On the Anaphoric Status of *Do So*

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Abstract

This article examines the anaphoric status of \textit{do so} anaphora, reclassifying it as deep anaphora in Hankamer and Sag's (1976) dichotomy of deep versus surface anaphora. Originally considered surface anaphora, \textit{do so} has been shown to exhibit mixed behavior when the full range of empirical facts are considered. I look at data from a wide variety of diagnostics and show that \textit{do so}'s behavior as surface anaphora falls out from independent properties of the anaphor. A consequence of this analysis as deep anaphora is that \textit{do so} should no longer be used as evidence for the internal structure of the verb phrase.

**KEYWORDS:** \textit{Do so} Anaphora, Deep Anaphora, Surface Anaphora, VP Structure

1 Introduction

\textit{Do so} anaphora\(^1\) is a VP anaphoric process, in which the string \textit{do so} refers back to an antecedent VP.\(^2\) For example, in (1), the second clause is understood to mean that Louie never feeds the cattle.

(1) Melvyn feeds the cattle, but Louie never does so.

Since Lakoff and Ross (1976) (henceforth L&R), \textit{do so} anaphora has been used as evidence for internal structure within the verb phrase. Responding to then-current claims in the literature that some or all adverbials are sisters to V, they argue that this cannot be the case and that there is a hierarchical ordering of constituents within the verb phrase, where the verb and its complement(s) are contained within the minimal VP but adjuncts are not. As a starting point they show that in a sentence containing \textit{do so}, \textit{do so} cannot leave behind any constituents that correspond to a complement in the antecedent clause; that is, \textit{do so} cannot stand in for only a V-head. This is illustrated by the examples in (2)–(4). In the grammatical (a) examples, \textit{do so} is standing in for a full VP, but in the (b) examples, \textit{do so} has replaced only the verb, resulting in ungrammaticality.

(2) a. John took the exam, and I did so, too.
   b. * John took the midterm exam, and I did so the final.\(^3\)

\[^1\]In this paper, I will only be interested in \textit{do so} anaphora. I will not consider the other instances of anaphoric \textit{so}, which are illustrated in (i).

\[^2\]Throughout much of this paper, I abstract away from the \textit{vP/VP} distinction and use VP as a neutral label. I will make reference to \textit{vP} only when the distinction is pertinent. The issue of whether \textit{do so} stands in for \textit{vP} or VP will be taken up in \S1.1.

\[^3\]In this example, the head noun \textit{exam} in the second clause has also been elided. However, this has no bearing on the grammaticality of this sentence (cf. ...*and I did so the final exam.\).

\[\text{\[L&R:106, ex. (14)\]}\]
(3)  a. John gave a book to Pete, and I did so, too.
   b. * John gave a book to Pete, and I did so to Mary.  [L&R:106, ex. (15)]

(4)  a. John loaded a sack onto the truck, and I did so, too.
   b. * John loaded a sack onto the truck, and I did so onto the wagon.  [L&R:106, ex. (16)]

In contrast, while complements to the verb cannot be stranded, L&R show that adjuncts can. This is shown by the examples from L&R in (5).

(5)  a. John flies planes carefully, but I do so with reckless abandon.  [Manner]
   b. John worked on the problem for eight hours, but I did so for only two hours.  [Duration]
   c. John takes a bath once a year, but Harry does so twice a month.  [Frequency]
   d. The army destroys villages by shelling them, but the air force does so by dropping napalm bombs on them.  [Means]

On the assumption that do so, along with deletion anaphora (VP Ellipsis, NP Ellipsis, Sluicing, etc.), targets a constituent, the empirical facts represented in (2)–(5) lead to the logical conclusion that complements form a constituent with the verb to the exclusion of adjuncts. If, on the other hand, the verb, its complements, and adjuncts were all subsumed under the same VP node, the explanation for why adjuncts, but not complements, can be stranded by do so would not be so straightforward.

Furthermore, if there is more than one adjunct within the verb phrase, any or all of them can be stranded after do so. For example, the VP in (6a) contains two adjuncts: the location PP in the park and the time PP on Friday. Do so can grammatically stand in for a string of constituents of any size down to the verb and its complement. In (6b), the entire verb phrase has been replaced by do so; in (6c), the verb, its complement, and the location adjunct have been replace, stranding the time adjunct; in (6d) only the verb and its complement have been replaced and both the location and the time adjuncts are stranded; and in (6e) do so is standing in for only the verb, resulting in ungrammaticality.

(6)  a. John ate an apple in the park on Friday.
   b. John ate an apple in the park on Friday, and Peter did so, too.
   c. John ate an apple in the park on Friday, and Peter did so on Thursday.
   d. John ate an apple in the park on Friday, and Peter did so in his yard on Thursday.
   e. * John ate an apple in the park on Friday, and Peter did so an orange in his yard on Thursday.

L&R interpret the fact that do so can strand adjuncts, but not complements, to the verb to mean that do so can stand in for nothing smaller than a VP and that adjuncts

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4For the full range of VP adverbial that can be stranded by do so see L&R:107-108.

5This fact is not explicitly discussed by L&R but follows naturally from their analysis. For an overview of the empirical facts, see Culicover and Jackendoff (2005:124-131)
within the verb phrase are folded into the structure by attaching to their own VP node. On a modern interpretation, the arguments they give (and extensions from them) point toward a nested structure like that in (7a) for the verb phrase in (6a); verb phrases, in general, have the schematic structure in (7b), where there can be zero, one, or more adjuncts.6

(7) a.  

```
          VP3
         /   \
VP2     PP
     /   \
VP1     PP
  /   \  
in the park
ate  an apple
```

b.  

```
          VP3
         /   \
VP2     adjunct
     /   \
VP1     adjunct
  /   \\
V complement
```

These facts regarding do so and the evidence it provides for the internal structure of verb phrase have become standard textbook material in generative syntax, and L&R’s arguments were extremely influential, laying the groundwork for regarding arguments versus adjuncts as a syntactic, as well as semantic, distinction. This structural distinction advocated by L&R was integral to the tenets of X-bar Theory in Government and Binding, under which the VPs in (7a) and (7b) would correspond to \( \bar{V} \) levels. Later during the development of the Minimalist Program, the distinction led to two separate operations (Merge and Adjoin) for integrating elements into a structure, the chief difference between them being that Merge saturates the selectional requirements of a head while Adjoin does not.

Recently, however, Culicover and Jackendoff (2005) (C&J) have called into question the validity of structures like those in (7) and L&R’s influential arguments for them from do so, pointing out that do so can stand in for a verb, its complement, and an adjunct that is not contiguous. Consider the examples in (8) (C&J’s ex. (31), pg. 125). Assuming that both VPs in (8c) have the same structure, this sentence poses a challenge for the structure in (7b) because there would be no VP node that do so could target that would subsume sleep and in the bunkbed, but not for eight hours.

(8) a. Robin slept for twelve hours in the bunkbed, and Leslie slept for eight hours on the futon.

b. Robin slept for twelve hours in the bunkbed, and Leslie did so on the futon.

\[ \text{do so = sleep for twelve hours} \]

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6Although he eventually arrives at a different structural analysis, Pesetsky (1995:228-230) discusses further arguments that the VP has the structure given in (7b).
Taking a semantic and pragmatic approach, C&J propose that the material stranded by *do so* contrasts with a corresponding focused constituent in the antecedent clause, and that the meaning of *do so* is understood to be the antecedent VP minus the contrasted material. For example, in (8b), the stranded PP *on the futon* stands in a contrastive relationship with *in the bunkbed* in the antecedent clause, and the meaning associated with *do so* is that of the antecedent VP excluding the meaning of the contrasted constituent, i.e. *sleep for twelve hours*. C&J argue that flat structure in the VP is sufficient to capture these facts. That is, C&J advocate a structure for VP like that in (9). Furthermore, since in their terms all that is necessary is a correspondence in meaning between the antecedent VP (modulo the exclusion of the meaning of the contrasted constituent) and *do so* and not a correspondence in syntactic structure, (9) also provides an account of the problematic fact in (8c).

(9)\[ VP \vdash V \vdash \text{complement} \vdash \text{adjunct}_1 \ldots \]

There are at least three ways we could respond to C&J’s arguments. 1) We could accept the arguments and abandon binary branching within the VP in favor of flat structure; 2) we could look for counter-arguments to C&J’s claims;\(^7\) or 3) we could use them as incentive to re-evaluate L&R’s original analysis of *do so* in order to reconcile C&J’s observations with binary branching. I will follow the third path in this paper. L&R’s arguments rely on *do so* anaphora being what Hankamer and Sag (1976) refer to as surface anaphora (i.e. the result of a transformation that occurs at a relatively superficial level, in which *do so* replaces a fully articulated VP structure). Here I propose to challenge the classification of *do so* as surface anaphora and argue instead that it is deep anaphora. As deep anaphora, *do so* is not probative of the internal structure of its antecedent VP because it is not replacing any syntactic structure under identity with its antecedent, but rather it forms an atomic syntactic unit on its own. A consequence of this analysis is that the debate regarding the internal structure of the VP remains open; evidence from *do so* does not speak to it one way or the other.

