

# “Context can!”: Contextual accommodation in exophoric and anaphoric VP ellipses

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## 1. Introduction

Since at least Hankamer & Sag (1976), it has been largely assumed that verb phrase ellipses (VPE) are interpreted strictly under identity with an antecedent verb phrase. Much intervening work has focused on the nature of the identity relation that is assumed to hold between the antecedent and ellipsis site. Key accounts advocating for a syntactic identity relation include Chomsky (1965), Hankamer & Sag (1976), and Fiengo & May (1994), whereas Dalrymple et al. (1991), Hardt (1993), and Merchant (2001) propose semantic accounts of identity, to name only a small sample from each camp.

Somewhat problematic for accounts that deny VPE the ability to receive any part of its interpretation from the nonlinguistic context are observations of apparently VPE-like constructions that are freely interpretable despite having no recognizable linguistic antecedent. In a corpus study, Miller & Pullum (2013) present several naturally occurring examples of such constructions, as in (1).

- (1) The aisles at the Lakewood Wal-Mart are surprisingly packed at 11 p.m. “Can we? Can we?” Vanessa tugs at her mother, pointing to a rack of “Lady and the Tramp” DVDs. Diaz shrugs. OK.

In this example, it is clear that the elided VP is something like “buy a ‘Lady and the Tramp’ DVD,” yet there suitable VP antecedent in the discourse. Miller & Pullum claim that VPE is not licensed by linguistic identity at all, but rather by a specific relation between the ellipsis site and the linguistic and nonlinguistic context wherein the VPE construction must pick out one member of a set of alternative situations made highly salient in the discourse. By contrast, Merchant (2004) suggests that antecedentless “VPE” is interpretable because listeners accommodate that the elided VP is something like “do that,” an anaphor that is known to be relatively free in its ability to draw its meaning from the nonlinguistic context.

Whatever the mechanism for interpreting antecedentless VPE constructions, it is clear that their interpretation is dependent on information retrieved from the nonlinguistic con-

text. This raises an empirical question that has not yet been addressed in the literature on VPE, namely, whether information from the nonlinguistic context is recruited during the interpretation of verb phrase ellipses. In other words, does VPE interpretation truly proceed only according to strict linguistic identity, or can salient nonlinguistic information influence the available interpretations even when there is a useable antecedent VP?

This paper presents two experiments that aim to open the investigation into this question. Experiment 1 reveals a restricted effect of manipulations in the nonlinguistic context on the interpretation of VPE constructions in the presence of a useable linguistic antecedent. Experiment 2 suggests that the effect is at least in part driven by ellipsis, as the interpretation of the VPE constructions in Experiment 1 is shown to be somewhat more flexible than interpretation of fully realized VPs under the same conditions. In sum, the results indicate that strict antecedent-ellipsis site identity alone is insufficient as a model of VPE interpretation, and that a fully realized model must also include a role for information drawn from the broader discourse context.

## **2. Experiment 1**

The goal of Experiment 1 was to explore how VPE interpretations are constructed when the linguistic antecedent and nonlinguistic context do not fully agree on what information should be included in the ellipsis site. This was investigated by creating contexts that vary in the extent to which they make numeral information salient, pairing them with antecedents that contained or did not contain a numeral, and probing whether subjects interpreted a VPE site as containing or not containing a numeral.

### **2.1 Methods**

The experiment was run on the Amazon Mechanical Turk platform. The procedure for an experimental item was as follows. First, participants viewed a nonlinguistic context presented as a comic strip. Second, they viewed a text dialogue between two characters in the comic strip. The dialogue consisted of an optional antecedent where a character expresses some desire to obtain a particular referent from the nonlinguistic context, plus a verb phrase elliptical reply from the other character indicating that the first character could not have the referent. Third, they read a sentence asking them to provide a rating for a particular interpretation of the dialogue's final utterance. Finally, they used a visual scale to provide a rating, which completed the trial and triggered the next item to appear.

The experiment had a 3 (nonlinguistic context) x 3 (antecedent) x 2 (interpretation prompt) design, for a total of 18 conditions. The levels for nonlinguistic context were as follows. In Unavailable contexts, no useful numeral information about the referent discussed in the dialogue is recoverable. Neither character interacted with the referent in question, as in (2). In Available contexts, numeral information about the referent is made available but not salient by having one character handle the relevant number of objects as a group, as in (3). In Salient contexts, numeral information about the referent is made highly salient by having a character interact with the objects in smaller groups and counting them, as in (4).

