

Opportunities and Challenges for a Referential Theory of VP-Ellipsis

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1 Introduction

- Verb phrase ellipsis (VPE):

(1) Mary looked into the problem, and Sue did too.

- Despite the considerable attention paid to VPE in the literature, the conditions under which a representation of an utterance may serve as a suitable antecedent for interpreting a subsequent ellipsis remain poorly understood.
- To help focus the talk, I collapse approaches into two opposing types:

Syntactic: The recovery of the elided VP meaning is dependent on their being a suitable syntactic VP to serve as an antecedent in the discourse. This need may arise from a constraint that allows for deletion under identity at surface structure, underlying syntactic structure, or syntactic logical form (Sag (1976) and many since), or a recovery procedure that reconstructs the missing VP at the ellipsis site at one of these levels (e.g., Williams (1977); Fiengo and May (1994)).

Referential: VPE is essentially a null proform, and hence interpretation is governed by the same types of semantically and pragmatically mediated processes used to resolve other types of referential expressions such as pronouns (Schachter 1977; Chao 1987; Hardt 1992; Kehler 1993a; Lobeck 1999; inter alia).

- The problem, in a nutshell: syntactic theories tend to undergenerate; the others tend to overgenerate.

(2) a. Mary looked into the problem, and Sue did too. (=1)
b. # The problem was looked into by Mary, and Sue did too. [look into the problem]

c. This problem was to have been looked into, but obviously nobody did. [look into the problem] (Vincent Della Pietra, in conversation, cited in Kehler (1993b))

- (3) a. Bush responded to the letter even though Clinton already had.
b. # This letter provoked a response from Bush and Clinton did too. [responded]
c. This letter provoked a response from Bush even though Clinton already had. [responded]

- Two paths toward reconciling the facts suggest themselves.
- Proponents of syntactic accounts: the fact that we see any apparent effects of syntactic structure demonstrates that syntax must be relevant to ellipsis licensing and recovery, since any sensitivity to syntax would seem out of the reach of referential accounts.
- Proponents of referential accounts: the paradox presented by (2b-c) is fundamentally more difficult to resolve on a syntactic theory than on a referential one, since if examples like (2c) are ruled out by the grammar, then no semantic or pragmatic factors should be able to rescue them.
- The Recycling Hypothesis (Arregui *et al.*, 2006): the language processor has a repair strategy for structure that allows it to “recycle” whatever linguistic materials are at hand to create one when one does not already exist. (See also Kim *et al.* (2011), and approaches to ANTECEDENT ACCOMMODATION, e.g. Fox (1999), Van Craenenbroeck (2012), Thoms (2015).)

- (4) a. Almost nobody approached the lion, but the trainer did. (Available VP)
b. Approaching the lion was nearly impossible, but the trainer did. (Embedded VP)
c. The lion was nearly impossible to approach, but the trainer did. (VP with trace)
d. The lion was nearly unapproachable, but the trainer did. (Negative adjective)

- On the other hand, whereas some researchers have posited theories capable of predicting the differences between examples like (2b-c) (Kehler, 2000; Grant *et al.*, 2012; Kertz, 2013), I’m not aware of anyone who has made the case for why one would expect the kind of gradience we see in cases like (4a-d) and others on a discourse referential theory.

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- Indeed, skepticism has been expressed about this prospect:

A semantic account that could mirror our results would need to find the same level of relevant fine-grained distinctions in purely semantic representations. Such an account would also have to deal with some nontrivial issues. Since all conditions have event-denoting verb roots, why would these event properties be made more salient or available in an active sentence than a passive, and why would they be made more available by an inflected VP than by a gerund, by a gerund than by a nominalization, etc. (Arregui *et al.*, 2006, p. 243)

- Whereas Arregui *et al.* are quite right, I'm far less pessimistic about the prospects of developing such a theory. The goal of this talk is to explain why, and hopefully inspire some ideas for future research.