Before moving on to the anaphoric status of *do so*, however, it will be helpful to review a few preliminaries about the syntax of the construction, namely the categorial status of *do* and *so*.

### 1.1 Preliminaries

Looking at the distribution of *so* in general, Bouton (1970) (henceforth B70) shows that it behaves more like an adverb than a nominal. The evidence that he gives against *so* being a noun is that it can’t be the subject of a sentence with a passive verb (10a) or tough predicate (10b); it can intervene between verb and subject, while other nominals cannot (10c); it can’t be the object of a preposition (10d); and it cannot be followed by an appositive noun phrase (10e).

\(^7\)For this line of argumentation, see Sobin (2008)
Instead, Bouton shows that *so* is an adverb. His first argument is that in certain uses, *so* is anaphoric to a manner adverbial in an antecedent clause. This is illustrated in (11a), where he claims that *it* refers back to the verb and its object *scrubbed the floor* and *so* refers back to the manner adverbial *on her knees* and in (11b), where *it* refers back to *killed his mother* and *so* refers back to *by wringing her neck*.

(11)  a. Brenda scrubbed the floor on her knees last night, and she does it so whenever her mother-in-law is around [B70:26, ex. (22e)]
    b. Steve killed his mother by wringing her neck last night, and he did it so because his wife, Brenda, had hidden his gun.

Before moving on to Bouton’s other arguments for *so* being an adverb, it should be noted that while in some uses *so* is clearly anaphoric to a manner adverbial in an antecedent clause as in (11), this doesn’t seem to be the case for the *so* of *do so*. Notice that the use of *so* as in the examples in (11) is grammatical when the manner content is expressed in the lexical semantics of the antecedent verb (12a), but if there is no manner content at all, the sentences is ungrammatical (12b).

(12)  a. Steve strangled his mother last night, and he did it so because his wife, Brenda, had hidden his gun.
    b. Steve killed his mother last night, and he did it (*so*) because she treated his wife, Brenda, badly.

*Do so* is felicitous however, even if there is no manner content in the antecedent clause.

(13)  Steve killed his mother last night, and he did so because she treated his wife, Brenda, badly.

Given the grammaticality of (13), it is difficult to maintain that the *so* of *do so* is anaphoric to a manner adverbial. However, this does not mean that this *so* cannot be an adverb in syntactic category as Bouton (correctly, I believe,) claims.

Bouton’s second argument that *so* is an adverb is distributional in nature—*so* can appear in immediate preverbal position, as can other adverbs. This is illustrated in (14) (see also (10c)).

(14)  Rick was told to have his work in on time, and he will so do—or flunk!  [B70:31, ex. (33a)]
The last argument that Bouton gives is directly related to *do so*. *Do* is normally transitive, but it can be used intransitively with certain adverbial modifiers, as in (15).

(15)  
   a. Zachary seldom does **that way** unless he is flustered.  [B70:34, ex. (42c)]  
   b. **How well** do you expect Adam to do on this test?  [B70:34, ex. (42a)]  
   c. Vernon will do **as he has always done in such a situation.**  
      [B70:34, ex. (42b)]

When *so* appears with *do* in *do so*, this is also an intransitive use of the verb. *Do* is not able to take a direct object, as shown in (16). Thus, it appears that *so* has the same status as the bolded adverbial constituents in (15).

(16)  
   I read the magazine in one hour, and Geoff did (*the book) so (*the book), (too).

I find Bouton’s arguments for the adverbial status of the *so of do so* to be convincing, and I will work under this assumption for the course of the paper although it will play no role until §6.

Moving now to the status of *do* in *do so*, one might take (16) as evidence that *do* is an auxiliary verb; on the contrary, it is generally taken to be a main verb (by, e.g. Lakoff and Ross 1976; Kehler and Ward 1999). This is made clear when it is contrasted with the *do* that shows up in the context of Verb Phrase Ellipsis (VPE); this *do* is a semantically empty auxiliary that enters the syntax through the process of *do*-support—a process that is also triggered by negation, question formation, and various other syntactic processes. There are four arguments in favor of the *do in do so* being a main verb presented in the literature cited above.

First, the *do of do so* has semantic content—roughly, it is only compatible with nonstative or eventive antecedents. VPE places no such restriction on its antecedent. This is shown by the examples in (17).

(17)  
   a. *I know the Easter Bunny is real, and Kent does so, too.*  
   b. I know the Easter Bunny is real, and Kent does, too.

Second, the *do of do so* does not raise to T, as would be expected if it were an auxiliary. In (18a), negation marks the left edge of the verb phrase. As we can see, the *do of do so* cannot sit to the left of negation; *do*-support is required provide phonological content to T as in (18b). The *do* in VPE can raise to T, however, as in (18c).

(18)  
   a. *I ran for five minutes, but did Grant so?*  
   b. I ran for five minutes, but Luke did not do so.  
   c. I ran for five minutes, but Luke did not.

The third piece of evidence is related to the second. The *do of do so* does not undergo subject-auxiliary inversion in the formation of polar questions, as the *do in VPE does*. Again, *do*-support provides the auxiliary for this purpose.

(19)  
   a. *I ate my sandwich in one sitting, but did Grant so?*  
   b. I ate my sandwich in one sitting, but did Grant do so?  
   c. I ate my sandwich in one sitting, but did Grant?
The last piece of evidence showing that the *do of do so* is a main verb is that it does not alternate with other auxiliaries, as shown in (20). This is again in contrast to the *do in VPE*, which is in complementary distribution with other auxiliary verbs.\(^8\)

(20) a. *I have read two books already, and Darrel has so, too.*
    b. I have read two books already, and Darrel has done so, too.
    c. I have read two books already, and Darrel has, too.

In light of this evidence, I will follow the standard view in considering the *do of do so* to be a main verb throughout this paper.\(^9\)

With this much in place regarding the syntax of *do so*, we can move on to our investigation of its anaphoric status. The rest of this paper is organized as follows. In

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\(^8\)Another example of a VP anaphor involving a *do* that occurs freely with auxiliaries is British English *do* illustrated in (i). Baltin (2007) provides evidence, however, that this *do* is not a main verb.

(i) a. John will run the race, and Bill will do, too [Baltin 2007:4, ex. (9b)]
    b. John has felt badly, and Bill has done too. [Baltin 2007:4, ex. (11a)]

\(^9\)In fact, the main verb status of *do* is not so straightforward. Conflicting evidence comes from *again* and the available interpretation it has when combined with *do so*. In the normal case, when *again* modifies a verb phrase as in (i), two readings are possible.

(i) Mary closed the door again.

The first reading that is possible in (i) is known as the *restitutive* reading and describes a situation in which the door was once closed, it opened, and then Mary returned it to its original state. The second reading—the *repetitive* reading—describes a separate situation, where Mary had already closed the door once, but it came open again so she closes it a second time. von Stechow (1996) argues that these two readings arise due to the possibility of different adjunction sites for *again*. When *again* attaches to the VP it modifies only the state described by the verb and we get the restitutive reading, but when *again* attaches to vP (or higher), it has scope over the action event denoted by the verb, resulting in the repetitive reading. Johnson (2004) uses this analysis to explain why only the repetitive reading is available when *again* modifies a verb phrase that has been deleted due to Verb Phrase Ellipsis, as shown by the examples in (ii). Since VPE deletes the whole VP, only the vP is left behind for *again* to modify, resulting only in the possibility of the repetitive reading.

(ii) a. Jane closed the door, and then Maribel did again. [Johnson 2004, ex. (29)]
    b. The wind blew the door open and no one closed it. Finally, *Maribel did again.* [Johnson 2004, ex. (30)]

If the *do of do so* were a main verb as has been argued here, we would expect the restitutive as well as the repetitive reading to be available when *again* modifies *do so*. On the contrary, the same contrast observed in (ii) with VPE is shown in (iii).

(iii) a. Jane closed the door, and then Maribel did so again.
    b. The wind blew the door open and no one closed it. Finally, *Maribel did so again.*

The unavailability of the restitutive reading could be taken as evidence that there is no VP in a clause containing *do so*, that is, that *do* is not a main verb, but an auxiliary verb (or perhaps little-v as analyzed by Stroik (2001) and Hallman (2004)), but if this were so, we would have no explanation for the facts presented in (17)–(20).

As far as I can tell, the categorial status of *do does* not have any bearing on arguments presented in the rest of this paper, and I will follow the traditional analysis of *do* as a main verb.
§2, I review the original claim by Hankamer and Sag (1976) that anaphoric processes are divided into two categories—deep anaphora and surface anaphora—and present their diagnostics for distinguishing the two categories. In §3, I use Hankamer and Sag’s diagnostics along with others to test the status of *do so*, and we will see that *do so* displays characteristics of both types of anaphora. §4 is devoted to showing that a surface anaphora analysis of *do so* encounters problems, and §5 argues that a deep anaphora analysis is superior. In §6, I discuss some consequences of a deep anaphora analysis of *do so*. §7 concludes the paper.