### Contextual accommodation in VP ellipses

The three levels for antecedent were: Exophoric, where there was no antecedent; Unmodified, which contained no numeral in the VP; and Modified, which contained a numeral in the VP. The VPE reply utterance for this scenario was the father character stating, “We can’t.” Example dialogues are shown in (5).

The levels for interpretation prompt were Polar, which corresponded to an interpretation with no numeral in the ellipsis site, and Scalar, which corresponded to an interpretation with a numeral in the ellipsis site. Examples are shown in (6).

There were 6 critical scenarios and 10 filler scenarios, and subjects saw one item from each scenario for a total of 16 items. Since there were more conditions than critical scenarios, subjects did not see a critical item for every condition. The items were organized in 18 lists so that the number of times each condition was viewed in each critical scenario was roughly even across all data collection.

152 native English speakers (66 male) aged 18-50 (mean=31.8, sd=7.7) were included in the analysis. An additional 41 subjects were excluded from the analysis for reporting that they were non-native English speakers, failing to attend to the task, or being over the age of 50. The experiment took about 15 minutes to complete, and subjects were paid USD 1.50 for participating.

(2) *Example Unavailable context*



(3) *Example Available context*



(4) *Example Salient context*



(5) *Example dialogues*

a. **Exophoric:** (no antecedent)

Father: We can't.

- b. **Unmodified:** Son: I want to buy candy bars!  
Father: We can't.
- c. **Modified:** Son: I want to buy five candy bars!  
Father: We can't.

(6) *Example interpretation prompts*

- a. **Polar:** On a scale from 1 to 7, where 1 is the least likely and 7 is the most likely, how likely do you think it is that the father meant: We can't buy any candy bars.
- b. **Scalar:** ...that the father meant: We can't buy five candy bars, but maybe we could buy fewer.

## 2.2 Predictions

The main question of Experiment 1 was whether information from the nonlinguistic context has any effect on the interpretation of VP ellipsis sites when there is a useable linguistic antecedent available. Two hypotheses are contrasted. According to the first, VP ellipsis sites are interpreted under strict linguistic identity. According to the second, ellipsis interpretation considers not only information from the linguistic antecedent, but also salient information from the broader discourse context.

If the first hypothesis is correct, then manipulations in the salience of numeral information in the nonlinguistic context should have no effect on ratings in the conditions with an Unmodified or a Modified antecedent. This is because this hypothesis purports that the process of VPE interpretation considers only the linguistic antecedent, at least when there is one available.

If the second hypothesis is correct, then changes in the information that is salient in the nonlinguistic context may affect ratings not only in the Exophoric conditions, but also in the conditions with a linguistic antecedent. This is because this hypothesis supports a model according to which information from multiple sources is integrated to form ellipsis interpretations.

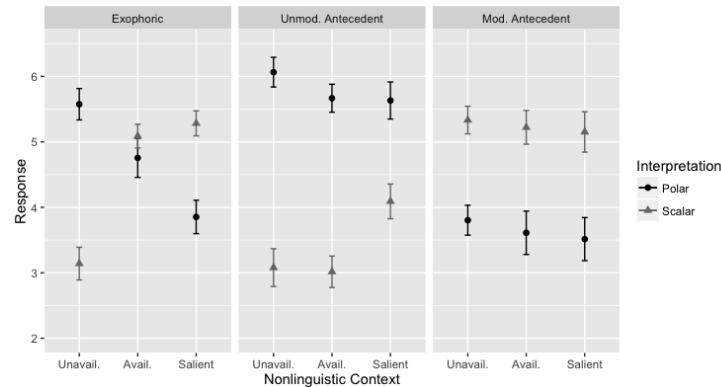
## 2.3 Results

Individual responses were removed if they were in the top or bottom 2.5% for reaction time. Mean ratings and standard errors by condition are shown in (7) and plotted in (8).

(7) *Experiment 1 mean ratings and standard errors*

<i>Ant.</i>	<i>Ctxt.</i>	Polar interpretation			Scalar interpretation		
		Unavailable	Available	Salient	Unavailable	Available	Salient
Exophoric		5.58 (0.240)	4.76 (0.298)	3.85 (0.255)	3.14 (0.250)	5.09 (0.181)	5.28 (0.191)
Unmodified		6.06 (0.227)	5.67 (0.213)	5.63 (0.283)	3.09 (0.288)	3.02 (0.240)	4.09 (0.265)
Modified		3.80 (0.228)	3.61 (0.332)	3.51 (0.329)	5.33 (0.211)	5.22 (0.258)	5.15 (0.308)

*Ant.* = Antecedent, *Ctxt.* = Nonlinguistic context

(8) *Experiment 1 mean ratings and standard errors*

## 2.4 Analysis

The response data were fit to a linear mixed-effects regression model with fixed effects of nonlinguistic context, antecedent, and interpretation prompt, two-way interactions for each pair of these, a three-way interaction between each, and random effects for subject and scenario. There was a significant three-way interaction between nonlinguistic context, antecedent, and interpretation prompt, licensing further analysis by antecedent type.

