) presents a validation of their accuracy with respect to certain well-verified effects. Regardless of the difficulties, it seems an inevitable way forward. Even the defenses of traditional data collection methods (Sprouse and Almeida, 2012, 2013) find some data points that are falsified by the experimental methods advocated by Gibson and Fedorenko (2013) - though a small number, 7 out of 146 in one particular analysis (Sprouse and Almeida, 2012, 13), there have been a not insignificant number of theoretical disputes for which the decision point has turned out to be a single phenomenon. The present discussion may turn out to be yet another.

5 Conclusion

I have argued that the lack of linguistic means for raising the salience of a pronoun's intended referent, other than explicit prior mention, means that salience as a licensing condition should be abandoned in favor of a more parsimonious approach. A linguistic, rather than contextual, D-type theory of NP-deletion, in which the inability of English 3rd person pronouns to be licit without an explicit linguistic antecedent is explained by an appeal to the general conditions of ellipsis, rather than invoking an independent notion of salience, is thus preferable. Experimental data from Amazon's Mechanical Turk supports this hypothesis, demonstrating that enriching the context, which might supply additional information about the intended referent of a pronoun (e.g. narrowing down the possible antecedents to a more unique and salient discourse referent), does not in fact improve the acceptability of a pronoun over sentences which lack such contexts.

English 3rd person pronouns thus pattern like German demonstrative pronouns, in adhering to a strict formal link condition, rather than German personal pronouns, which show pragmatic control. I have therefore pursued an analysis which attempts to achieve structural symmetry between the English pronoun and the German demonstrative, under which these pronouns undergo NP-deletion and are licensed by ellipsis, while the German personal pronoun is licensed only by uniqueness and contains an inherently null NP, rather than an ellipsis site. This hypothesis is supported by other German data, such as the requirement for all complement material of a personal weak article to be null. In adapting the analysis of Patel-Grosz and Grosz (2017), I have redefined the index as a marker of ellipsis, rather than of salience, in an attempt to unify this approach conceptually and structurally with that of Elbourne (2013). Additionally, structural economy constraints in German, namely *Minimize DP!*, predict that the demonstrative-like ellipsis pronoun would be the *only* available pronoun in English. If a homophonous, context-licensed 3rd person pronoun did exist, it would surface in the experimental test sentences, which does

not occur.

This paper demonstrates the need to pursue more experimentally precise and statistically robust data collection methods to inform our syntactic and semantic theories, as our individual judgments as linguists will be increasingly inadequate to illuminate more opaque and fuzzy effects. Future research should endeavor to expand the data set, and provide experimental verification or falsification of other relevant examples discussed here. In addition, there is nothing to say that these test sentences are the last word on contextual richness - future experiments could provide more substantial contextual information, all without providing an explicit linguistic antecedent, and see if the lack of an effect observed here was simply due to the limited amount of information provided. It is also going to be essential to show that the degraded acceptability of pronouns corresponds, at least roughly, to the degree of acceptability of NP-deletion in other contexts. Finally, as I have noted, only 3rd person gendered pronouns have been rigorously investigated here. It is possible that other pronouns in English can be assimilated to this framework, but the present data has nothing to say about 1st or 2nd person pronouns. For now, it appears that the domain of salience is so limited that it should be replaced with a more general set of licensing conditions corresponding to an existing phenomenon, NP-deletion.

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A Experimental test sentences

$[\pm E]$ corresponds to $[\pm \text{EVENT}]$, and $[\pm P]$ corresponds to $[\pm \text{PRONOUN}]$.

- (40) a. In my last marriage, he never helped around the house. $[+E, +P]$
b. In my last marriage, my husband never helped around the house. $[+E, -P]$
c. In the past, he never helped around the house. $[-E, +P]$
d. In the past, my husband never helped around the house. $[-E, -P]$
- (41) a. In my last relationship, she made the first move. $[+E, +P]$
b. In my last relationship, my girlfriend made the first move. $[+E, -P]$
c. Last time, she made the first move. $[-E, +P]$
d. Last time, my girlfriend made the first move. $[-E, -P]$
- (42) a. I had an interview yesterday, and he kept asking me strange questions. $[+E, +P]$
b. I had an interview yesterday, and the interviewer kept asking me strange questions. $[+E, -P]$
c. Yesterday, he kept asking me strange questions. $[-E, +P]$
d. Yesterday, my interviewer kept asking me strange questions. $[-E, -P]$
- (43) a. I ordered pizza last night, and when he arrived I realized I was out of cash. $[+E, +P]$
b. I ordered pizza last night, and when the man arrived I realized I was out of cash. $[+E, -P]$
c. Last night, when he arrived, I realized I was out of cash. $[-E, +P]$
d. Last night, when the man arrived, I realized I was out of cash. $[-E, -P]$
- (44) a. In my first game at the tennis tournament, he was far better than me. $[+E, +P]$
b. In my first game at the tennis tournament, my opponent was far better than me. $[+E, -P]$
c. At the tennis tournament, he was far better than me. $[-E, +P]$
d. At the tennis tournament, my opponent was far better than me. $[-E, -P]$
- (45) a. I sang in a duet, and he harmonized with me perfectly. $[+E, +P]$
b. I sang in a duet, and my partner harmonized with me perfectly. $[+E, -P]$
c. I was singing and he harmonized with me perfectly. $[-E, +P]$
d. I was singing and my partner harmonized with me perfectly. $[-E, -P]$
- (46) a. At my last therapy session, he really helped me work out some issues. $[+E, +P]$
b. At my last therapy session, my therapist really helped me work out some issues. $[+E, -P]$
c. The other day, he really helped me work out some issues. $[-E, +P]$
d. The other day, my therapist really helped me work out some issues. $[-E, -P]$