2 Deep vs. Surface Anaphora

In their seminal paper, Hankamer and Sag (1976) (henceforth H&S) make a broad distinction between two different types of anaphoric processes. In surface anaphora the target of anaphora is syntactically opaque; it has internal structure throughout core syntax and this structure is deleted or replaced by a proform late in the derivation. In deep anaphora on the other hand, the target of anaphora is syntactically transparent; there is no syntactic structure other than that, which surfaces at the end of the derivation. Based on this distinction, they arrive at the taxonomy of anaphoric processes in table 1.

<table>
<thead>
<tr>
<th>Deep</th>
<th>Surface</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>do it</em></td>
<td>Verb Phrase Ellipsis</td>
</tr>
<tr>
<td>Null Complement Anaphora</td>
<td><em>do so</em></td>
</tr>
<tr>
<td>Personal pronouns</td>
<td>Sluicing</td>
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<tr>
<td>Propositional <em>it</em></td>
<td>Stripping</td>
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<td></td>
<td>Gapping</td>
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<td></td>
<td>Noun Phrase Ellipsis</td>
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</table>

Table 1: Taxonomy of anaphoric processes

As representative cases, Verb Phrase Ellipsis (VPE) and *do it* anaphora are illustrated schematically in (21) under current assumptions about clause structure but abstracting away from the *vP/VP* distinction.\(^\text{10}\)

(21)  a. Surface Anaphora: VPE

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TP
   T
 T  VP → Ø
   V  DP
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b. Deep Anaphora: *Do it*

\(^{10}\)The structure in (21a) illustrates VPE with a monotransitive verb. However, VPE is possible with verbs of any valence, granted conditions on VPE (i.e. having an accessible antecedent and licensing auxiliary) are met.
H&S identify three diagnostics that distinguish deep anaphora from surface anaphora. I'll discuss each of these diagnostics in turn below, using VPE and do it as representative examples of the surface and deep anaphora classes, respectively.

The first diagnostic that H&S identify is that surface anaphora, but not deep anaphora, exhibits the **Missing Antecedent Phenomenon** (MAP). The MAP is the configuration, in which a pronoun finds its antecedent within the target of an anaphoric process (Grinder and Postal 1971). Take, for example, the sentence containing VPE in (22), where the crossed out material corresponds to the verb phrase that was deleted in the course of the derivation of the sentence.

(22) VPE

I've never ridden a camel, but Ivan has [ridden a camel], and he says *it* stank horribly.  

[H&S:403, ex. (23)]

Here we are interested in the referent of the italicized pronoun, which intuitively, refers to a camel. The overt occurrence of *a camel* cannot serve as the antecedent for the pronoun; it is an indefinite DP under the scope of negation, and as such it cannot introduce a new entity into the discourse. This is shown by the ungrammatical sentence in (23). Therefore, the antecedent of *it* must be the occurrence of *a camel* that is contained within the site of VPE. This makes sense since the pronoun is referring back, specifically, to the camel that Ivan rode.

(23) *I've never ridden a camel, and it stank horribly.*  

[H&S:404, ex. (25)]

H&S argue that the MAP is only possible with surface anaphora because the target of the anaphoric process begins the derivation with full syntactic structure and therefore, can contain an antecedent. Since the target of deep anaphora is an atomic unit that never has internal syntactic structure, sentences in which a pronoun is to find its antecedent within the target of a deep anaphor are not grammatical. This is illustrated by the sentence containing do it anaphora in (24).

(24) **Do it**

*I've never ridden a camel, but Ivan has done it, and he says *it* stank horribly.*

[H&S:404, ex. (26)]

Again, the overt occurrence of *a camel*, being an indefinite under the scope of negation, cannot serve as the antecedent for the pronoun, and since the verb phrase never contained an occurrence of *a camel*, the pronoun is left without an antecedent, resulting in ungrammaticality.

The second diagnostic that H&S identify is that deep anaphora allows **pragmatic control**, while surface requires a linguistic antecedent.\(^{11}\) For instance, given the scene

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\(^{11}\)See Merchant (2004:717-724) for a recent discussion of, and thorough dispensation of, possible objections to this claim.
described in (25), it is perfectly felicitous to respond with the sentence containing *do it* anaphora in (25a); the response containing VPE in (25b), however, is not felicitous.

(25)  

**SCENE:** Sag produces a cleaver and prepares to hack off his left hand.

VPE

a. # Don’t be alarmed, ladies and gentlemen, we’ve rehearsed this act several times, and he never actually does.  
[H&S:392, ex (6a)]

*Do it*

b. . . . He never actually does it.  
[H&S:392, ex (6b)]

The fact that deep anaphora allows pragmatic control but surface anaphora does not is related to the manner in which instances of these two types of anaphora find their meaning. In Sag and Hankamer (1984), the authors argue that the reference of a deep anaphoric element is obtained “by reference to some object in a model of the world constructed by the interpreter of the sentence of discourse” (328). The interpretation of a surface anaphoric element, on the other hand, is obtained “by reference to a linguistic representation associated with the antecedent, specifically a propositional representation of the kind generally called logical form” (328). Therefore, for the interpretation of a VP deep anaphor, all that is required is that there is some pragmatically salient event available in the discourse that can serve as the antecedent. This event is provided for *do it* in (25b) by the SCENE. A surface anaphor, on the other hand, requires a linguistic antecedent because its interpretation is dependent on the logical form (a linguistic object) of that antecedent, and since there is no linguistic antecedent for VPE in (25a), it is not felicitous.12

The last diagnostic H&S identify is related, again, to the manner in which deep and surface anaphora are interpreted. Surface anaphora requires **syntactic identity** between the target and its antecedent; deep anaphora does not.13 In the example of VPE in (26), the antecedent clause is passive, while the target is active. The result is ungrammaticality.

(26)  

VPE

* The oats had to be taken down to the bin, so Bill did.  
[H&S:413, ex (65a)]

The same passive/active mismatch involving *do it* is grammatical, however, (27).

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12Given that the interpretation of deep anaphora does not require reference to any linguistic object, Sag and Hankamer (1984) rename deep and surface anaphora **model-interpretive anaphora** and **ellipsis**, respectively. I will continue to use the original names, however.

13H&S only discuss passive/active mismatches, which Kehler (2002) show only to be ungrammatical with surface anaphora when the target and antecedent clauses are in a Resemblance coherence relation. Other types of syntactic mismatches, such as transitivity alternations, are more robust in causing ungrammaticality. Although Frazier and Clifton (2005, 2007) show that the restriction on these types of syntactic identity can be relaxed under certain discourse conditions. See also Merchant (2007, 2008) for a treatment syntactic mismatches and VP anaphora.

H&S also disregard “housekeeping processes like *Do* Support or **Affix Hopping**” (423) in the calculation of syntactic identity, saying that they follow surface anaphoric processes. The idea being that if they happen after a surface anaphoric process has taken place, they cannot affect syntactic identity. Another such housekeeping rule that H&S do not discuss is what Fiengo and May 1994 call vehicle change involving pronouns. Instances of vehicle change also do not affect the syntactic identity requirement on surface anaphora.
The oats had to be taken down to the bin, so Bill did it.

Based on these three diagnostics, H&S classify *do so* as surface anaphora (413-418). However, many authors have noted that as a surface anaphor, *do so* has anomalous behavior (Kaplan 1976; Williams 1977b; Ward et al. 1991; Cornish 1992; Kehler and Ward 1999, 2004). These authors, however, merely noted the idiosyncracies of *do so* or were interested in using it to call into question the deep versus surface anaphor distinction. Here, I will maintain that the distinction between deep and surface anaphora is a real one, but that *do so* is actually deep anaphora and that its apparent surface anaphora behavior fall out from independent properties of the anaphor. In the section that follows, I present the empirical facts that bear on whether *do so* is deep or surface anaphora, but before doing so, I will set aside two diagnostics that are claimed to be probative of deep versus surface anaphora. The first is one of H&S’s original tests: the MAP.

I set aside the MAP because of a confound in the logic of the test. Recall that Sag and Hankamer (1984) argue for two different mechanisms of anaphoric processing. A surface anaphor gets its meaning by making reference to the linguistic representation of its antecedent, while a deep anaphor gets its meaning by making reference to the discourse model constructed by the speaker. This distinction accounts for the ability of deep, but not surface, anaphors to be pragmatically controlled. Applying this analysis to sentences such as (22) and (24), which purportedly test for the MAP we are left with an analytical challenge. Since we are interested in the interpretation of the italicized pronoun and since pronouns are generally considered to be deep anaphors, it should make no difference if the antecedent of the pronoun is syntactically active. All that matters is whether the antecedent exists as an entity in the discourse model of the speaker. This should certainly be true if the antecedent is “contained” within a deep anaphor or a surface anaphor. Consider further sentence (24). In the interpretation of this sentence, the deep anaphor *do it* gets its meaning by making reference to the camel riding event introduced by the antecedent clause. Upon *do it* receiving its meaning, a new proposition is entered into the discourse model, namely that Ivan has ridden a camel. Thus, the camel that Ivan rode is in the discourse model, and it is this entity that serves as the antecedent for the pronoun. This reasoning is in line with the observation made by Bresnan (1971:592) and Johnson (2001:456, ft. 30) that when testing the MAP against a deep anaphor, an antecedent for the pronoun can usually be inferred upon further consideration.