2 Independent Support for a Referential Theory

- Why think that VP is anaphoric? Mainly since it patterns with pronominal reference in so many ways.
- First, like pronouns but unlike, say, forms of bare argument ellipsis (gapping, stripping), VPE is compatible with non-local antecedents (Hardt, 1990):

(5) The thought came back, the one nagging at him these past four days. He tried to *stifle it*. But the words were forming. He knew he *couldn't*.

- Second, pronouns and VPE can be cataphoric (Lakoff, 1968; Jackendoff, 1972):
- (6) a. If he_i makes a statement criticizing President Putin, Trump_i will make a fool of himself.
 b. If McCain will ϕ_i , Trump [will make a statement criticizing President Putin]_i.
 c. # He_i will make a fool of himself, if Trump_i makes a statement criticizing President Putin.
 d. # Trump will ϕ_i , if McCain [will make a statement criticizing President Putin]_i.

- Side note: Cataphora is mysterious on a deaccenting approach (Kehler, 2017):

(7) [Context: What should we do this afternoon?]
 a. # If you're willing to go to the mall, I'd like to go to the mall.
 b. If you're willing to go the mall, I'd like to (go to the mall).
 c. If you're willing to, I'd like to go to the mall.

- Third, pronouns and VPE both allow for split antecedents:

(8) Mary wants to go to Spain and Fred wants to go to Peru, but because of limited resources, only one of them can. (Webber, 1978)

- Fourth, under certain conditions pronouns and VPE can access a referent that is not coreferent with, but is nonetheless semantically derivable from, the meaning of an antecedent expression:

(9) Jean is a Frenchman, although he hasn't lived there for many years. (Ward *et al.*, 1991)

(10) Martha and Irv wanted to dance with each other, but Martha couldn't, because her husband was here. (Webber, 1978)

- Fifth, but more controversially, VP-ellipsis can refer to situationally-evoked referents (see Hankamer (1978) for counterarguments, and Miller and Pullum (2014) for a reconciliation):

(11) a. [John tries to kiss Mary. She says:]
 John, you mustn't. (=Schachter 1977, ex. 3)
 b. [John pours another martini for Mary. She says:]
 I really shouldn't. (=Schachter 1977, ex. 4)

- The final parallel comes from anaphoric dependencies and the licensing of strict and sloppy readings.

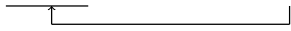
(12) a. Mary loves her mother and Sue does too. [loves Mary's/Sue's mother; strict/sloppy]
 b. Mary loves Mary's mother and Sue does too. [loves Mary's mother; strict only]

- We also see strict and sloppy readings at the event level:

(13) a. I'll help you if you want me to, but I'll kiss you even if you don't.
[want me to help/kiss you; strict or sloppy] (Hardt, 1994)

b. I'll help you if you want me to help you, but I'll kiss you even if you don't. [want me to help you; strict only]

(14) I'll help you if you want me to ϕ , but...



(15) I'll kiss you even if you don't ϕ .



- A more sophisticated example at the event level:

(16) John kisses his girlfriend when she wants him to and hugs her when she doesn't, and Bill does too.

- A possible reading results from interpreting the first VPE as strict, and the second as sloppy:

(17) John_j kisses his_j girlfriend_{jj} when she_{jj} wants him_j to kiss her_{jj} and hugs her_{jj} when she_{jj} doesn't want him_j to kiss her_{jj}, and

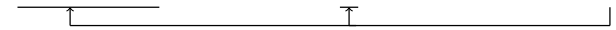
Bill_b kisses his_b girlfriend_{bg} when she_{bg} wants him_b to kiss her_{bg} and hugs her_{bg} when she_{bg} doesn't want him_b to kiss her_{bg}.

- This reading requires recording the anaphoric dependency between the antecedent and elided event pronouns on the strict reading of the first VPE.

(18) John kisses his girlfriend when she wants him to ϕ and hugs her when she doesn't ϕ , and...



