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A Unified Analysis of English *do so* and Chinese *zheme zuo* ‘so do’ in a Coordination Construction

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ABSTRACT

The purpose of this paper is threefold: (i) to describe the semantic restrictions imposed on English *do so* (henceforth, DS) anaphor and Chinese *zheme zuo* ‘so do’ (henceforth, SD) anaphor; (ii) to argue that the DS/SD anaphora are not formed through PF deletion but are instead present in underlying representations—more specifically, to propose that an LF-mechanism that is based on the copying of an appropriate function from the antecedent clause onto DS/SD phrases can systematically explain the (un)grammaticality of DS and SD anaphors; and (iii) to argue that, on the basis on various observations, DS and SD anaphors should be classified as instances of deep anaphora. This LF-mechanism can also explain the reason why Á-movement and passive subject movement sentences are impossible with DS/SD phrases. Furthermore, we reveal that (i) *do* in DS and *zuo* ‘do’ in SD function as an intransitive verb and a light verb, respectively; (ii) English *so* and its Chinese counterpart *zheme* ‘so’ function as an adverb and an NP placeholder, respectively; and (iii) the English *so* and the Chinese *zheme* ‘so’ serve the same grammatical function—

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namely, replacing the VP of the antecedent clause. The findings of this study contribute to a deeper understanding of the syntactic and semantic properties of DS and SD anaphors.

Keywords: Do So; *Zheme Zuo* ‘So Do’; Deep Anaphor; Intransitive Verb; Manner Adverb; Semantic Composition; Appropriate f(e) Copy; LF-Analysis

1. Introduction

in the coordination clause, as shown in (1) (taken from

English *do so* anaphor can replace a variety of targets Houser (2010))^[1].

- (1) a. I [ate an apple yesterday in the park], and Moira did so, too.
 b. I [ate an apple yesterday] in the park, and Moira did so in the garden.
 c. I [ate an apple] yesterday [in the park], and Moira did so today.
 d. Robin [slept] for twelve hours [in the bunkbed], and Leslie did so for eight hours.

Concretely, DS can replace (i) the whole Predicate (1a), (ii) the remainder of the Predicate apart from a contrasting adjunct (1b), or (iii) the remainder of the Predicate apart from an adjacent adjunct, that is, a non-constituent (1c–d). Chinese *zheme zuo* ‘so do’ anaphor, which is the counterpart of DS, also has similar flexibilities to DS in the types of its antecedent verb phrase, as shown in (2) ((2a), (2b), and (2c) are taken from Wei and Li (2016: (16b), (16a), (20c)), respectively)^[2].

- (2) a. *Zhangsan zuotian nian-LE na-ben shu, Mali ye zheme zuo-LE.*
 Zhangsan yesterday read-le that-CL book Mary also so do-le
 ‘Zhangsan read the book yesterday; Mary did so, too.’
 b. *Zhangsan zai tushuguan nian shengjing, Mali zai jiali ye zheme zuo.*
 Zhangsan at library read bible Mary at home also so do
 ‘Zhangsan read the bible at the library; Mary also did so at home.’

Concretely, DS can replace (i) the whole Predicate (2a), (ii) the remainder of the Predicate apart from a contrastive adjunct (2b) (See Houser (2010: 21–22) for additional instances)^[1]. Meanwhile, passivization (3a), *wh*-movement (3b–c), and topicalization (3d) from within the verb phrase are unavailable with DS (See Houser (2010: 21–22) for additional instances)^[1]. Moreover, DS must include any elements corresponding to a complement in the antecedent clause (3f) ((3a), (3c), (3d), (4e), (4f) are taken from (44), (39a), (39b), (40), (5e) of Houser (2019)^[1], respectively, and (3b) taken from Bruening (2019: (123))^[2]).

- (3) a. * The vase was broken by the children, and the jar was done so, too.
 b. * I know which book Harry read and which book Bill did so.
 c. * I don’t know which puppy you should adopt, but I know [which one] you shouldn’t do so.
 d. * I don’t know who Tom did go to a movie with, but I know [who] he didn’t do so.
 e. * I think the BLUE papers Pete should sign, and I think [the GREEN ones] Jan should do so.
 f. * I [ate] an apple yesterday in the park, and Moira did so an orange today in the garden.

SD patterns with DS. Passivization (4a), *wh*-movement (4b), and topicalization (4c) from within the verb phrase are unavailable with SD, and SD cannot replace a verb alone while excluding the frequency adverb phrase *three times* that is a complement (4d) ((4a), (4b), and (4c) are taken from (36), (35), (20) of Wei and Li (2016)^[3], respectively).

- (4) a. * *Zhangsan bei [(Lisi) ma], Mali ye bei zheme zuo.*
 Zhangsan BEI Lisi scold Mary also BEI so do
 ‘(Intended) Zhangsan was scolded (by Lisi), *Mary was done so as well.’
 b. * *Wo zhidao hali dule na ben shu, ye zhidao bier zheme zuo.*
 I know Harry read which book, also know Bill did so.
 ‘I know Harry read which book and Bill did so.’
 c. * *juzi, wo xiwang ta manman chi; *pingguo, wo xiwang ta ye zheme zuo.*
 orange, I hope he slowly eat apple I hope he also so do
 ‘Oranges, I hope that he slowly eats (them); *apples, I hope that he does so as well.’
 d. * *Zhangsan nian-LE san-ci, Mali zheme zuo-LE si-ci.*
 Zhangsan read-le three-times Mary so do-le four-times
 ‘Zhangsan read three times; Mary did so four times.’

((i) Postverbal non-subcategorized complements in Chinese include duration phrases, frequency phrases, and purposive phrases. For more details, see Wei and Li (2016: 191)^[3]. (ii) A null object *pro* is present following the verb *nian* ‘read’ in (4d))

The purpose of this work is to demonstrate that, focusing on passive subject movement and $\bar{A}$ -movement, SD anaphora as well as DS anaphora do not replace any verb

phrase structure but instead project a verb phrase independently from the outset of the derivation, so that they are instances of deep anaphora rather than surface anaphora.

Surface anaphora refers to a type of anaphora in which one or more linguistic elements in a postcedent clause are identical to those in an antecedent clause and are replaced by an anaphor (Houser (2010)^[1], and Hankamer and Sag (1976)^[4]), as in an instance (1) of English *do it* anaphora.

- (5) Steve has eaten an apple, and John has done it(=eaten an apple), too.

In contrast, *Deep anaphora* refers to a type of anaphora that is controlled nonlinguistically, i.e., pragmatically (Houser (2010)^[1], and Hankamer and Sag (1976)^[4]), as in an instance

(6) of English *do so* anaphora ((6) is taken from Houser (2010: (73))^[1] (According to Houser (2010)^[1], this anaphora is permissible in a pragmatically inferred context).

- (6) There is no protocol mandating the third person for advice columnists. Prudie does so because it feels comfortable, and she is tired of the “I” word. (do so=use the third person).

To achieve this purpose, Section 2 introduces the semantic restrictions on DS and SD anaphora in coordinate clauses. Section 3 discusses how the internal structure of DS/SD is derived and which element it is that replaces VP, followed by Section 4, which examines their formation aspects. Finally, Section 5 concludes the paper.

2. The Semantic Restrictions on DS and SD

As Lakoff (1966) discusses the examples in (7) below^[5], he argues that DS is only possible with a non-stative antecedent, not a stative antecedent ((7) is taken from Lakoff (1966: 12))^[5]. This argument is further supported by Lakoff and Ross (1976)^[6], and Kehler and Ward (1999, 2004)^[7,8].

- (7) a. I learned the answer, although Bill told me not to do so.
 b. * I knew the answer, although Bill told me not to do so.