The second diagnostic I will set aside is the availability of sloppy readings, which are cited as evidence of surface anaphora. In a sentence such as (28) that contains VPE, two readings of the second clause are possible. The first reading is that Kent harvested Hubert’s cabbage plants; this is known as the strict reading. The other reading is called the sloppy reading. On this reading, Kent harvests his own cabbage plants.

(28) Hubert harvested some of his cabbage plants, and Kent did, too.

A standard analysis of how sloppy readings arise is that they result from a pronoun in the target of VPE acting as a bound variable, whereas with the strict reading it does not (Williams 1977a). This can be illustrated schematically as in (29)
Presumably, the sloppy reading is available with VPE because it is surface anaphora; that is, there is a pronoun contained within the target of VPE available to be bound by the subject of the clause. The claim is that he same is not true with cases of deep anaphora; there is no internal syntactic structure in the target, and therefore, there is no pronoun available to act as a bound pronoun. A sloppy reading is available with sentences containing do so, such as those in (30). (30a) has both the reading where Scott asks Luke’s girlfriend to the prom (strict), as well as the reading where he asks his own girlfriend (sloppy). Likewise, (30b) can mean that Jeremy gave Devin’s mother a pie or mean that he gave his own mother a pie.

(30) a. Luke asked his girlfriend to prom, and Scott did so, too.
    b. Devin gave his mother a pie, and Jeremy did so, too.

The facts in (30) could be taken as evidence against a deep anaphora analysis of do so. However, it appears that the availability of a sloppy reading is not indicative of surface anaphora. Fiengo and May (1994:248, fn. 13) provide the example of do it anaphora in (31), noting that it has both a strict and sloppy reading. Similarly, the example in (32) involving Null Complement Anaphora allows both readings. Both do it anaphora and Null Complement Anaphora are deep anaphors.

(31) Max$_i$ hit his$_i$ friend, and Oscar$_j$ did it, too. (do it = hit his$_{i/j}$ friend)
(32) Jordan$_i$ was happy to help her$_i$ mom in the greenhouse, but Jacqueline$_j$ refused Ø. (Ø= to help her$_{i/j}$ mother in the greenhouse)

In light of sentences like those in (31) and (32) it is difficult to maintain that the availability of sloppy readings is probative of surface anaphora; the phenomenon cross-cuts the deep versus surface distinction.\footnote{In fact, Bach et al. (1974) provide the empirical basis for this conclusion early on, although this work predates the H&S’s and the terms deep anaphora and surface anaphora. They provide a comprehensive discussion of various anaphoric processes and whether they allow a sloppy reading, and from their examples, it is clear that the availability of a sloppy reading cross-cuts the deep versus surface distinction.}

Having set aside the MAP and the availability of sloppy readings as diagnostics of surface anaphora, I will move on to the empirical facts bearing on the anaphoric status of do so. I will start with the other two diagnostics identified by H&S reviewed above and then move on to a further diagnostics that has been claimed to make different predictions depending on whether the target of anaphora contains an underlying syntactic structure: extraction from within the site of do so. If do so were surface anaphora, we expect extraction to be possible.

3 The Facts

3.1 Pragmatic Control

H&S show that do so, in constrast to do it, does not allow pragmatic control, indicating that it is a surface anaphor. This is shown by the examples in (33)–(35).
This generalization is very robust and speakers uniformly consider the (a) examples in (33)–(35) to be infelicitous.

### 3.2 Syntactic Identity

Contra H&S, *do so* anaphora allows mismatches in syntactic identity of various kinds between the target and antecedent. Kehler and Ward (1999) (henceforth K&W) provide many examples of this sort, drawing on a broader notion of syntactic identity and showing that *do so* allows voice alternations (36), a process nominal (37) or role nominal (38) as the antecedent, and split-antecedents (39). The antecedent phrases are bracketed in these examples.

(36)  
| a. | Since regardless of which bit is initially assigned, it will be [flipped] if more information is gained by doing so. | [K&W, ex. (33)] |
| b. | Section 1 provides the examples to be [derived by Gapping], and a formulation of Gapping capable of doing so. | [K&W, ex. (34)] |
| c. | As an imperial statute the British North America Act could be [amended] only by the British Parliament, which did so on several occasions. | [K&W, ex. (35)] |
| d. | The formalisms are thus [more aptly referred to as information- or constraint-based rather than unification-based], and we will do so here. | [K&W, ex. (36)] |
| e. | It is possible that this result can be [derived from some independent principle], but I know of no theory that does so. | [K&W, ex. (37)] |

(37)  
| a. | The [defection of the seven moderates], who knew they were incurring the wrath of many colleagues in doing so, signaled that it may be harder to sell the GOP message on the crime bill that it was on the stimulus package. | [K&W, ex. (38)] |
| b. | Even though an Israeli [response] is justified, I don’t think it was in their best interests to do so right now. | [K&W, ex. (40)] |

(38)  
| a. | One study suggests that almost half of young female [smokers] do so in order to lose weight. | [Ward & Kehler 2005, ex. (35)] |
| b. | The majority of horse [riders] do so purely for leisure and pleasure. | [Ward & Kehler 2005, ex. (36)] |
Fortunately, the first person to [die in 1990] and the first couple to [file for divorce in 1990] were allowed to do so anonymously.  

What I am suggesting is that when we [delay], or when we [fail to act], we do so intentionally.

Moreover, Cornish (1992) cites the example in (40), in which the antecedent of do so is a deverbal adjective.\(^{15}\)

(40) He went on to claim that the allegedly [high-spending] Labour authorities had, by so doing, damaged industry and lost jobs.  

Other form mismatches that are allowed by do so are transitivity mismatches (41)–(43) and middle/nonmiddle mismatches (44)–(45).\(^{16}\)

(41) a. * John wanted the horseshoe to hang over the door, so Steve did so.  
    b. John told Steve to hang the horseshoe over the door, and it does so now.

(42) a. * A bunch of books burned last night, and I heard that John did so.  
    b. John burned his books last night, and they did so for 20 minutes before anyone put them out.

(43) a. * Mary claimed that the door closed on its own, but I actually did so.  
    b. Mary claimed that I closed the door, but it actually did so on its own.

(44) a. I was told that this new peanut butter spreads easily, and I am very excited to do so.  
    b. I was apprehensive about spreading my new peanut butter, but I am very pleased to discover that it does so easily.

(45) a. I have tried pairing the N800 with other devices, and it does so easily.\(^{17}\)  
    b. The N800 pairs with other devices easily, and I do so all the time.

The acceptability of these mismatches in syntactic form provide strong positive evidence that do so is deep anaphora, although we will see in §4.2 that some of them can be accommodated while still maintaining a surface anaphora analysis.

\(^{15}\)In fact, (40) contains an example of what Kehler and Ward (1999) call ‘preverbal so’ and not do so proper. However, Cornish’s example works equally as well with do so as is shown in (i).

(i) He went on to claim that the allegedly [high-spending] Labour authorities had, by doing so, damaged industry and lost jobs.

\(^{16}\)It is curious that mismatches in transitivity are only tolerated with do so when the transitive variant is the antecedent. By way of explanation, we might note that there is an asymmetry in the entailment relations between the transitive and intransitive sentences. That is, the transitive entails the intransitive, but not vice versa. For example, in (42b) if John burns his books it entails that the books, indeed, burn. To the contrary, in (42a) the fact that a bunch of books burned does not entail that John (or anyone) burned them. On a deep anaphora account of do so (which I eventually arrive at) where the antecedent of the anaphor is resolved pragmatically, this asymmetry in the transitivity mismatches might tell us something about what information is in the discourse model for the interpreter to draw on in order to find an antecedent for do so. Speculatively, the interpreter can rely not only on the events in the discourse model, but also on the events entailed from them.

\(^{17}\)www.realtime-unifiedcommunications.com/mobilityfixed mobs_converge/2007/04/why_the_nokia_n800_rocks.htm
3.3 Extraction

Since the target of surface anaphoric processes start out the derivation with internal syntactic structure, we would expect that movement out of the target should be possible, where this contains a movable element such as a DP object. Schuyler (2001) shows this to be the case for VPE. For example, in (46) and (47) the bracketed wh-phrases are understood to be the direct object of the verb and the object of a VP-internal preposition, respectively.

(46) I don’t know which puppy you SHOULD adopt, but I know [which one] you SHOULDN’T. [Schuyler 2001:1, ex. (1)]
(47) I don’t know who Tom DID go to a movie with, but I know [who] he DIDN’T. [Schuyler 2001:3, ex. (10b)]

Similarly, topicalization from within the target of VPE is also possible, as shown in (48), indicating that A-movement in general is possible.