- (47) a. I was tutoring yesterday and she wasn't understanding anything. $[+E, +P]$
 b. I was tutoring yesterday and my student wasn't understanding anything. $[+E, -P]$
 c. Yesterday, she wasn't understanding anything. $[-E, +P]$
 d. Yesterday, my student wasn't understanding anything. $[-E, -P]$
- (48) a. I was coaching volleyball yesterday, and she was missing the ball every time. $[+E, +P]$
 b. I was coaching volleyball yesterday, and one player was missing the ball every time. $[+E, -P]$
 c. Yesterday, she was missing the ball every time. $[-E, +P]$
 d. Yesterday, one player was missing the ball every time. $[-E, -P]$
- (49) a. If I get pregnant, I will definitely keep it. $[+E, +P]$
 b. If I get pregnant, I will definitely keep the baby. $[+E, -P]$
 c. If it happens, I will definitely keep it. $[-E, +P]$
 d. If it happens, I will definitely keep the baby. $[-E, -P]$
- (50) a. At my waltz lessons, she kept tripping over my feet. $[+E, +P]$
 b. At my waltz lessons, my partner kept tripping over my feet. $[+E, -P]$
 c. In the ballroom, she kept tripping over my feet. $[-E, +P]$
 d. In the ballroom, my partner kept tripping over my feet. $[-E, -P]$
- (51) a. At Sarah's oncology appointment, he told her that she was getting better. $[+E, +P]$
 b. At Sarah's oncology appointment, the doctor told her that she was getting better. $[+E, -P]$
 c. When Sarah went, he told her that she was getting better. $[-E, +P]$
 d. When Sarah went, the doctor told her that she was getting better. $[-E, -P]$
- (52) a. At Mary's wedding, she didn't let him pick out any decorations. $[+E, +P]$
 b. At Mary's wedding, she didn't let the groom pick out any decorations. $[+E, -P]$
 c. When planning, Mary didn't let him pick out any decorations. $[-E, +P]$
 d. When planning, Mary didn't let the groom pick out any decorations. $[-E, -P]$
- (53) a. In math class, our teacher gave him detention. $[+E, +P]$
 b. In math class, our teacher gave a student detention. $[+E, -P]$
 c. Last week, our teacher gave him detention. $[-E, +P]$
 d. Last week, our teacher gave a student detention. $[-E, -P]$
- (54) a. At the school assembly, the speaker told her to be quiet. $[+E, +P]$
 b. At the school assembly, the speaker told Hannah to be quiet. $[+E, -P]$

- c. In the auditorium, the speaker told her to be quiet. $[-E, +P]$
 - d. In the auditorium, the speaker told Hannah to be quiet. $[-E, -P]$
- (55)
- a. During the game, Coach Johnson put him on the bench. $[+E, +P]$
 - b. During the game, Coach Johnson put Michael on the bench. $[+E, -P]$
 - c. On Saturday, Coach Johnson put him on the bench. $[-E, +P]$
 - d. On Saturday, Coach Johnson put Michael on the bench. $[-E, -P]$
- (56)
- a. On his blind date, Daniel really liked her. $[+E, +P]$
 - b. On his blind date, Daniel really liked the girl he met. $[+E, -P]$
 - c. At the restaurant, Daniel really liked her. $[-E, +P]$
 - d. At the restaurant, Daniel really liked the girl he met. $[-E, -P]$
- (57)
- a. At the boxing match, Ivan knocked him out. $[+E, +P]$
 - b. At the boxing match, Ivan knocked his opponent out. $[+E, -P]$
 - c. At the arena, Ivan knocked him out. $[-E, +P]$
 - d. At the arena, Ivan knocked his opponent out. $[-E, -P]$
- (58)
- a. At the concert, I saw him dancing in the crowd. $[+E, +P]$
 - b. At the concert, I saw Ben dancing in the crowd. $[+E, -P]$
 - c. Last night, I saw him dancing in the crowd. $[-E, +P]$
 - d. Last night, I saw Ben dancing in the crowd. $[-E, -P]$
- (59)
- a. During the meeting, Isaac told her they were out of money. $[+E, +P]$
 - b. During the meeting, Isaac told Gabrielle they were out of money. $[+E, -P]$
 - c. In the office, Isaac told her they were out of money. $[-E, +P]$
 - d. In the office, Isaac told Gabrielle they were out of money. $[-E, -P]$