In contrast, Houser (2010: 34q)^[1] and Wee (2019: in (8a) and (8b), respectively (the wavy-underlined verb (22))^[9] report that DS construction allows a stative antecedent and a non-agentive stative antecedent, as shown (refers to the antecedent of DS)).

- (8) a. Landsburg attempts, by economic sleight of hand, to argue that racism does not exist in corporate America because it would not be in its bottom-line interest for it to do so.
 b. All the children resemble their mother's relations more closely than they do their father's. They are thought to do so on account of the genetic effects of this curious kinship system.

Culicover and Jackendoff (2005) make a three-way distinction: state, non-action event, and action event^[10], and they claim that DS occurs only with an agentive-action event as in (9) below ((9) is taken from Culicover & Jackendoff (2005: 284(2))^[10] (We can observe that DS is not possible with the stative antecedent verb 'dislike'. We will investigate what types of stative antecedent verbs the DS is compatible with in the future).

- (9) a. * Robin dislikes Ozzie, but Leslie does not do so. [Stative]
 b. Robin read the newspaper today, but Leslie didn't do so. [Action event]
 c. * Robin fell out the window, but Leslie did not do so. [Non-action event]

However, this condition is not exception-free. Huddleston and Pullum (2002)^[10] report that contra Culicover and Jackendoff (2005)^[11], DS can occur with a non-agentive action event, as shown in (10) below ((10) is taken from Huddleston & Pullum (2002: 1532)^[10] (Houser (2010: 43) notes that action/nonaction distinction is related to agentivity, given that the action predicates (e.g. run, read, think about) are agentive, while nonaction predicates (e.g. fall, grow, strike as, realize) are nonagentive^[1]).

- (10) When the tree fell, it did so with a loud crash.

In the end, as unaccusative sentences are compatible with DS, we add a theme subject to these thematic events, as shown in (11) below ((11) is taken from Hallman (2013: 50a–b))^[12].

- (11) a. The river froze solid, and the pond did so, too.
 b. The towels dripped dry, and the socks did so, too.

In short, DS can represent non-stative, stative (depending on situations), non-agentive stative, agentive-action, agentive, and theme events (Wee (2020) states that *do so* phrases denote atelic events^[9]. See Wee (2020) for details^[9]). agentive predicates or activity and accomplishment predicates in Vendler's (1967)^[13] verb type classification—but it cannot be anaphoric to stative or achievement verbs. Let us first start with the sentences in (12) and (13) in which activity and accomplishment verbs are used ((12) and (13) are taken from Wei and Li (2016: (11)) and Wei and Li (2016: (12)^[3], respectively).

Wei and Li (2016: 188)^[3] state that SD can be anaphoric to verbs that occur in commands—specifically,

- (12) a. *Zhangsan xie(-wan) zhe baogao-LE, Mali ye zheme zuo(-LE).*
 Zhangsan write-finish this report LE Mary also so do(-LE)
 'Zhangsan wrote (and finished) the report; Mary did so, too'
 b. *xie(-wan) zhe baogao!*
 'Write and finish this report!'

- (13) a. *Zhangsan qi-si-LE baba, Lisi ye zheme zuo.*
 Zhangsan anger-dead-LE father, Lisi also so do
 '(Intended) Zhangsan angered his father to death, and Lisi did so.'
 b. *qi-si ta!*

anger-dead him
‘Anger him to death!’

The activity verb phrase *xie(-wan)* ‘(finish) writing’ which stative and achievement verbs are used ((14) and in (12a) and the accomplishment verb phrase *qi-si* ‘ang- (15) are taken from Wei and Li (2016: (9)) and Wei and gry to death’ in (13a) are used in imperatives, as in (12b) and (13b). The sentences (14) and (15) below are ones in Li (2016: (10) ^[3], respectively).

- (14) a. *Zhangsan zhidao daan, *Lisi ye zheme zuo.*
Zhangsan know answer Lisi also so do
‘Zhangsan knows the answer; *Lisi also does so.’
b. **zhidao daan!*
know answer

- (15) a. *Zhangsan daoda bowuguan-LE, *Lisi zheme zuo-LE.*
Zhangsan arrive.at museum LF Lisi so do-LE
‘Zhangsan arrived at the museum; *Lisi also did so.’
b. **daoda bowuguan!*
arrive.at museum

SD in these sentences cannot function as an anaphor to the stative verb *zhidao* ‘know’ in (14a) or the achievement verb *daoda* ‘arrive’ in (15a) as both violate the relevant restriction (See Wei and Li (2016: 189–190) for additionally (un)grammatical examples ^[3]). In the next section 3, we will discuss how the internal structure of DS/SD is derived and which element it is that replaces VP.

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

However, multiple pieces of evidence point to *do* in DS behaving as a main verb rather than an auxiliary. The first piece of evidence is that, if *do* in DS were an auxiliary, it would be expected to raise to T. This prediction is not

- (17) a. *I ran for five minutes, but Luke did not so.
b. I ran for five minutes, but Luke did not do so.

The second piece of evidence supporting the analysis of *do* in DS as a main verb is that it does not undergo subject–auxiliary inversion in the formation of polar ques-

- (18) a. *I ate my sandwich in one sitting, but did Grant so?

3. Analyses of the Internal Structure of DS/SD

3.1. The Syntactic Category of *do*

The syntactic category *do* in DS is a main verb, more specifically, an intransitive verb. The reasoning for this argument is as follows. At first glance, one might consider example (16) as evidence that *do* of DS functions as an auxiliary verb, given that auxiliaries typically do not take nominal complements ((16) is taken from Houser (2010: (16)) ^[1]).

borne out, as illustrated in (17a): *do* in DS cannot appear to the left of negation. Instead, *do*-support is required to supply phonological content to T, as shown in (17b) ((17) is taken from Houser (2010: (20)) ^[1]).

tions, as illustrated in (18a). As with (17b), *do*-support is necessary to supply phonological content to T, as shown in (18b) ((18) is taken from Houser (2010: (21)) ^[1]).

- b. I ate my sandwich in one sitting, but did Grant do so?

The final piece of evidence indicating that *do* in DS other auxiliaries, as demonstrated in (19) (taken from functions as a main verb is that it does not alternate with Houser (2010: (22))^[1]).

- (19) 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.

Taken together, these empirical facts indicate that the *do* of DS is not an auxiliary verb but an intransitive verb. Let us examine what the category of *so* is in what follows.

3.2. The Syntactic Category of *so*

The syntactic category *so* in DS is an adverb. A range

of empirical evidence for this argument is as follows. The first piece of evidence for the *so* of DS of being an adverb is that the *so*, as can other adverbs, can appear in immediate preverbal position, as shown in (20) (taken from Bouton (1970: (33a))^[14]).

- (20) Rick was told to have his work in on time, and he will so do—or flunk!

The second piece of evidence for the *so* of DS of being an adverb is that in the previous subsection, we got to the conclusion that the *so* of DS is an intransitive verb, which implies that the *so* is an adverb. Additionally, there are data (21) to note (taken from Houser (2010: 6))^[1].

- (21) a. Tonya danced wildly, and she did so because she was swept away by the music.
b. Tonya danced, and she did so because she was swept away by the music.

It can be observed that there is a manner component in the antecedent in (21a), whereas there is not in (21b). These data indicate that *so* in DS functions anaphorically, referring to the event kind denoted by the verb phrase. Concretely, when the antecedent of DS is not modified by an adverb, as in (21b), repeated in (22), DS refers to a particular event kind, for instance, *dancing*, in (21b).

- (22) Tonya danced, and she did so because she was swept away by the music.

When the antecedent of DS is modified by an adverb, as in (21a), repeated in (23), the *so* refers to a more specific event kind (*wild dancing* here).