(48) I think the blue papers PETE should sign, and I think [the green ones] JAN should. [Schuyler 2001:11, ex. (79)]

Given the VPE facts, if do so were surface anaphora, we would predict A-movement out of the target to be possible. As the sentences in (49)–(52) show, wh-movement (49) and topicalization (50) from within the verb phrase, object relative clauses (51), and antecedent contained deletion (52) are all ungrammatical with do so.

(49) a. *I don’t know which puppy you SHOULD adopt, but I know [which one] you SHOULDN’T do so.
   b. *I don’t know who Tom DID go to a movie with, but I know [who] he DIDN’T do so.
(50) *I think the blue papers PETE should sign, and I think [the green ones] JAN should do so.
(51) *I saw the same man as you did so last week.
(52) *I visited every city Frank did so.

The fact that you can’t get A-movement out of the target of do so is a strong indicator that it is deep anaphor. However, other movement facts point toward it being a surface anaphor. In particular, do so is possible with unaccusative verbs, as shown in (53). If we follow the standard analysis of unaccusative and assume that their subjects are underlying internal arguments of the verb that arrive in the subject position by A-movement, we would not expect these examples to be possible.

---

18Schuyler argues that extraction from within the site of VPE is only possible when there is a contrastively focused element in the c-command domain of the extracted phrase. In both (46) and (47), for example, the negative polarity of the second clause is contrasted with the positive polarity of the initial clause. This is indicated by focal stress on the auxiliary verbs, and since the auxiliaries are contained within the c-command domain of the fronted wh-words, Schuyler’s condition is satisfied. In the following examples demonstrating extraction from the target of do so this same condition is satisfied and the examples are still ungrammatical.
(53)  a. Ashley fainted at the party, and Maureen did so, too.
b. Michelle fell down the stairs, and Jill did so, too.

Not all A-movement out of the target of do so seems to be possible, however; do so cannot be passivized (54), as expected on a deep anaphora account since the passive subject originates as the internal argument of the verb.

(54) * The vase was broken by the children, and the jar was done so, too

Furthermore, raising is not possible out of the site of do so, as shown in (55), where do so is meant to stand in for the matrix verb phrase.

(55) a. * Andy is likely to buy three parkas next winter, and Marsha does so, too.
     [do so = be likely to buy three parkas next winter]
b. * Louise seems to be walking quickly, and Candace does so, too.
     [do so = seem to be walking quickly]

The availability of movement from the target of do so gives conflicting results. A-extraction, passivization, and raising are not possible, indicating that do so is a deep anaphor, but it seems that the A-movement associated with unaccusatives is possible, pointing toward surface anaphora.

3.4 Summary

The empirical facts bearing on whether do so is deep or surface anaphora are summarized in table 2. As we can plainly see, the behavior of do so is mixed. The facts regarding the availability of pragmatic control and the movement of unaccusative subjects point toward it being surface anaphora, while the facts regarding the syntactic parallelism requirement, raising, and A and passive movement indicate that it is deep anaphora.

<table>
<thead>
<tr>
<th></th>
<th>Deep</th>
<th>Surface</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pragmatic Control</td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>Syntactic Parallelism</td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>Extraction</td>
<td>A-movement, Passives, Raising</td>
<td>Unaccusatives</td>
</tr>
</tbody>
</table>

Table 2: Diagnostics indicating deep vs. surface anaphora

Previous authors have argued that the mixed behavior of do so is proof that the deep versus surface dichotomy is false (e.g. Williams 1977b). However, if the putative evidence against either the surface anaphora or the deep anaphora analysis can be explained in other terms, a coherent analysis of do so can be given while maintaining the deep versus surface distinction. This is the task I take up in the following sections, showing first that the evidence against do so being surface anaphora cannot all be explained away. The evidence against a deep anaphora analysis, however, can be explained in other terms.
4 Addressing the Evidence Against the Surface Anaphora Analysis

There are two properties of *do so* that must be addressed if one wants to maintain a surface anaphora analysis: syntactic identity mismatches and the unavailability of certain types of movement out the the site of anaphora. I will address each of these in turn.

As discussed in §3.3, *do so* allows syntactic mismatches of various kinds. Examples of these mismatches are repeated in (56).

(56) a. Even though an Israeli response is justified, I don’t think it was in their best interests to do so right now. [process nominal]
    b. One study suggests that almost half of young female smokers do so in order to lose weight. [role nominal]
    c. He went on to claim that the allegedly high-spending Labour authorities had, by so doing, damaged industry and lost jobs. [adjective]
    d. Since regardless of which bit is initially assigned, it will be flipped if more information is gained by doing so. [passive/active]
    e. Mary claimed that I closed the door, but it actually did so on its own. [transitivity]
    f. I was told that this new peanut butter spreads easily, and I am very excited to do so. [middle/non-middle]
    g. What I am suggesting is that when we delay, or when we fail to act, we do so intentionally. [split-antecedent]

Fu et al. (2001) provide an account of why *do so* can have as its antecedent a process nominal. They argue that these nominals are derived from verbs in the syntax and not in the lexicon; nouns that do not derive from verbs, they argue, cannot serve as antecedents for *do so*. This contrast is shown in (57).

(57) a. Sam’s [destruction of his documents] this morning was preceded by Bill’s doing so. [Fu et al. 2001:571, ex. (42a)]
    b. * His [accident] before the party and my doing so after are not a coincidence. [Fu et al. 2001:574, ex. (47b)]

More explicitly, the authors argue that process nominals not only contain verb, but a whole verb phrase as well, and that the nominal is derived via head adjunction of the verb to the nominal suffix. This is schematized in the tree in (58) for a DP such as *the destruction of the documents*. The structure has been simplified from the original structure the authors propose.

19 The authors leave aside the issue of how *of* is inserted into the structure, and I will do the same.
Evidence that process nominals contain a VP comes from sentences like those in (59), in which there are adverbs within the DP. Since adverbs don’t normally modify nouns, an analysis such as that in (58) provides a straightforward account of these sentences.

(59)  a. Kim’s explanation of the problem to the tenants thoroughly (did not pre-

vent a riot). [Fu et al. 2001:549, ex. (1a)]

b. His transformation into a werewolf so rapidly was unnerving. [Fu et al. 2001:555, ex. (8a)]

This analysis of process nominals also provides an account of why they can serve as the antecedent for do so, while still maintaining that the anaphor is surface anaphora. It isn’t the nominal, per se, that is the antecedent, but rather the VP contained within the NP. This VP matches the target of do so, thereby maintaining the syntactic identity requirement on surface anaphora. Applying this analysis to the example in (56a), where the process nominal response is the apparent antecedent of do so, we arrive at an internal structure for the noun as in (60).

(60)  DP  

    D  

    the   

    NP  

    VP  

    (destroy)  

Again, it is the VP contained within the noun that serves as the antecedent to do so. A similar line of argumentation could be appealed to for the deverbal adjective that is acting as the antecedent for do so in (56c); indeed, Drijkoningen (1992) has proposed that deverbal adjectives are derived syntactically by combining a verb phrase with a derivational morpheme. With this analysis in place, the fact that do so can have a process nominal and adjectival antecedents is not evidence against it being surface anaphora.

While Fu et al. do not explicitly discuss role nominals as antecedents of do so, it is conceivable that their analysis could be imported to cover examples such as those in (38) as well. Responding directly to Fu et al., however, Ward and Kehler (2005) argue that there is no evidence for a hidden VP in role nominals. The main source of evidence
they provide is that while certain role nominals are possible antecedents, others are not, as shown by the examples in (61).

(61) a. # My [computer] does so faster than yours.  
    [Ward & Kehler 2005, ex. (39)]

b. # The boats [propeller] failed to do so, and now were stuck.  
    [Ward & Kehler 2005, ex. (40)]

In order for the analysis of Fu et al. to cover all of these examples, they would be forced to maintain that certain role nominals contain a VP, but others do not, but as Ward and Kehler say, there is no independent evidence that this is the case. In light of these facts, Ward and Kehler propose a discourse-based analysis of do so anaphora, essentially arguing that do so is a deep anaphor.20

Turning now to other types of mismatches in syntactic identity, the fact that do so allows passive/active mismatches can be accounted for while, at the same time, maintaining that it is surface anaphora. Voice alternations have also been noted for VPE, a canonical example of surface anaphora, as shown in (62) where the antecedent VP is passive and the target VP is active. (See Sag (1976:6, 51 fn. 2); Dalrymple et al. (1991:440-441); Fiengo and May (1994:201-203); Johnson (2001:407-472); Kehler (2002:53-63) for further examples and discussion.)