(19) Bill [kisses his girlfriend when she wants him to ϕ and hugs her when she doesn't ϕ].



- The explanation requires not only that VPE is referential, but that discourse models include representations of anaphor/antecedent dependencies.

3 Discourse Model Referents

- So what accounts for gradience in a referential theory of VPE?
- Researchers tend to seek clearly storable, rule-based constraints on elidability, without considering the nature of the interpretation process itself.
- But if there's anything we know about accounting for discourse reference, it's that we need a notion of DISCOURSE MODEL, i.e., a interlocutor's mental model that contains a structured record of the entities and eventualities that have been introduced and the relationships that hold among them (Karttunen, 1976; Webber, 1983, inter alia).

- Referring expressions care about whether the referent:
 - has been explicitly introduced into the discourse
 - is otherwise inferrable from something that has been explicitly introduced into the discourse
 - is situationally present (exophora)
 - is prominent (i.e., highly activated)
 - topical
- An example of how salience matters can be found in Arregui et al.'s results – as they themselves note, the difference between (4a) and (4b) does not concern whether a matching VP exists, but whether it appears in the expected position.
- How might some of the mismatch data be explained?

- Fact 1: Passive-active mismatches (20b-c) tend to be degraded compared to matches (20a) (Arregui *et al.*, 2006; Kertz, 2013).

(20) a. Mary looked into the problem, and Sue did too. (=1)

b. # The problem was looked into by Mary, and Sue did too. [look into the problem]

c. This problem was to have been looked into, but obviously nobody did. [look into the problem]

- Possible explanation: In match cases, the referent is already introduced via the semantic analysis of the antecedent sentence (20a):

(21) a. S: *look_into*(Mary, problem)

b. VP: $\lambda x. look_into(x, problem)$

- In the case of mismatch, it's not, and needs to be constructed (20c):

(22) a. S: *look_into(someone, problem)*
 b. VP: $\lambda x. look_into(someone, x)$

- Referent creation (using algorithm from Dalrymple *et al.* (1991)):

(23) a. $P(someone) = look_into(someone, problem)$
 b. $P = \lambda X. look_into(X, problem)$
 c. $P(nobody) = look_into(nobody, problem)$

- So degraded acceptability may just be due to work involved in referent construction within the discourse model. Hence the predictions differ from those of a deaccenting approach, which cares more about entailment, and hence sees no difference between the match and mismatch cases.

- Fact 2: Mismatches in 'parallel' coherence construals (20b) are degraded compared to those in 'non-parallel' construals (20c).

- First, let's take a look at effects of parallel coherence in the nominal domain, where parallel pronoun interpretation is enforced by information structure:

(24) a. Margaret Thatcher admires Hillary Clinton, and George W. Bush absolutely worships her. [*her*=Clinton]
 b. Margaret Thatcher admires Ronald Reagan, and George W. Bush absolutely worships her. [*her*=???]

- Parallel interpretation not required in non-Parallel contexts:

(25) Jeff Sessions cooperated with Chuck Schumer, and Trump fired him. [*him*=Sessions]

- An ambiguous case:

(26) Colin Powell defied Dick Cheney, and George W. Bush punished him.

- On a referential theory, one would expect the same pattern for VPE:

(27) a. Mary looked into the problem, and Sue did too. (=1)
 b. # The problem was looked into by Mary, and Sue did too. [look into the problem]

c. This problem was to have been looked into, but obviously nobody did. [look into the problem]

- That is:

- (27a) has parallel coherence and a parallel referent, so VPE is good
- (27b) has parallel coherence with a non-parallel referent, so VPE is bad
- (27c) has non-parallel coherence, so VPE is good

- So again, viewing VPE as referential gives us insight into these effects. The explanation for why mismatch is degraded could be as simple as recoverability of a suitable discourse model referent.