The results for the Exophoric conditions showed a significant interaction between nonlinguistic context and interpretation prompt ( $p < .001$ ), indicating that the effect on ratings of manipulating the context was different for the two VPE interpretations. Paired comparisons between the Unavailable and Salient conditions indicated that the Polar interpretation was rated significantly lower in the Salient context than in the Unavailable context, while the Scalar reading was rated significantly higher (all  $p$ 's  $< .001$ ).

For the conditions with Unmodified antecedents, there was also a significant interaction between nonlinguistic context and interpretation prompt ( $p < .05$ ). Paired comparisons indicated that ratings of the Polar interpretation were not affected by manipulations in the nonlinguistic context (all  $p$ 's  $> .3$ ). The Scalar interpretation was rated significantly higher with a Salient context than with either an Unavailable or an Available context ( $p$ 's  $< .01$ ).

For the conditions with Modified antecedents, ratings were reliably predicted by interpretation prompt ( $p < .001$ ), and there was no significant effect of nonlinguistic context ( $p > .6$ ) or interaction between nonlinguistic context and interpretation prompt ( $p > .9$ ).

## 2.5 Discussion

The results from the Exophoric conditions confirm that antecedentless VPE constructions are readily interpretable, at least in the discourses used here. They also indicate that subjects were sensitive to the manipulation of numeral salience in the nonlinguistic context. As numeral information is made more salient, subjects tend to prefer the interpretation with a numeral in the VPE site and disfavor the interpretation without a numeral.

The conditions with an Unmodified antecedent show that manipulations in the nonlinguistic context can have an effect on VPE interpretations, even when there is a useable

linguistic antecedent. With an Unmodified antecedent, the Polar interpretation, which assumes the antecedent-identical unmodified VP in the ellipsis site, was always significantly preferred over the Scalar interpretation. However, the Scalar interpretation was considered to be significantly better when the nonlinguistic context provided salient numeral information than when it did not. This suggests that nonlinguistic information is considered when VPE constructions are being interpreted, although the effect of such information on interpretations seems to be subordinate to the role played by the linguistic antecedent.

By contrast, in the conditions with Modified antecedents, nonlinguistic context did not play a role in determining VPE interpretations. The Scalar interpretation, which assumes an antecedent-identical modified VP in the ellipsis site, was preferred over the non-faithful Polar interpretation across the board. This points to an interesting asymmetry in the role of nonlinguistic context in determining VPE interpretations. While it appears that a strong context can motivate at least marginal consideration of information not mentioned in the linguistic antecedent, there is not a context configuration that can suppress the inclusion in a VPE interpretation of information that was overtly mentioned in the antecedent.

### 3. Experiment 2

Experiment 1 showed that strong nonlinguistic contexts can boost consideration of non-antecedent-identical VPE interpretations by calling attention to information that was not mentioned in the antecedent. The goal of Experiment 2 was to determine whether this effect is unique to ellipsis by soliciting ratings of fully spelled-out VPs in the same positions as the VPE constructions of Experiment 1.

#### 3.1 Methods

The design and execution of Experiment 2 were identical for those to Experiment 1, except that in the conditions with antecedents, the reply utterance was augmented with the full antecedent-identical VP. The new dialogues are shown in (9).

186 native English speakers (87 male) aged 18-50 (mean=31.9, sd=7.1) were included in the analysis. An additional 26 subjects were excluded from the analysis for reporting that they were non-native English speakers, failing to attend to the task, or being over the age of 50. The experiment took about 15 minutes to complete, and subjects were paid USD 1.50 for participating.

(9) *Example dialogues*

- a. **Exophoric:** (no antecedent)  
Father: We can't.
- b. **Unmodified:** Son: I want to buy candy bars!  
Father: We can't buy candy bars.
- c. **Modified:** Son: I want to buy five candy bars!  
Father: We can't buy five candy bars.

### 3.2 Predictions

Experiment 2 tests whether the context-driven nonidentity effect from Experiment 1 is unique to VPE, or whether the nonlinguistic salience manipulation also affects the interpretations that are available when a VP identical to the antecedent is overtly realized.