- (23) Tonya danced wildly, and she did so because she was swept away by the music.

In summary, multiple lines of empirical evidence indicate that the syntactic category of the *so* of DS is an adverb and that, semantically, the *so* is anaphoric to an event-kind anaphor in terms of semantics.

3.3. The Internal Structure of DS

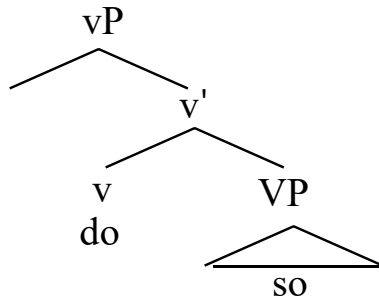
Stroik (2001)^[15], in an internal structure analysis of DS, argues that *do* functions as a functional category *v* that has a morphophonetic and a semantic justification, and that *so* is the VP complement of *do*, based on an interrogative sentence such as (24) and relative clauses such as (25) ((24) is taken from Stroik (2001: (6))^[15], and (25) taken from Stroik (2001: (7) and (8))^[15]).

- (24) a. What are you doing?
b. Eating the leftovers.

- (25) a. Ted left, which he shouldn't have done.
b. Pat had read a book, which is what Sam had done too.

In the interrogative sentence (24), the complement of *do*—a *wh*-word—undergoes movement to the clause-initial position. The response to the question word *what* in (24a) ranges over the verb phrase *eating the leftovers*. Analogously, the relative pronouns in (25) take the verb phrases in the main clauses as their antecedents. Based on these observations, Stroik concludes that these *wh*-words function as replacements for VPs, and by extension, the *so* of DS also replaces a VP, whereby the *do* is the functional category *v*.

- (26) vP-internal structure of DS



However, the reasoning behind structure (26) encounters two problems: (i) *so* can appear in immediate preverbal position, as shown in (27) ((27a) and (27b) are taken from Bouton (1970: (33a))^[14] and Cornish (1992: (19d))^[16]), respectively. This is a piece of evidence against *so* being a noun and rather, for *so* being an adverb ((27a, b) indicate that Haddican (2007) 's argument that *so* is merged not in V, but is a nominal complement that incorporates into the matrix V is not on the right track^[17]).

- (27) a. Rick was told to have his work in on time, and he will so do—or flunk!
b. He went on to claim that the allegedly [high-spending] Labour authorities had, by so doing, damaged industry and lost jobs.

(ii) *so* can't be the subject of a sentence with a passive verb (28a) (taken from Bouton (1970: (9b))^[14]) or tough predicate (28b) (taken from Bouton (1970: (15b))^[14]); it can intervene between verb and subject, while other nominals cannot (28c) (taken from Bouton (1970: (19b))^[14]).

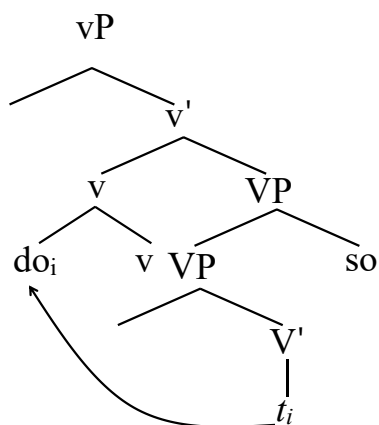
- (28) a. Someone broke our front window, and we think that {it/*so} was done sometime around noon.
b. Mary wants us to have a party but {it/*so} will be hard to do at this time of year.
c. Jeremy had been planning to propose to Marilyn for several weeks, but the doing of {it/*so} in public he hadn't counted on.

These observations indicate that *so* behaves more like an adverb than a nominal. As an alternative analysis, based on the *Cambridge Dictionary* (29) as well as the discussion in the sub-sections 3.1 and 3.2, we assume that (i) the *do* functions as an intransitive verb and (ii) the *so* operates as a manner adverb, shortly, DS has the vP-internal structure of (30).

- (29) <https://dictionary.cambridge.org>.

DS is defined as “to act in the manner previously mentioned”

(30) The internal structure of DS



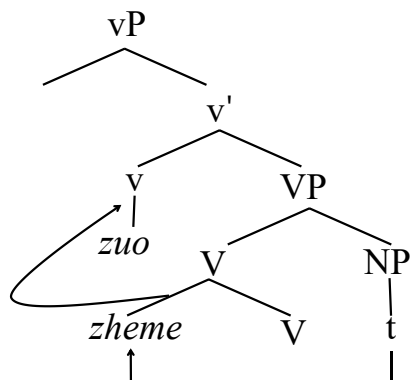
(do adjoins to v to check the [Vform] of the light verb. Adger (2003) argues that the functional category v, which bears an unvalued uninterpretable verb feature ([uv:]), enters into an Agree relationship with a verb bearing [iV], being valued as [v:V] by the verb. See Adger (2003: 18¹) for detail^s.^[18])

3.4. The Internal Structure of SD: Wei and Li (2016)

Wei and Li (2016)^[3] assume that the formation of SD

involves the following three steps: (i) first, the word *zheme* ‘so’, the counterpart of the English *so*, is first base-generated at the complement NP position of the VP, (ii) it is then incorporated into the verb, and (iii) the resulting incorporated verb undergoes V-to-v movement, yielding the surface word order *zheme zuo* ‘so do’. A tree structure representing these derivational processes is shown in (31) below (taken from Wei and Li (2016: (44)^[3]) (See Wei and Li (2016:198–203) for details^[3], including the observation that *zuo* ‘do’ is a light verb.).

(31) Structure of *zheme-zuo*



An important consequence drawn from this analysis is that (i) the overt morpheme *zheme* ‘so’ can be understood as representing a VP and (ii) *zuo* ‘do’ is a light verb.

To recapitulate this section: (i) *do* in DS and *zuo* ‘do’ in SD function as an intransitive verb and a light verb, respectively; (ii) the English *so* and its Chinese counterpart *zheme* ‘so’ function as an adverb and an NP placeholder, respectively; and (iii) the English *so* and Chinese *zheme* ‘so’

serve the same grammatical function, namely, replacing the VP of the antecedent clause.

4. DS/SD as Deep Anaphora

In this section, we will argue that DS/SD are deep anaphors and further will reveal a condition that influences the grammaticality and ungrammaticality of these

anaphors.

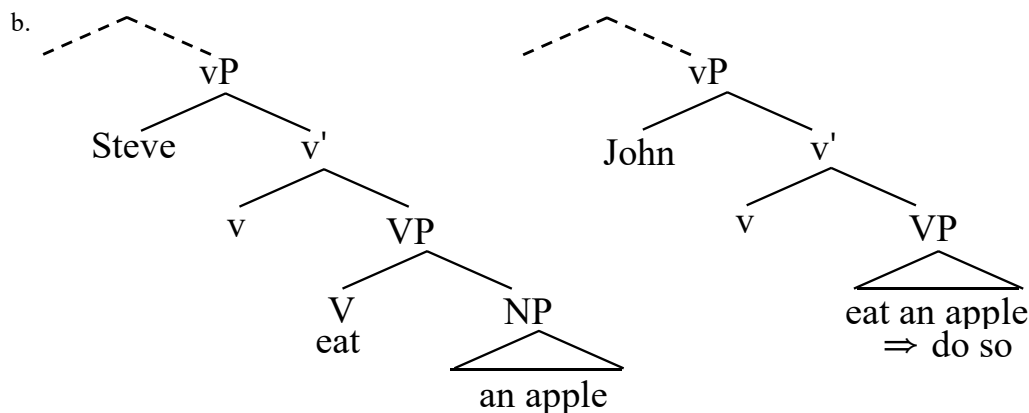
4.1. Against PF-Deletion Approach

Hankamer and Sag (1976: 419) define surface anaphora as an anaphor that is derived transformationally by PF-deletion and Hankamer and Sag (ibid.: 421) note that surface anaphor requires superficial syntactic identity of structure between the antecedent segment and the segment

to be anaphorized, but does not necessitate that the anaphor correspond to a coherent semantic unit ^[4]. They further argue that DS is surface anaphor, i.e., DS is derived via PF-deletion. However, we will demonstrate that a PF-deletion do not have bearing on DS/SD anaphora, centering on passive subject movement and Á-movement.