(62) a. The system can be used by anyone who wants to use the system.  
    [Merchant 2007:3, ex. (2b)]

b. This problem was to have been looked into, but obviously nobody did look into the problem.  
    [Kehler 2002:53, ex. (83)]

On a surface anaphora analysis of VPE that disallows mismatches in syntactic identity, data like that in (62) present a challenge. To meet the challenge, Merchant (2007)21 follows a line of argumentation similar to that of Fu et al. (2001)—the apparent mismatch in syntactic identity is merely an illusion. Following a recent proposal by Collins (2005) that divorces Voice from the head that determines the transitivity of the verb phrase (v), Merchant proposes that it is the Voice head that licenses VPE, causing its vP complement to go missing. Voice is outside the target of ellipsis, and the syntactic identity requirement therefore holds only over vP. Under this analysis, the two clauses in (63a) would have structures like those in (63b) and (63c). Importantly, both of these structures have a transitive-v that introduces an agent argument, though this argument is unexpressed in the passive structure (represented by Arg in (63b))

(63) a. This problem should have been looked into, but nobody did.

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20 The details of Ward and Kehler’s (2005) analysis will be discussed in the next section.

21 Merchant (2008) puts forth a similar analysis of syntactic mismatches in ellipsis to the one described here, although in this work he does not discuss mismatches in transitivity between the target and antecedent clauses.
Merchant’s analysis of voice alternations in VPE could be directly transferred to the examples of voice alternations with do so in (36). As an instance of surface anaphora, we could say that do so targets vP, thereby excluding the Voice head which would otherwise cause the target and antecedent to be nonidentical. The transitivity and middle mismatches that do so allows present a potential problem, however. These alternations are ungrammatical with VPE, as shown in (64) and (65), respectively, and Merchant’s analysis correctly rules them out.

(64) This can freeze. *Grant will. [adapted from Johnson (2004)]

(65) *I was told that this new peanut butter spreads easily, and I am very excited to.

On Merchant’s analysis, the reason that these are ungrammatical is that the target clauses and the antecedent clauses have different argument structures; more precisely, the antecedent clauses are unaccusative and therefore lack external arguments, while
the target clauses are transitive and have external arguments. If, in this system, VPE is licensed by the Voice head, there is no way to maintain syntactic identity between the vPs since it is precisely v that determines whether there is an external argument or not. This is made explicit in the trees in (66), which correspond to the target and antecedent clauses in (64).

\[(66) \ a. \ \text{TP} \]
\[
\begin{array}{c}
\text{DP}_1 \\
\text{This} \\
\text{T} \\
\text{VoiceP} \\
\text{can} \\
\text{vP} \\
\text{v}_{\text{unacc}} \\
\text{VP} \\
\text{freeze \ (this)}
\end{array}
\]

\[
\begin{array}{c}
\text{TP} \\
\text{DP}_2 \\
\text{Grant} \\
\text{T} \\
\text{VoiceP} \\
\text{will} \\
\text{Voice[Act]} \\
\text{\#vP} \rightarrow \emptyset \\
\text{\(t_2\)} \\
\text{\(v\)} \\
\text{v}_{\text{trans}} \\
\text{VP} \\
\text{freeze \ this}
\end{array}
\]

However, as we have seen in (41)–(43), these types of argument structure mismatches are possible with do so. In light of this, we would be forced to say that do so is not licensed by the Voice head, but rather by v in order to maintain the syntactic identity required by surface anaphora. On this analysis, do so would target only the VP, which is the complement of v. If we follow the standard assumption, however, that the verb always raises to v in English, an analysis in which only VP is replaced by do so would predict that the main verb would survive along with do so.\footnote{This challenge for the analysis might be overcome by assuming that head movement is a PF operation (Chomsky (1995:368); Chomsky (2001:37-38)). On this account, do so would replace the VP before V moves to v; essentially, do so insertion would bleed head movement.} This is, of course, the wrong prediction:

\[(67) \ a. \ * \text{Melvyn feeds the cattle, and Louie feeds do so, too.} \]
Thus, it seems that an analysis along the lines of Merchant’s is not possible for *do so*. It is possible to accommodate the nominal and adjectival antecedents and the voice mismatches, but the argument structure mismatches pose a problem. Also difficult to accommodate are the split-antecedents exemplified in (39). Since the antecedent of *do so* corresponds to two separate verb phrases in these cases, it is unclear to me how both of them could be replaced by *do so* in a single clause. On a deep anaphora account, these sentences would pose no problem since listeners are able to construct a pragmatic antecedent for *do so* from the joint event denoted by the conjoined VPs in the previous clause.

Moving now to the facts about extraction that point toward *do so* being deep anaphora, recall that *A* movement, passive subject movement, or raising is not possible. The relevant examples are repeated in (68).

\[(68) \begin{align*}
\text{a.} & \quad \text{*I don’t know which puppy you SHOULD adopt, but I know [which one] you SHOULDN’T do so.} \\
\text{b.} & \quad \text{*I think the BLUE papers PETE should sign, and I think [the GREEN ones] JAN should do so.} \\
\text{c.} & \quad \text{*I saw the man again that I did so last week.} \\
\text{d.} & \quad \text{*I visited every city Frank did so.} \\
\text{e.} & \quad \text{*The vase was broken by the children, and the jar was done so, too} \\
\text{f.} & \quad \text{*Andy is likely to buy three parkas next winter, and Marsha does so, too} 
\end{align*}\]

These facts are difficult to explain if *do so* is surface anaphora. As is the case with VPE in (69), we would expect that any movements that occur before *do so* replaced the verb phrase to be grammatical, as long as the relevant conditions on those movements are met.

\[(69) \begin{align*}
\text{a.} & \quad \text{I don’t know which puppy you SHOULD adopt, but I know [which one] you SHOULDN’T.} 
\end{align*}\]
b. I think the blue papers PETE should sign, and I think [the green ones] JAN should.
c. I saw the man again that I did last week.
d. I visited every city Frank did.
e. The vase was broken by the children, and the jar was, too
f. Andy is likely to buy three parkas next winter, and Marsha is, too

Explaining the inability to extract from the target of a surface anaphoric process is not an easy task, but can be done. Houser et al. (2007) show that Verb Phrase Pronominalization (VPP) in Danish has all of the hallmarks of surface anaphora except that it does not allow A-movement out of the target of anaphora. In VPP, an overt proform det stands in for a verb phrase and is anaphoric to some other verb phrase that precedes it. The VP proform can appear in situ as in (70) or it can appear clause initially with verb second (V2) as in (71). In both cases, it is licensed by a finite auxiliary, here the modal kan.

(70) Han siger han kan [hækle], men selvfølgelig kan han ikke det.
    he says he can crochet but of course can he not det
    ‘He says he can crochet, but of course he can’t.’  
    [Houser et al. 2007, ex. (1)]

(71) Han siger han kan [hækle], men det kan han ikke.
    he says he can crochet but det can he not
    ‘He says he can crochet, but he can’t.’  
    [Houser et al. 2007, ex. (2)]

That VPP does not allow A-extraction is shown by (72).

(72) * Jeg ved hvem SUSAN kildede, men jeg ved ikke [hvem] PALLE gjorde
    I know who Susan tickled but I know not who Palle did
    det.
    DET

    Intended: ‘I know who Susan tickled but I don’t know who Palle did.’  
    [Houser et al. 2007, ex. (3)]

Houser et al. maintain a surface anaphora analysis of VPP, and attribute the ungrammaticality of (72) to a violation of the locality condition on movement. These authors exploit the fact that Danish is a V2 language that has a single position (Spec-CP) available for discourse marked elements (including topics and wh-words) to move to. Furthermore, the authors assume that the verb phrase target of VPP is topic-marked—a reasonable assumption since it always has a linguistic antecedent and is therefore, discourse-old. As a topic-marked element, the VPP target is available for movement to Spec-CP and will be closer than any discourse marked element contained within it. This is schematized in the tree in (73).
Houser et al.'s analysis relies on language specific properties of Danish to explain the ungrammaticality of A-movement out of the target of VPP, so it would be difficult to give the same explanation for English *do so*. English is not a V2 language, and there is no evidence that there is any type of movement to Spec-CP in clauses containing *do so*; it is ungrammatical for all or part of the anaphor to be fronted, as shown in (74).24

(74) a. *Melvyn feeds the cattle, and does so Louie, too.
   b. *Melvyn feeds the cattle, and does Louie so, too.
   c. *Melvyn feeds the cattle, and so Louie does, too.

Moreover, even if an analysis along the lines of the one given for Danish VPP could be devised for *do so*, it would not explain why passive subject movement is disallowed. Since the landing site of the passive subject is Spec-TP and not Spec-CP, there would be no competition for movement and locality would not come into play. Indeed, Danish VPP is possible with passive VPs, as shown by (75).

(75) Jeg ved at både Susan og Palle gerne ville vælges til formand,
   I know that both Susan and Palle happily would elect_PASS to chairman
   men jeg ved ikke hvem af dem blev det.
   but I know not who of them became DET
   ‘I know that both Susan and Palle wanted to be elected chairperson, but I dont
   know which of them was.’ [Houser et al. 2007, ex. (12b)]

However, an explanation for why *do so* does not passivize may lie in the status of the *do of do so*. As shown in §1.1, this verb is intransitive, and there is no passive form of intransitive verbs in English. With this view, the lack of passivization with *do so* has little to do with its anaphoric status, but rather falls out from general properties of

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24 The sentence in (i), however, is grammatical.