If the former is correct, then there should be no effect of nonlinguistic context manipulation on interpretations in Experiment 2 when there is a linguistic antecedent. If the latter holds, then the available interpretations in Experiment 2 should be similar to that for Experiment 1. In particular, the rating of the Scalar interpretation with an Unmodified antecedent should increase in the Salient context as compared to the other contexts. This would indicate that there is a general effect of contextual manipulations, and that the nonidentity effect observed in Experiment 1 is not due to any special flexibility introduced by ellipsis.

### 3.3 Results

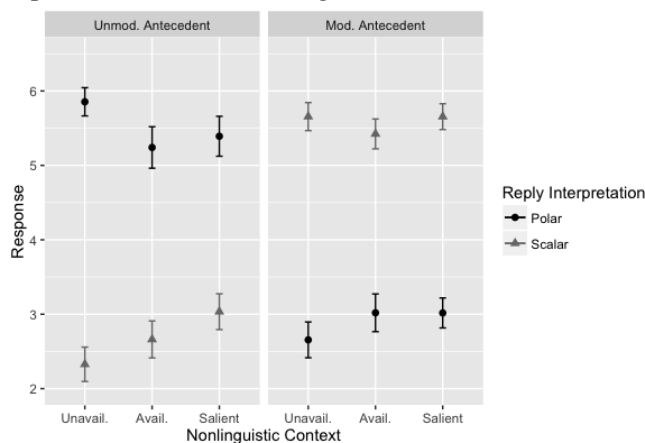
The response data were trimmed according to the same criteria as in Experiment 1. The Exophoric data are not presented here because the stimuli were identical to Experiment 1. The mean ratings and standard errors by condition are shown in (10) and plotted in (11).

(10) *Experiment 2 mean ratings and standard errors*

Ant.	Ctxt.	Polar interpretation			Scalar interpretation		
		Unavailable	Available	Salient	Unavailable	Available	Salient
Unmodified	Unmodified	5.85 (0.190)	5.24 (0.278)	5.39 (0.268)	2.33 (0.231)	2.66 (0.248)	3.03 (0.241)
	Modified	2.66 (0.240)	3.02 (0.253)	3.02 (0.202)	5.66 (0.188)	5.42 (0.201)	5.66 (0.173)

Ant. = Antecedent, Ctxt. = Nonlinguistic context

(11) *Experiment 2 mean ratings and standard errors*



### 3.4 Analysis

The response data were fit to a linear mixed-effects regression model with fixed effects of nonlinguistic context, antecedent, and interpretation prompt, two-way interactions for each pair of these, a three-way interaction between each, and random effects for subject

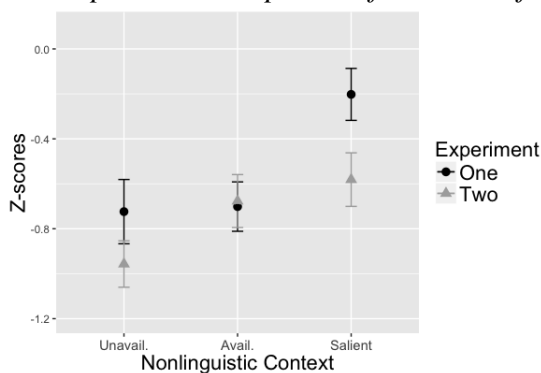
and scenario. There was a significant three-way interaction between nonlinguistic context, antecedent, and interpretation prompt, licensing further analysis by antecedent type.

The conditions with Modified antecedents showed the same set of effects as in Experiment 1. Ratings were reliably predicted by interpretation prompt ( $p < .001$ ), with no effect of nonlinguistic context ( $p > .6$ ) or interaction between the two ( $p > .3$ ).

The critical comparison between the two experiments is in the conditions with Unmodified antecedents. In Experiment 2, there was a significant interaction between nonlinguistic context and interpretation prompt ( $p < .05$ ). Paired comparisons showed that ratings of the Polar reading were marginally different between the three context types (all  $p$ 's  $> .05$ ). For the Scalar reading, the rating with a Salient context was significantly higher than the rating with an Unavailable context ( $p < .05$ ), while the ratings in the Available context were not significantly different than for either other context type ( $p$ 's  $> .2$ ).

To compare the magnitude of the nonidentity effect in the two experiments, the responses for the Scalar interpretation with an Unmodified antecedent were z-transformed. The mean z-scores and standard errors are plotted in (12).