Let us analyze whether PF-deletion is involved in the formation aspect of DS/SD, starting with (32a).

(32) a. Steve has eaten an apple, and John has [eaten an apple=done so], too.

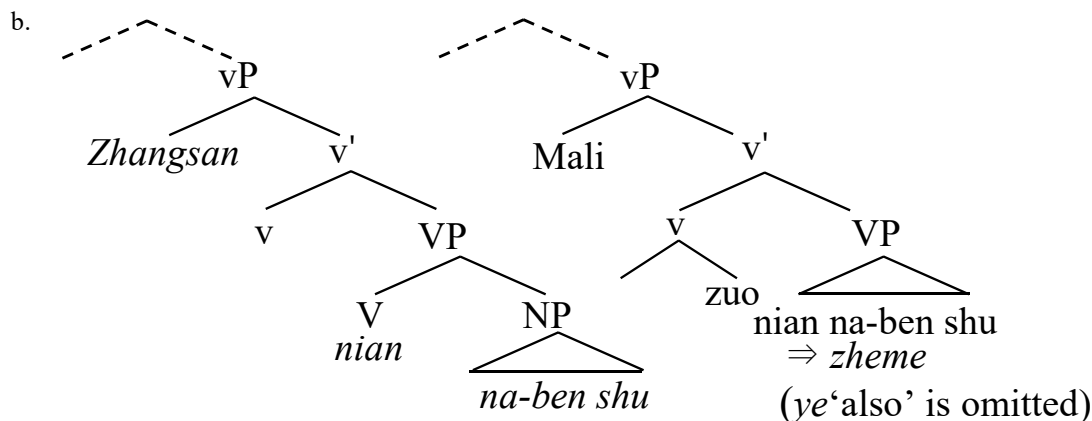


According to the PF-deletion approach, DS in (32a) will be formed through the processes in (32b). Specifically, the VP in the postcedent clause is identical to the VP in the antecedent clause in terms of syntactic structure and semantics. As a result, the VP *eat an apple* in the postcedent clause is subject to deletion at PF, after which *do so* is introduced into the VP position that un-

derwent deletion (Merchant (2001, 2008) assumes that VP-ellipsis is derived by PF-deletion under the syntactic identity condition ^[19, 20]. Refer to Merchant (2001, 2008) with respect to the licensing condition on VP ellipsis ^[19, 20]). Below (33a) is a Chinese sentence corresponding to the (32) above and the SD will be formed through the processes as in (33b).

(33) a. *Zhangsan nian-LE na-ben shu, Mali ye zheme zuo-LE.*

Zhangsan read-le that-CL book Mary also so do-le
'Zhangsan read the book; Mary did so, too.'

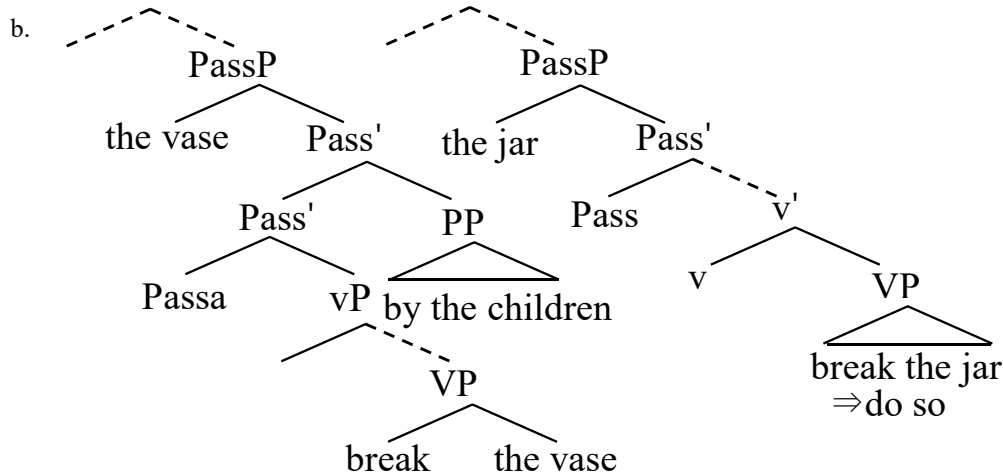


Specifically, the VP in the postcedent clause is identical to the VP in the antecedent clause in terms of syntactic structure and semantics, so that VP *nian-le na-ben shu* ‘read the book’ in the postcedent clause is subject to deletion at PF, after which *zheme zuo* ‘so do’ is introduced into the VP

position that underwent deletion.

The PF-deletion approach can also explain the ungrammaticality of a passive DS (3a=34a) and a passive SD (4a=35a) below (regarding the analysis of Chinese passivization, we follow Pan and Hu (2022) ^[21]).

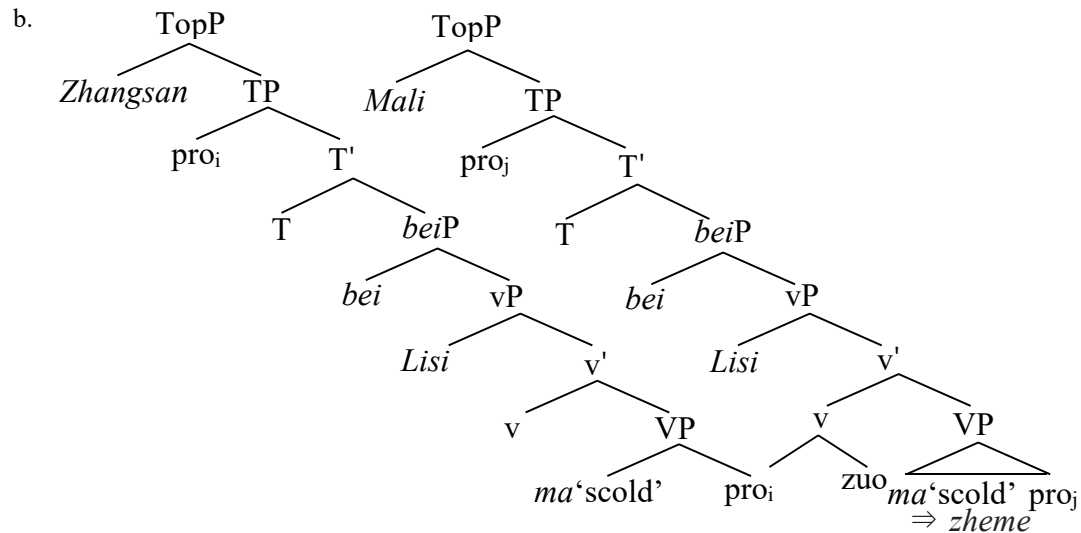
- (34) a. * The vase was broken by the children, and the jar was done so, too.



- (35) a. * *Zhangsan bei Lisi ma, Mali ye bei zheme zuo.*

Zhangsan BEI Lisi scold Mary also BEI so do

‘(Intended) Zhangsan was scolded by Lisi, Mary was done so as well.