- Fact 3: adjectival and nominal antecedents tend to be even worse than clause-level mismatches

(28) a. Almost nobody approached the lion, but the trainer did.
 b. Approaching the lion was nearly impossible, but the trainer did it.
 c. The lion was nearly impossible to approach, but the trainer did it.
 d. The lion was nearly unapproachable, but the trainer did.

- But such antecedents undoubtedly affect the acceptability of pronouns as well:

(29) a. Do reactions from parents affect *their* children?
 b. Do parental reactions affect *their* children? (Ward *et al.*, 1991)

(30) a. Jean was born in France, although he hasn't lived there for many years.
 b. Jean is a Frenchman, although he hasn't lived there for many years. (=9)

- Let's explore this idea further with respect to a related phenomenon.

4 A Parallel Debate: *do so* anaphora

- Hankamer and Sag's (1976) famously categorized *do so* as a form of surface anaphora, hence requiring a syntactic antecedent

- However, cases of mismatch abound (Kehler and Ward, 2007):

- (31) As an imperial statute the British North America Act could be amended only by the British Parliament, which *did so* on several occasions. [= amended the British North America Act] (Groliers Encyclopedia)
- (32) There was a lot more negativity to dwell on, if anyone wished to *do so*. [= dwell on more negativity]
- (33) With or without the celebration, Belcourt is well worth seeing, and you can *do so* year round. [= see Belcourt]
- (34) ... He went on to claim that the allegedly high-spending Labour authorities had, by *so doing*, damaged industry and lost jobs. [= spent highly] (Cornish, 1992)

Nominalized antecedents (Process Nominals; see Miller and Hemforth (2015) for a pragmatic explanation for gradience with nominalized antecedents):

- (35) 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 than it was on the stimulus package. [= defecting] (*Washington Post*)
- (36) Even though an Israeli response is justified, I don't think it was in their best interests to *do so* right now. [= respond] (token provided by Dan Hardt)

- Fu *et al.* (2001, henceforth FRB) used such examples to argue that process nominals must contain a VP in their syntactic representations.

- FRB consider the referential stance, but cite the contrast between (37–38) as evidence against it:

- (37) His removal of the garbage in the morning and Sam's *doing so* in the afternoon were surprising. (= their 42b)
- (38) * Kim's accident in the morning and Sue's *doing so* in the evening were not coincidences. (= their 43b)

- However, these judgments do not significantly change when *do so* is replaced by an controversially 'deep' anaphor such as *do it*:

- (39) His removal of the garbage in the morning and Sam's *doing it* in the afternoon were surprising.

- (40) * Kim's accident in the morning and Sue's *doing it* in the evening were not coincidences.

- The lesson is that any effects attributed to a VPE-specific factor should be compared against *do it* anaphora or a similar form (see also Murphy (1985), Tanenhaus and Carlson (1990), Mauener *et al.* (1995) for comparisons between VPE and event anaphora with mismatched antecedents)
- Importantly, FRB's analysis applies only to process nominalizations, and not other types, such as role nominalizations. But felicitous, naturally-occurring examples of the latter are readily found:

- (41) One study suggests that almost half of young female smokers *do so* in order to lose weight. [= smoke]

- (42) The majority of horse riders *do so* purely for leisure and pleasure. [= ride horses]

- (43) AmericaNet.Com, its officers, directors or employees are not responsible for the content or integrity of any ad. Sellers/buyers/subscribers/investors *do so* at their own risk. [= sell/buy/subscribe/invest]

- (44) Data from the Retirement Survey reveals that 5% of early retirees *do so* because of the ill health of others. [= retire early]

- Now one might react by saying that role nominalizations also contain VP structure. But many cases remain unacceptable:

- (45) # Most professors will *do so* for hours even when no one is listening. [= profess]

- (46) # In my opinion, our governor *does so* better than the last one did. [= govern]

- The distinction between (41–44) and (45–46) mirrors an analogous distinction at the nominal level, with respect to so-called *outbound anaphora* (Postal, 1969; Ward *et al.*, 1991).