(i) Melvyn feeds the cattle, and so does Louie.

While the anaphor in this example appears to be *do so*, H&S show that it has different properties. For example, the anaphor in (i) can be licensed by auxiliary verbs (e.g. *Melvyn has fed the cattle, and so has Louie*). The reader is referred to Hankamer and Sag (1976, 415-416) for a complete overview.
the syntax of English and the lexical properties of *do*. Similarly, as we saw in §1.1, *do so* is not compatible with stative antecedents. This explains why raising is not possible with *do so*; raising predicates such as *seem* and *be likely* are stative and therefore are not possible antecedents. This is made clear by the examples in (76).

(76)  
  a.  *Richard seems happy, and Merrill does so, too.*  
  b.  *Katie’s pet is likely a dog, and Jacob’s pet does so, too.*

We have seen in this section that the surface anaphora analysis of *do so* faces many challenges. Some of these challenges can be overcome (process nominal antecedents, passive/active mismatches, A-movement); others, however, cannot (role nominal antecedents, transitivity and middle/nonmiddle mismatches). I therefore conclude that the surface anaphora analysis is untenable, and in the rest of the paper, pursue an analysis of *do so* as deep anaphora. Before I can arrive at this analysis however, I must address the evidence presented in §3 that pointed toward *do so* being surface anaphora: the need for a linguistic antecedent and the ability of the subjects of unaccusatives to escape the target. I take up the task of addressing these issues in the next section.

5 Addressing the Evidence Against the Deep Anaphora Analysis

The most daunting challenge for a deep anaphora analysis is the inability of *do so* to take its meaning from the nonlinguistic context. As mentioned in the previous sections the availability of pragmatic (i.e. non-linguistic) control is a hallmark of deep anaphora. Taken at face value, this property of *do so* is a strong indication that it is surface anaphora. Fortunately for the task at hand, however, this problem has already been addressed by K&W.\(^{25}\) The solution they pursue lies not in the syntax or semantics of *do so*, but rather in its discourse properties. In their analysis of the pragmatic properties of *so*, they draw a distinction between occurrences of *so* before the verb (preverbal *so* illustrated in (77)) and occurrences of *so* after the verb (postverbal *so* illustrated in (78)). The relevant observation for the task at hand is that the use of preverbal *so* is only felicitous with antecedents that are discourse-old (in the sense of Prince (1992)) and salient.

(77)  
  a.  In fact, in substantiating these fears, Judge Bork again essentially concedes that economic freedom is a component of the Constitution: “We already have clauses that could be used to protect economic freedom—and were so used.”  
      [K&W:233, ex. (1)]  
  b.  “...and with complete premeditation resolved that His Imperial Maj-esty Haile Selassie should be strangled because he was head of the feudal sys-tem.” He was so strangled on Aug.26, 1975 in his bed most cruelly.  
      [K&W:233, ex. (2)]

(78)  
  a.  If you thought that the questions could be answered courteously, why didn’t you answer them so?  
      [K&W:241, ex. (24b)]  
  b.  I guess/think/suppose/say so.  
      [K&W:241, ex. (26b)]

\(^{25}\)See also Kehler and Ward (2004) for further discussion.
Based on the syntax of *do so*, we would expect that it share properties with other instances of postverbal *so*. However, K&W show that *do so* actually has the same properties as preverbal *so*; namely, its antecedent must be discourse-old. They argue that this mismatch in syntactic and pragmatic properties falls out from its historical development. The predecessor of *do so* was the Old English *swa don* construction (Higgins 1992), an instance of preverbal *so*. K&W do not expand further on this argument, but the logic behind their claim seems to be that while the syntax of *do so* changed over time (i.e. the change from preverbal *swa* to postverbal *so*), it still retains vestiges of its pragmatic properties.26 Here, I will make no claims as to whether the pragmatic properties of *do so* have a historical explanation. Instead, I will use K&W’s observation that its antecedent must be discourse-old to explain why *do so* cannot be controlled by the real-world context.

The reason that Sag and Hankamer (1984) give for surface anaphora requiring a linguistic antecedent has to do with the mechanism by which surface anaphoric processes acquire their meaning. They claim that this is done by making reference to the LF of its antecedent, and since the LF is a linguistic object, it cannot be recovered from the real-world context, only the linguistic context. Deep anaphora, on the other hand, is not restricted in the same way. It gets its meaning through pragmatic inference and therefore can have a linguistic antecedent but needn’t. Since the use of deep anaphora is compatible with both linguistic and nonlinguistic antecedents, it is entirely possible that factors about usage can come into play that have nothing to do with how the anaphor acquires its meaning and which have the effect of restricting the type of antecedent the process allows. This seems to be the case with *do so*. If the pragmatic properties of *do so* allow it only to be used with antecedents that are discourse-old as Kehler and Ward argue, this has the effect of requiring *do so* to have a linguistic antecedent.

Thus, we have arrived at a taxonomy of anaphoric processes like that in Table 3, where there are two dimensions along which they can vary. Surface anaphoric processes acquire their meaning through reference to the LF of their antecedent and therefore require a linguistic antecedent in the discourse. Deep anaphoric processes on the other hand acquire their meaning through pragmatic inference, and whether or not they require a linguistic antecedent comes from restrictions on their use in discourse. *Do so* is more restricted than other instances of deep anaphora in that its antecedent must be discourse-old.

<table>
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<tr>
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<th>LF-matching</th>
<th>Pragmatic Inference</th>
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<tbody>
<tr>
<td>Linguistic Control</td>
<td>Surface Anaphora</td>
<td><em>do so</em></td>
</tr>
<tr>
<td>Nonlinguistic Control</td>
<td></td>
<td><em>do it</em></td>
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Table 3: Taxonomy of anaphoric processing

The challenge for this line of argumentation is to find evidence for the distinction between the semantic (i.e. LF) and pragmatic requirements of a linguistic antecedent. Theoretically and analytically the distinction is clear, but empirically it can be quite opaque. One possible avenue to explore is a third class of discourse entities (apart

26K&W do not, however, look into the pragmatic properties of *swa don* in Old English and Higgins does not discuss them either.
from discourse-old and discourse-new) discussed in Prince (1992): inferrables. In their discourse status, inferrables occupy an intermediary position between discourse-old and discourse-new entities, and they arise when the mention of some entity in the discourse evokes the existence of another entity. Take for example, the sentence in (79), where the inferrable in question is the italicized DP, *the door*.

(79) He passed by the Bastille and *the door* was painted purple.  
[Prince 1992:305, ex. (17b)]

In this example, *the door* has not been mentioned previously in the discourse and therefore is not technically discourse-old. However, it is treated as though it is old information (i.e. it has the definite determiner). This is possible due to the part/whole relationship between doors and buildings. If a speaker assumes that the hearer know that the Bastille is a building, he or she can reasonably assume that the hearer knows that the Bastille has a door. This is to say that the mention of the Bastille evokes the existence of its canonical parts, including its door.

In her study of inversion in English, Birner (1992, 1994) shows that while inferrables have a discourse status between discourse-old and discourse-new, in determining when inversion is felicitous, they pattern with discourse-old entities. That is, in their syntax, inferrables behave as if they were discourse-old. Generalizing Birner’s results about inferrables to the domain of VP anaphora, if *do so* is compatible with an antecedent that is inferrable, we have the empirical justification for the distinction made above. Such justification comes from the examples in (80)–(82). The examples in (80) are taken from the American National Corpus.

(80) a. But I notice that in both the biography and your prefaces, you shy away from any feminist indignation on Powell’s behalf. May I do so, just for a sec? (*do so* = engage in feminist indignation)  
[Article247\_3920]

b. There is no protocol mandating the third person for advice columnists. Prudie does so because it feels comfortable, and she has tired of the “I” word. (*do so* = use the third person)  
[ArticleIP\_44138\_D17]

(81) Bats are already on my list of culinary conquests (they’re a delicacy in Pormpruaaw) but I have no desire WHATSOEVER to ever ever do so again. (*do so* = eat bats)

(82) She has informed me that she’ll bring a bottle of wine for her girls. When I asked her not to because I’m not comfortable with it and my kids aren’t allowed to do so, she argued that mine don’t have to.27 (*do so* = drink wine)  
[Dear Abby, 12/26/2007]

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27 In this example, it isn’t immediately clear what the antecedent of VPE in the final clause is (i.e. *she argued that mine don’t have to*). As discussed above, VPE is surface anaphora and requires a linguistic antecedent. Intuitively, the meaning attributed to the elided material in this clause is ‘drink wine’. However, there is no antecedent VP *drink wine* in this example (which is precisely why the example is so interesting). Thus, there is a tension between the meaning attributed to the ellipsis site and the available linguistic antecedents. We can resolve this tension, however, if we take the antecedent of VPE to be *do so* in the preceding clause, making the full structure of this clause *she argued that mine don’t have to do so*. This elided occurrence of *do so* is interpreted through the same mechanism of inference that the overt occurrence is. Allowing this, we arrive at the correct meaning for the ellipsis site: drink wine.
In each of these examples, there is no antecedent VP with the meaning that corresponds to that of *do so*. Instead, the meaning of *do so* is inferred from the previous linguistic context. The exact conditions under which an antecedent for *do so* can be inferred from previously uttered linguistic material is unclear. However, it is clear from these examples that *do so* does not require a linguistic antecedent, and therefore we can conclude that *do so* is not surface anaphora as previously claimed.