(34a) and (35a), after PF-deletion, involve DS replacement processes as in (34b) and (35b), respectively. As can be seen in (34b) and (35b), semantic identity does not hold between the VP in the antecedent clause and the counterpart in the postcedent clause. Thus, they turn out to be ill-

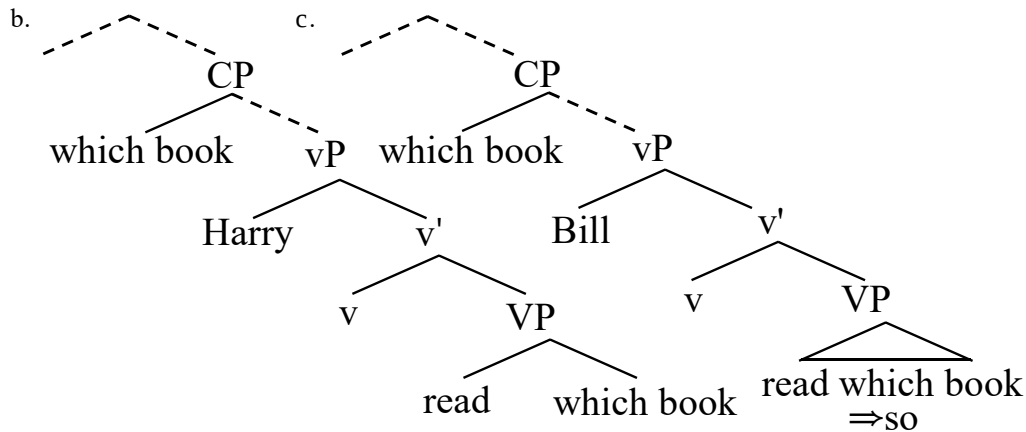
formed.

The PF-deletion mechanism works well with (34) and (35). But the mechanism cannot carry over to explanation for the ungrammaticality of Á-movement sentences containing DS, as shown in (36) (taken from (3)).

- (36) a. * I know which book Harry read and which book Bill did so.
 b. * I don't know which puppy you should adopt, but I know [which one] you shouldn't do so.
 c. * I don't know who Tom did go to a movie with, but I know [who] he didn't do so.
 d. * I think the BLUE papers Pete should sign, and I think [the GREEN ones] Jan should do so.

Let us discern the reason, taking (36a) as a representative example. It will involve PF-deletion and DS replacement processes as in (37b).

- (37) a. * I know which book Harry read and which book Bill did so.



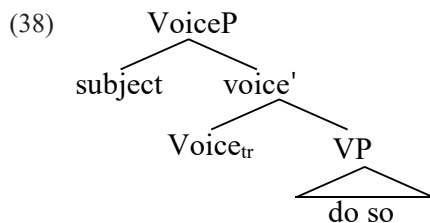
Structural parallelism and semantic identity holds in the VP projection level of both clauses, and furthermore, the same DP *which book* is copy-moved in both clauses. Given these points, (37a) is expected to be perfectly grammatical contrary to fact. This means that the PF-deletion approach is rendered untenable. SD follows suit.

To recapitulate section 4.1, DS/SD anaphora in the case of Á-movement and passive subject movement sentences not replace any structure within the verb phrase. Rather, they constitute a verb phrase in their own right from the outset of the derivation. They do not have any bearing on PF-deletion. An alternative way for analyzing (un)grammaticality of them is required.

4.2. Proposal: LF Analysis

We discussed in the preceding section that DS/SD is base-generated as it is, rather than derived via PF-deletion of a VP licensed by an antecedent. In this section, we will account for the reason why Á-movement and passive subject movement sentences are impossible with DS/SD by employing Bruening's (2019) LF-approach as an alternative to PF-deletion^[2].

Bruening (2019)^[2] proposes that (i) *do so* is VP and the semantic value of the VoiceP of DS is simply $\lambda e.f(e)$ (i.e, a function that takes an argument event *e* and returns a function into which this event is fed) and (ii) it is also a VP, which necessarily combines with Voice. If this is active Voice_{tr}, an initiator, is added, as shown in (38) (taken from Bruening (2019: 88)^[2]).



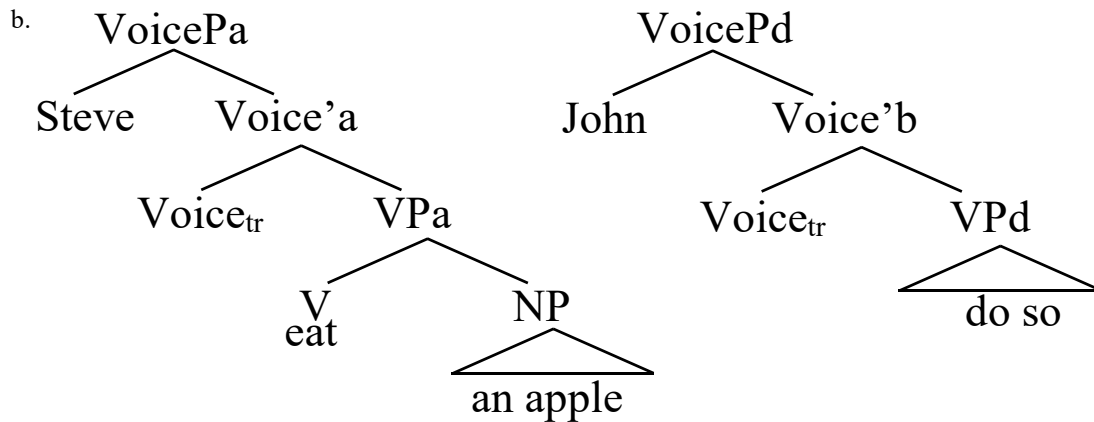
- a. $[[VP \text{ do so}]] = \lambda e.f(e)$
- b. $[[Voice']] = \lambda x \lambda e.f(e) \ \& \ \text{Init}(e, x)$ (Init=initiator)
- c. $[[VoiceP]] = \lambda e.f(e) \ \& \ \text{Init}(e, \text{subject})$

He notes further that as the compositional semantics is constructed, $f(e)$ in the postcedent clause should be replaced with an appropriate function from the antecedent clause. In other words, an appropriate function from the antecedent clause should be copied onto $f(e)$ in the postcedent clause.

We will explain the (un)grammaticality of the DS/SD anaphora that have been observed so far using the semantic composition principle of (38). To see how the semantic compositions of DS/SD are made, let us take (32) as an

example, repeated in (39a). (39b) shows syntax structures for the antecedent and postcedent clauses of (39a), and (40) illustrates the concrete processes by which the semantic compositions of the antecedent and postcedent clauses are calculated at the LF structure (the head performs lambda abstraction, so that “ λx ” is part of the denotation of the head. We mark the relevant node of the antecedent as “vPa” or “VPa” (and so on), and the one in the structure of DS/SD as “vPd” or “VPd” (and so on).

(39) a. Steve has eaten an apple, and John has [eaten an apple=done so], too.