- Standard examples that demonstrate the infelicity of such anaphora involve semantically non-transparent relationships (examples from Ward *et al.*):

(47) Fritz is a cowboy. # He says *they* can be difficult to look after. [= cow]

(48) Dom's clothes are absolutely elephantine. # Indeed, you could almost lose *one* in them. [= an elephant]

- Ward et al.:

...we shall argue that the degree to which outbound anaphora is felicitous is determined by the relative accessibility of the discourse entities evoked by word-internal lexical elements, and not by any principle of syntax or morphology. (p. 449)

- As this characterization predicts, felicitous examples are readily found when a sufficient degree of semantic transparency holds:

(49) Do parental reactions affect *their* children? [=parents]

(50) I think if I were a Peruvian I wouldn't want to live *there* for the next couple of years. [= Peru]

(51) It's awfully foggy tonight so you people out there driving better watch out for *it*. [= fog]

(52) Very well. But I warn you that if you continue in such foolishness you'll be the last paleontologist alive by the time you retire. There's no future in *it*. [= paleontology]

- We argued that the key difference between (41–44) and (45–46) lies in precisely the sort of semantic transparency and activation factors that Ward et al. cited in arguing against grammatical anaphoric island constraints.

- This analysis predicts that felicitous uses should occur only with those role nominalizations that have a highly transparent semantic relationship with the verb they nominalize

- We collected the *-er/-or* agent nominalizations that occur at least 2000 times in the British National Corpus (n=42).

- As an approximate measure of semantic transparency, we used the LSA vector cosine value (lsa.colorado.edu)¹ between the verb and its role nominalization.

¹Computed using Matrix Comparison over the *General Reading up to 1st year college* corpus.

– Assumption: the more transparent the relationship between a role nominalization and the nominalized verb, the more likely they will be found in similar contexts.

– For instance, *smoke* and *smoker* receive a 0.82 score, which is indicative of a high degree of relatedness (1 represents perfect contextual overlap)

– On the other hand, *profess* and *professor* receive a 0.06 score, which indicates a degree of relatedness close to chance (0 represents chance).

- Searches of the form *Ns do so* (e.g., *drivers do so*) were performed using Google and the results filtered and analyzed.

- Felicitous examples of *do so* in which a role nominalization unambiguously serves as antecedent were found for 29 cases; these nominalizations had an average 0.491 degree of relatedness with the verbs they nominalize.

- The 13 cases not found, on the other hand, had an average score of only 0.264. These means are significantly different (one-tailed t-test; p=.004).

- Furthermore, examples of two of the highest-scoring nominalizations of the 42 – *farmer* at 0.81, and *developer* at 0.77 – were not found, for reasons that appear to be idiosyncratic given that, unlike many of the other unattested cases, felicitous examples can be readily constructed.

(53) Many marijuana farmers *do so* with a sincere sense that they are doing nothing wrong, and not out of greed without regard for the law.

(54) Many developers of free software profess narrowly practical reasons for *doing so*: they advocate allowing others to share and change software as an expedient for making software powerful and reliable. (<http://www.gnu.org/philosophy/university.html>)

- Setting these aside, the other 11 verb-nominalization pairs had an average 0.168 transparency score; indeed, no examples were found for any nominalizations with a score of less than 0.2.

- *Do so* is governed by the same pragmatic principles that apply to other forms of reference. Along with other discourse factors (e.g., salience, topicality), semantic transparency influences accessibility: the more transparent the semantic relationship between a nominalization and the verb it nominalizes, the more accessible the event evoked by the nominalization will be.

5 Conclusion

- There are too many parallels between VPE and other forms of reference to dismiss the referential theory.
- And indeed, the analogy immediately gives rise to explanations for clines in acceptability.
- As with other forms of reference, coming up with predictive theories will be hard. But that doesn't mean that the idea is wrong!
- That having been said, it seems likely that linguistic form leaves vestiges in mental representations that we have yet to fully understand, requiring further experimental work to uncover.

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