This view of the anaphoric processing of *do so* bears a similarity to the analysis of Ward and Kehler (2005), where they conclude that the antecedent of *do so* is determined by pragmatic means (i.e., through reference to the discourse model) and that the ability of a (role) nominal to serve as an antecedent relies on the extent to which the associated event structure of that nominal is salient. Their claim is that a role nominal such as *smoker* or *rider* in (38a) and (38b) are sufficiently transparent and are able to introduce smoking and riding events into the discourse model. Other role nominals such as *computer* or *propeller*, which have more conventionalized meanings that go beyond ‘something that computes’ or ‘something that propels’, are not transparent enough to enter the required event into the discourse model. Presumably, a similar type of “transparency” is responsible for the evocation of the events that serve as the antecedent of *do so* in the examples in (80)–(82), except here it is not a single word that needs to be sufficiently transparent, but rather it is the preceding linguistic context which must be transparent enough to introduce an event into the discourse model which can serve as the antecedent of *do so*.

The second property of *do so* that seems to indicate that it is surface anaphora is that it is compatible with unaccusative antecedents, as shown in (83). This objection to a deep anaphora analysis arises on the standard view that unaccusative subjects originate as the internal argument of the verb;\(^{28}\) if the target of deep anaphora is an atomic unit without syntactic structure, there would be no position for for an internal argument.

(83) a. Ashley fainted at the party, and Maureen did so, too.
    b. Michelle fell down the stairs, and Jill did so, too.

This objection, however, is quite easily dispensed with. As discussed in §1.1, the *do* of *do so* is an intransitive main verb, and if this is so, there is nothing to preclude there from being both an unaccusative and an unergative *do*. The existence of two variants of the verb is quite difficult to prove however. In English, there is little that distinguishes unergatives and unaccusatives syntactically. A potential syntactic diagnostic proposed by (Levin and Hovav 1995) is the ability of unaccusative verbs (along with transitive

\(^{28}\)The view that unaccusative subjects originate as the internal argument of the verb arises, in part, from assumptions about theta role assignment. Following an analysis such as that of Baker (1988), in which arguments receive their theta roles by virtue of occupying specific structural positions (the Uniform Theta Assignment Hypothesis, of UTAH), the only way for the unaccusative subject to get a Theme theta role is for it to originate as the internal argument of the verb and then move into subject position. If, however, we abandon this position and take the view that theta roles are features on the verb, which are imparted to arguments through an Agree relation (see Hornstein 2001:37-42 and references therein), we would no longer be wedded to unaccusative subjects originating as the internal argument of the verb. Instead they could originate in Spec-vP (or Spec-TP) and receive their theta role in that position. On this view, the fact that unaccusatives are compatible with *do so* would be unsurprising. This analysis, however, would face the challenge of explaining how *do so* would assign the correct theta role to its subject in any particular case.
and passive verbs) to appear in the resultative construction, as shown in (84) (their example (19)).

(84) a. The river froze solid.
    b. The prisoners froze to death.
    c. The bottle broke open.
    d. The gate swung shut.

Unergative verbs, however, are only licensed in the resultative construction if they are followed by a reflexive pronoun, as in (85) (their example (3)).

(85) Dora shouted *(herself) hoarse.

Therefore, it should be possible to use the resultative construction as a test for unaccusative do. Unfortunately, as Levin and Rappaport Hovav point out (pg. 49), the resultative phrase behaves as a complement to the verb and thus, cannot be stranded by do so anaphora. This is shown by the examples in (86) (their examples (41b) and (41c)).

(86) a. * Bill fastened the shutters open, and May did so shut.
    b. * The joggers ran the pavement thin, and the runners did so smooth.

Consequently, there is little direct evidence for the claim that there are two versions of the do in do so. However, there is no evidence to the contrary either. Therefore, it remains a valid line of argumentation for explaining why do so is compatible with unaccusatives even if it is deep anaphora.

In this section I have addressed the two pieces of evidence that seemed to point toward do so being surface anaphora, and I have shown these to fall out not from the anaphoric status of do so, but from independent properties of the construction. Thus, a coherent analysis of do so as deep anaphora can be given on closer consideration of these facts.

6 Consequences

Given the discussion in §4 and §5, I conclude that do so is deep anaphora and not surface anaphora as previously claimed. As such, Lakoff and Ross’s (1976) claims about the internal structure of the verb phrase based on do so—and Culicover and Jackendoff’s (2005) objections to these claims—are, in fact, invalid; do so has no bearing on the internal structure of its antecedent VP since it does not targets a constituent node in the derivation, thereby replacing existing structure. Instead, from the beginning of the derivation, do so forms a VP in its own right with do as its head and so as an obligatory adverb. Any PP adverbials that appear to have been “stranded” outside the site of do so anaphora are simply adjuncts to the VP, and as suggested by C&J (pg. 126) are in a contrastive relationship with PP adjuncts in the antecedent VP. The fact that do so does not replace existing structure and leaves adverbials behind is made clear from the examples in (87) where the DPs in the prepositional phrases do not correspond to adjuncts. Rather, they correspond to arguments in the antecedent clause.
In both of these examples the DP in the PP corresponds to the direct object in the antecedent clause, and these DPs are contrastively focused just as the PP adverbials are in previous examples. In, (87a), *filet mignon* contrasts with *hot dog* as the thing that John wouldn't turn down, and in (87b), *beets* contrasts with *cucumbers* as the item Micah chopped. Thus, it appears that these examples are of the same type as examples such as those in (5) where the phrases following *do so* correspond to adjuncts. If *do so* were surface anaphora, however, we now have a problem as the structures that would underlie the sentences in (87) are not grammatical, as shown in (88).

(88) a. *He wouldn’t have turned down flat with the filet mignon.*
   
b. *Micah chopped to the beets into tiny pieces.*

The deep anaphora account of *do so*, on the other hand, handles these data quite easily; the DPs following *do so* in the examples in (87) are simply adjuncts that express contrastive information, and it just happens that that information corresponds to an argument in the antecedent clause. More explicitly, in an example such as (89) the antecedent clause introduces a chopping event into the discourse model. In the normal case where there is no PP adjunct in the *do so* clause the inference is that Micah’s chopping event also involves cucumbers. In (87b), however, the PP adjunct overrides this inference and specifies that beets, not cucumbers, were involved in the chopping event.

(89) Chris chopped the cucumbers into tiny pieces, and Micah did so, too.

As a final note, apart from the empirical objections presented here and in previous sections, there are theory internal reasons why a surface anaphora analysis of *do so* is unappealing. Within Minimalism, surface anaphora is modeled either as deletion (VPE) or deletion plus insertion of a semantically inert proform (Danish VPP). If it were surface anaphora, *do so* would have to be different, however. *Do so* is semantically active; it is restricted in the semantic class of antecedent it can correspond to (see §1.1). Assuming a standard Y-model of syntax like that in Figure 1, in order for this semantic requirement to be enforced at LF *do so* replacement would have to occur during narrow syntax and I am aware of no mechanisms in the theory that would make this possible. No such theoretical objections can be made to the deep anaphora analysis since *do so* does not replace any structure; it is simply present from the start of the derivation, throughout narrow syntax, and into LF where the semantic restriction is checked.

7 Conclusion

In this section I have shown that *do so* is an instance of deep anaphora contra previous claims that it is surface anaphora. To begin, there seemed to be evidence in support of both analyses. The availability of syntactic mismatches and the impossibility of

29Sobin (2008) reaches a similar conclusion.
\[\text{Narrow Syntax} \quad \downarrow \quad \text{PF} \quad \downarrow \quad \text{LF}\]

Figure 1: The Y-model of syntax

\(^{\text{\-}}\)-movement, passive subject movement, and raising all pointed toward do so being deep anaphora. On the other hand, the lack of pragmatic control and the possibility of unaccusative subject movement indicated that do so was a surface anaphor. In the end, however, the evidence against the surface anaphora analysis proved more resilient, while the evidence against do so being deep anaphora found explanations in terms independent of its anaphoric status. As a consequence of do so being a deep anaphor, it has no bearing on the debate of whether the verb phrase has flat or hierarchical structure, and therefore, evidence from do so should not be used as evidence in support of either position. Another consequence of the conclusions of this section is that the results of the diagnostics for deep versus surface anaphora should not be taken at face value. They can give false or conflicting results. Instead, we should examine in detail the syntactic, semantic, and pragmatic properties of the anaphor in question to determine the precise cause of the empirical behavior we observe.

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