(40) [semantic composition processes of the antecedent clause]

- a. $[[VPa]] = \lambda e.eat(e, \text{an apple})$
- b. $[[Voice'a]] = \lambda x \lambda e.eat(e, \text{an apple}) \ \& \ \text{Init}(e, x)$
- c. $[[VoicePa]] = \lambda e.eat(e, \text{an apple}) \ \& \ \text{Init}(e, \text{Steve})$ < x that is abstracted over is bound by *Steve*>

[semantic composition processes of the postcedent clause]

- d. $[[VPd]] = \lambda e.f(e)$
- e. $[[Voice'b]] = \lambda y \lambda e.f(e) \ \& \ \text{Init}(e, y)$
- f. $[[VoicePd]] = \lambda e.f(e) \ \& \ \text{Init}(e, \text{John})$ < y that is abstracted over is bound by *John*>
- g. $[[VoicePd]] = \lambda e.eat(e, \text{an apple}) \ \& \ (e, \text{John})$ (the copying of the function “ $eat(e, \text{an apple})$ ” of the antecedent VP onto the $f(e)$)

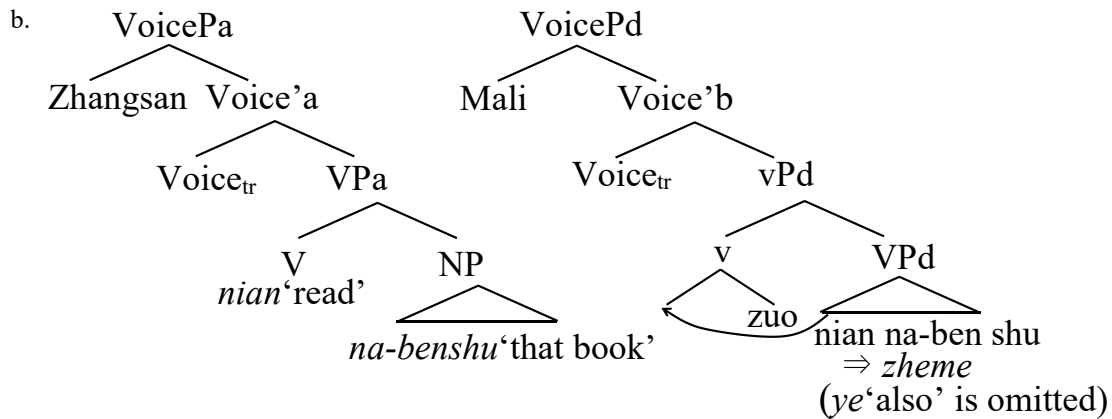
As the semantic compositions are constructed, the function $f(e)$ in the denotation of vPd should be replaced with an appropriate function in order to derive a complete semantics of the postcedent clause. The function f that re-

places $f(e)$ should originate from a VPa that corresponds to DS. The copying of the function “ $eat(e, \text{an apple})$ ” of the antecedent VP onto the $f(e)$ yields correct semantics of VoicePd.

Let us apply the ‘semantic compositions plus an appropriate function copy mechanism’ to the well-formed sentence in (33), repeated in (46a). (41b) shows syntax structures for the antecedent and postcedent clauses of

(41a), and (42) illustrates the concrete processes by which the semantic compositions of the antecedent and postcedent clauses are calculated at the LF structure.

- (41) a. Zhangsan nian-LE na-ben shu, Mali ye zheme zuo-LE.
 Zhangsan read-le that-CL book Mary also so do-le
 ‘Zhangsan read the book; Mary did so, too.’



- (42) [semantic composition processes of the antecedent clause]

- [[VPa]] = $\lambda e. nian'read'(e, na-ben shu 'that book')$
 - [[Voice'a]] = $\lambda x \lambda e. nian'read'(e, na-ben shu 'that book') \& Init(e, x)$
 - [[VoicePa]] = $\lambda e. nian'read'(e, na-ben shu 'that book') \& Init(e, Zhangsan) < x \text{ that is abstracted over is bound by Steve} >$
- d. [semantic composition processes of the postcedent clause]
- [[VPd]] = $\lambda e. f(e)$
 - [[Voice'd]] = $\lambda y \lambda e. f(e) \& Init(e, y)$
 - [[VoicePd]] = $\lambda e. f(e) \& Init(e, Mali'Mary') < y \text{ that is abstracted over is bound by Mali'Mary'} >$
 - [[VoicePd]] = $\lambda e. nian'read'(e, na-ben shu 'that book') \& (e, Mali'Mary')$ (the copying of the function “*nian'read'*” of the antecedent VP onto the $f(e)$)

As the semantic compositions are constructed, the function $f(e)$ in the denotation of VoicePd should be replaced with an appropriate function in order to derive a complete semantics of the postcedent clause. The function f that replaces $f(e)$ should originate from a VPa that corre-

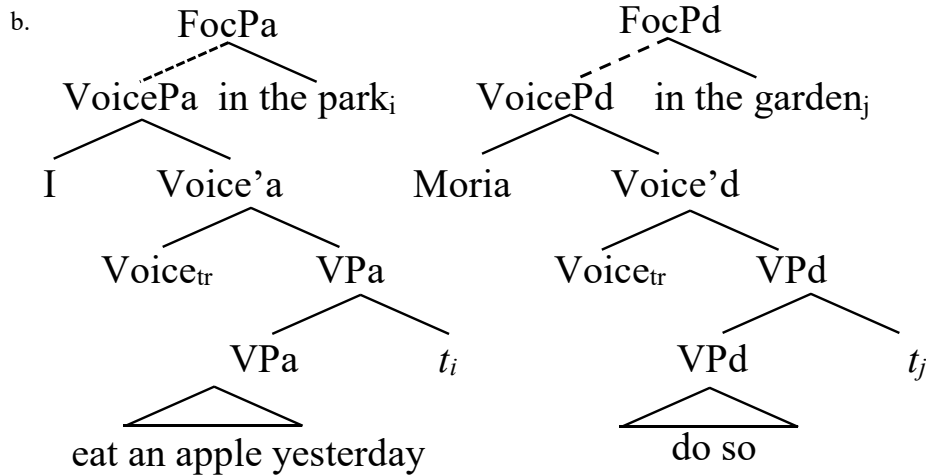
sponds to DS. The copying of the function “*nian'read'*($e, na-ben shu$ ‘that book’)” of the antecedent VP onto the $f(e)$ yields correct semantics of VoicePd. This mechanism can explain the grammaticality contrast between (43a–d) and (43e) (taken from Houser (2010: 2)^[1]).

- (43) a. I [ate an apple yesterday in the park], and Moira did so, too.
 b. I [ate an apple yesterday] in the park, and Moira did so in the garden.
 c. I [ate an apple] yesterday [in the park], and Moira did so today.
 d. Robin [slept] for twelve hours [in the bunkbed], and Leslie did so for eight hours.
 e. * I [ate] an apple yesterday in the park, and Moira did so an orange today in the garden.

To begin with, let us consider (43b), repeated in (44a). (44b) shows syntax structures for the antecedent and postcedent clauses of (44a), with (45) illustrating the con-

crete processes by which the semantic compositions of the antecedent and postcedent clauses are calculated at the LF structure.

(44) a. I [ate an apple yesterday] in the park, and Moira did so in the garden.



(45) [semantic composition processes of the antecedent clause]

- a. $[[VPa]] = \lambda e. \text{eat}(e) \wedge \text{object}(e) \wedge \text{time}(e)$ (e, an apple yesterday)
- b. $[[\text{Voice}'a]] = \lambda x \lambda e. \text{eat}(e) \wedge \text{object}(e) \wedge \text{time}(e)$ (e, an apple yesterday) & $\text{Init}(e, x)$
- c. $[[\text{VoicePa}]] = \lambda e. \text{eat}(e) \wedge \text{object}(e) \wedge \text{time}(e)$ (e, an apple yesterday) & $\text{Init}(e, I) < x$ that is abstracted over is bound by I)
- d. ...

[semantic composition processes of the postcedent clause]

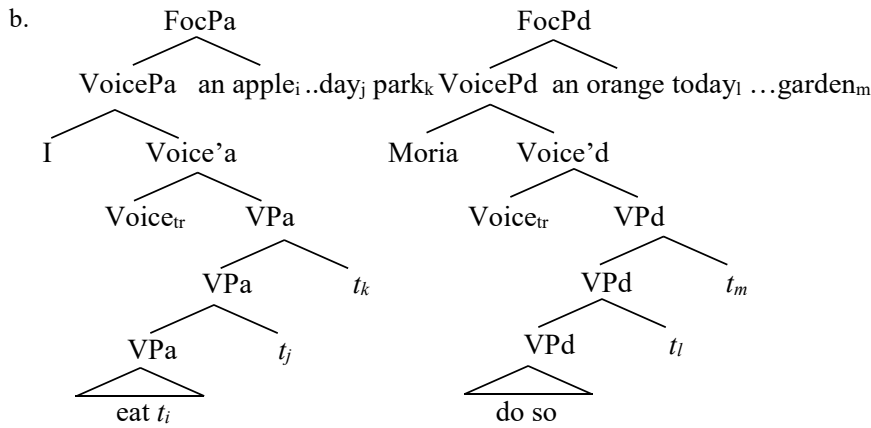
- e. $[[VPd]] = \lambda e. f(e)$
- f. $[[\text{Voice}'d]] = \lambda y \lambda e. f(e) \wedge \text{Init}(e, y)$
- g. $[[\text{VoicePd}]] = \lambda e. f(e) \wedge \text{Init}(e, \text{Moira}) < y$ that is abstracted over is bound by *Moira* >
- h. $[[\text{VoicePd}]] = \lambda e. \text{eat}(e) \wedge \text{object}(e) \wedge \text{time}(e)$ (e, an apple yesterday) & $\text{Init}(e, \text{Moira})$ (the copying of the function “eat(e) ^ object(e) ^ time(e) (e, an apple yesterday)” of the antecedent VP onto the $f(e)$)
- i. ...

As noted earlier, the function $f(e)$ in the denotation of VoicePd must be replaced by an appropriate function from the antecedent clause in order for semantic compositions to be fully read off in the postcedent clause. The copying of the function “eat(e) ^ object(e) ^ time(e)” of the antecedent VP onto the $f(e)$ yields correct semantics of VoicePd. Additionally, another consideration is the obligatory reconstruction of A-bar movement—such as for the purpose of binding R-expressions within the moved phrase, and in contrast, A-movement does not require such reconstruction

(Lebeaux 1988^[22]; Lebeaux 2009^[23]; Chomsky 1995^[24]; Fox 1999^[25]; Takahashi and Hulsey 2009^[26]). This condition is satisfied because the trace t_j that is abstracted over can be legitimately bound by the contrastive focus element *in the garden*.

Subsequently, let us analyze a factor leading to the ungrammaticality in (43e), repeated in (46a). In order to meet parallelism between the antecedent and postcedent clauses, syntactic configuration for (46a) should be (46b).

(46) a. * I [ate] an apple yesterday in the park, and Moira did so an orange today in the garden.

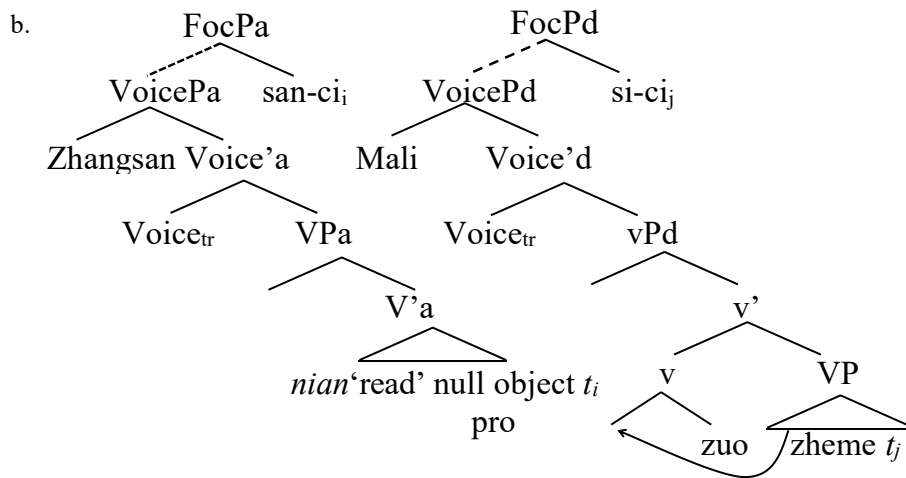


But syntactic configuration faces one problem: there is no available argument position for *the orange* that underwent A-bar movement to be reconstructed into in the postcedent clause. In other words, the postcedent clause lacks a syntactic circumstance that may accommodate the A-bar relocated element. Thus, (46a) is grammatically incorrect. This internal structure (that cannot be accessed syntactically) naturally leads us to predict that DS/SD constructions with an adjunct(s) that are contrastively focused

are well-formed. This prediction is borne out, as previously observed in the (43a–d).

(47a), which is repeated from (4d), is a sentence in which SD stands in for only the verb and ungrammaticality occurs. (47b) shows syntactic structures for the antecedent and postcedent clauses of (47a), with (48) illustrating the concrete processes by which the semantic composition of (47b, c) is calculated at the LF-structure.

(47) a. * *Zhangsan nian-LE san-ci, Mali zheme zuo-LE si-ci.*
 Zhangsan read-LE three-times Mary so do-LE four-times
 ‘Zhangsan read three times; Mary did so four times.’



(48) [semantic composition processes of the antecedent clause]

- a. $[[VPa]] = \lambda e. nian'read'(e, t_i)$
- b. $[[Voice'a]] = \lambda x \lambda e. nian'read'(e, t_i) \& Init(e, x)$
- c. $[[VoicePa]] = \lambda e. nian'read'(e, t_i) \& Init(e, Zhangsan) <x \text{ that is abstracted over is bound by Zhangsan}>$
- ...

[semantic composition processes of the postcedent clause]

d. [[VPd]] = $\lambda e.f(e)$

e. [[Voice'd]] = $\lambda y\lambda e.f(e) \ \& \ \text{Init}(e, y)$

f. [[vPd]] = $\lambda e.f(e) \ \& \ \text{Init}(e, \text{Mali}) < y$ that is abstracted over is bound by *Mali*

g. [[VoicePd]] = $\lambda e. \text{nian}'\text{read}'(e, t_i) \ \& \ \text{Init}(e, \text{Mali})$ (the copying of the function “*nian'*read’(*e, t_i*)” of the antecedent VP onto the *f(e)*)

Let us copy the VP_a, the function *nian'*read’(*e, t_i*) in (48a), that corresponds to SD onto the *f(e)* in (48d), resulting in (48g). As we can see, the trace *t_i* that is abstracted over is bound by the contrastive focus element *san-ci* ‘three-times’. This indicates that there is no available argument position for *san-ci* ‘four-times’ that underwent A-bar movement to be reconstructed into the postcedent clause.

Hence, (47a) is ungrammatical.

This internal structure (that cannot be accessed syntactically) naturally leads us to predict that DS/SD constructions with an adjunct(s) that are contrastively focused are well-formed. This prediction is borne out, as shown in (49) below (taken from Wei and Li (2016: (44))^[3]).

- (49) Zhangsan gen wo jieshao-LE yi-ge hao pengyou gei ta; Lisi ye gen wo zheme zuo
Zhangsan with me introduce-LE one-CL good friend to him; Lisi also with me so do
‘Zhangsan introduced a good friend to him with me; Lisi did so with me as well.’

This syntactic environment (under which extraction from within the DS/SD phrase is impossible) renders sentences of (3=50) and (4=51) below ungrammatical.

- (50) a. *The vase was broken by the children, and the jar was done so, too.
b. *I know which book Harry read and which book Bill did so.
c. *I don’t know which puppy you should adopt, but I know [which one] you shouldn’t do so.
d. *I don’t know who Tom did go to a movie with, but I know [who] he didn’t do so.
e. *I think the BLUE papers Pete should sign, and I think [the GREEN ones] Jan should do so.

- (51) a. *Zhangsan bei [(Lisi) ma], Mali ye bei zheme zuo.
Zhangsan BEI Lisi scold Mary also BEI so do
‘(Intended) Zhangsan was scolded (by Lisi), *Mary was done so as well.’
b. *Wo zhidao hali dule na ben shu, ye zhidao bier zheme zuo.
I know Harry read which book, also know Bill did so.
‘I know Harry read which book and Bill did so.’
c. *juzi, wo xiwang ta manman chi; *pingguo, wo xiwang ta ye zheme zuo.
orange, I hope he slowly eat apple I hope he also so do
‘Oranges, I hope that he slowly eats (them); *apples, I hope that he does so as well.’
d. *Zhangsan nian-LE san-ci, Mali zheme zuo-LE si-ci.
Zhangsan read-le three-times Mary so do-le four-times
‘Zhangsan read three times; Mary did so four times.’

To recapitulate this section, the DS/SD anaphora in A-movement and passive subject movement do not have bearing on PF-deletion and instead, they are base-generated. In other words, they are not classified into surface anaphora

but into deep anaphora. Meanwhile, for complete semantic compositions in the postcedent clause, an appropriate function from the antecedent clause must be copied into the *f(e)*; otherwise, the DS/SD anaphors are ill-formed.

5. Conclusions

To conclude, we have revealed the following points. Firstly, regarding the formation aspect of DS/SD anaphora, it can be assumed that if a VP in the antecedent clause and one in the postcedent clause conform to structural parallelism and semantic identity, then the DS/SD anaphora will be formed via PF-deletion. However, empirical evidence such as in examples (36a–d) does not support the PF-deletion mechanism. Instead, we propose that (i) DS/SD anaphors are present in underlying representations, and (ii) semantic compositions plus an appropriate function copy mechanism can explain the (un)acceptability of DS/SD anaphors. Secondly, the acceptability of DS/SD anaphors depends on whether an appropriate function from the antecedent clause can be copied into the f(e), i.e., the ‘so’/‘zuo’ position within the framework of semantic composition (as shown in examples (44)–(51)). Thirdly, an appropriate function cannot be copied into the f(e) when complements are contrastively focused (illustrated by examples (46) and (47)). In the end, DS and SD anaphors should be classified as deep anaphora.

Author Contributions

Conceptualization, I.-H.I.; methodology, M.S.K.; resources, J.O.L.; data curation, M.S.K.; writing—original draft preparation, I.-H.I.; writing—review and editing, I.-H.I.; project administration, J.O.L. All authors have read and agreed to the published version of the manuscript.

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Data can be given upon reasonable request.

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The authors declare no conflict of interest. The funders had no role in the design of the study; in the collection, analyses, or interpretation of data; in the writing of the manuscript; or in the decision to publish the results.

Abbreviations

DS	do so
SD	<i>zheme zuo</i> ‘so do’
LE	aspect
CL	classifier
LF	logical form
NP	noun phrase
VP/vP	verb phrase
PF	phonetic form
f(e)	function(event)
Voice _{tr}	transitive voice
Init	initiator

References

- [1] Houser, M.J., 2010. The syntax and semantics of do so Anaphora [Doctoral dissertation]. University of California at Berkeley: Berkeley, California, USA.
- [2] Bruening, B., 2019. Passive do so. *Natural Language & Linguistic Theory*. 37(1), 1–49.
- [3] Wei, T.-C., Li, Y.-H.A., 2016. How to do so in Mandarin Chinese. *Journal of East Asian Linguistics*. 25(2), 183–212.
- [4] Hankamer, J., Sag, I.A., 1976. Deep and surface anaphora. *Linguistic Inquiry*. 7(3), 391–428.
- [5] Lakoff, G., 1966. Stative adjectives and verbs in English. In: Oettinger, A.G. (ed.). *Mathematical Linguistics and Automatic Translation*, Report No. NSF-17. Computational Laboratory, Harvard University: Cambridge, Massachusetts, USA. pp. I-1–I-15.

- [6] Lakoff, G., Ross, J.R., 1976. Why you can't do so into the kitchen sink. In: McCawley, J.D. (ed.). *Syntax and Semantics 7: Notes from the linguistic underground*. Academic Press: New York, USA. pp. 101–111.
- [7] Kehler, A., Ward, G., 1999. On the semantics and pragmatics of identifier so. In: Turner, K. (ed.). *The semantics/pragmatics interface from different points of view, Vol.1*. Elsevier: Amsterdam, Netherlands. pp. 233–256.
- [8] Kehler, A., Ward, G., 2004. Constraints on ellipsis and event reference. In: Horn, L.R., Ward, G. (eds.). *The Handbook of pragmatics*. Basil Blackwell: Oxford, UK. pp. 383–403.
- [9] Wee, H.-K., 2020. Do so and do it anaphora revisited. *Discourse and Cognition*. 27(1), 185–208.
- [10] Huddleston, R.D., Pullum, G.K., 2002. *The Cambridge grammar of the English language*. Cambridge University Press: Cambridge, UK.
- [11] Culicover, P.W., Jackendoff, R., 2005. *Simpler syntax*. Oxford University Press: Oxford, UK.
- [12] Hallman, P., 2013. Predication and movement in passive. *Lingua*. 125, 76–94.
- [13] Vendler, Z., 1967. *Linguistics in philosophy*. Cornell University Press: Ithaca, New York, USA.
- [14] Bouton, L.F., 1970. Do so: do + adverb. In: Sadock, J., Vanek, A. (eds.). *Studies presented to Robert B. Lees by his students*. Linguistics Research, Inc.: Edmonton, Canada. pp. 17–38.
- [15] Stroik, T., 2001. On the Light Verb Hypothesis. *Linguistic Inquiry*. 32(2), 362–369.
- [16] Cornish, F., 1992. So be it: the discourse-semantic roles of so and it. *Journal of Semantics*. 9(2), 163–178.
- [17] Haddican, B., 2007. The structural deficiency of verbal pro-forms. *Linguistic Inquiry*. 38(3), 539–547.
- [18] Adger, D., 2003. *Core Syntax: A Minimalist Approach*. Oxford University Press: Oxford, UK.
- [19] Merchant, J., 2001. *The Syntax of Silence: Sluicing, Island, and the Theory of Ellipsis*. Oxford University Press: Oxford, UK.
- [20] Merchant, J., 2008. An Asymmetry in Voice Mismatches in VP-Ellipsis and Pseudogapping. *Linguistic Inquiry*. 39(1), 169–179.
- [21] Pan, H., Hu, X., 2022. The passive construction in Chinese. In: Aronoff, M. (ed.). *Oxford Research Encyclopedia of Linguistics*. Oxford University Press: Oxford, UK. DOI: <https://doi.org/10.1093/acrefore/9780199384655.013.884>
- [22] Lebeaux, D., 1988. *Language acquisition and the form of the grammar* [Doctoral dissertation]. University of Massachusetts at Amherst: Amherst, Massachusetts, USA.
- [23] Lebeaux, D., 2009. *Where does binding theory apply?* The MIT Press: Cambridge, Massachusetts, USA.
- [24] Chomsky, N., 1995. *The Minimalist Program*. The MIT Press: Cambridge, Massachusetts, USA.
- [25] Fox, D., 1999. Reconstruction, binding theory, and the interpretation of chains. *Linguistic Inquiry*. 30(2), 157–196.
- [26] Takahashi, S., Hulsey, S., 2009. Wholesale merger: beyond the A/A'-distinction. *Linguistic Inquiry*. 40(3), 387–426.