(12) *Two-experiment comparison for Unmodified antecedent, Scalar interpretation*



The z-transformed data were fit to a linear mixed-effects regression model with main effects of nonlinguistic context and experiment, an interaction between the two, and random effects for subject and scenario. There was a marginal interaction between nonlinguistic context and experiment ( $p < .1$ ). Paired comparisons showed that the ratings for the Scalar interpretation in the condition with an Unmodified antecedent and Salient context were significantly higher in Experiment 1 than in Experiment 2 ( $p < .01$ ). The ratings in this condition were also higher than in the corresponding conditions with an Unavailable or Available context in either experiment (all  $p$ 's  $< .01$ ).

### 3.5 Discussion

The results of Experiment 2 showed some effect of the salience of numeral information in the nonlinguistic context on the interpretation of a fully realized verb phrase with no numeral. This finding is somewhat surprising, and may be worthy of further study. However, it also seems to be the case that the boost associated with a strong supporting context is likely greater under ellipsis than it is for fully spelled-out VPs. This suggests that there is



something special about ellipsis that makes its interpretation even more prone to influence from the nonlinguistic context than fully realized VPs are.

#### **4. General discussion and conclusion**

Two experiments revealed a sensitivity to manipulations in the information available in the nonlinguistic context on sentence interpretation that is at least in part specific to VPE constructions. Experiment 1 showed that certain non-antecedent-identical VPE interpretations are available when they are supported by strongly salient information from the nonlinguistic context (plot (8), Unmodified antecedent, Scalar interpretation). By soliciting interpretations of antecedent-identical full VPs under the same conditions, Experiment 2 confirmed that this non-identity effect was more pronounced than would be expected if VPE constructions were interpreted only as though the antecedent VP were present at the ellipsis site (plot (11), Unmodified antecedent, Scalar interpretation; plot (12), Salient context).

The role of nonlinguistic context in determining VPE interpretations appears to be subject to two limitations. First, context appears to contribute to interpretation only asymmetrically. A strong context can motivate the consideration of information that was not mentioned in the antecedent, but there is no evidence that context can cause information mentioned in the antecedent to be ignored. Second, although the presence of contextual support increased the likelihood for subjects to consider a non-antecedent-identical interpretation, antecedent-identical ellipsis interpretations were always significantly preferred.

Thus, it appears that accounts of VPE interpretation based solely on strict identity with a VP antecedent are insufficient. Instead, a full account of VPE interpretation must minimally include a role for nonlinguistic information in the determination of VPE interpretations.

The results are compatible with two broad accounts of VPE interpretation. According to the first, there is no special role for linguistic identity in the interpretation mechanism. Interpretation proceeds according to general discourse salience. The apparently privileged status of the linguistic antecedent in determining the interpretation is actually an illusion stemming from the fact that uttered material is simply much more salient than any information being monitored in the nonlinguistic context. Such an account is closely related to the model of VPE licensing sketched by Miller & Pullum (2013).

The second class of accounts acknowledges separate but interactive modules that interpret VPE constructions according to a linguistic antecedent vs. the broader discourse context. The two information sources might be considered in parallel, with linguistic information being weighted more heavily, or in serial, with interpretation under identity preceding a repair or accommodation module that partially corrects interpretations that appear to be at odds with the broader context. This class of model recalls accounts such as Arregui et al. (2006) and Merchant (2004), in which VPE is interpreted primarily under identity, but other mechanisms are available to repair defective ellipsis-antecedent pairs. Any prior identity account could in principle be a model of the linguistic component of such a mechanism, so the current data are not intended as evidence that any previous work on interpretation under identity is invalid.

More work is necessary to determine how VPE interpretations correlate with the relative salience of linguistic and nonlinguistic information, as this will shed light on how ex-

actly discourse information, including nonlinguistic information, interacts with the linguistic module. Likewise, the interaction of linguistic and nonlinguistic information sources during online processing of VPE should be studied.

One caveat for the experiments presented here concerns the Salient “nonlinguistic” contexts. The critical nonidentity effect from Experiment 1 was observed only with the Salient contexts, and these comic strips contained nonsentential linguistic information included to boost numeral salience to a level not thought possible through purely visual means. This calls into question whether the nonidentity effect is truly nonlinguistic in nature.

At the very least, the numeral information provided by the Salient context was not part of the antecedent for the VPE site in any traditional sense. In this regard, we believe the experimental design is still valid to address the main question of interest. The results of Experiment 1 are problematic for accounts that mandate strict identity between antecedent and ellipsis site, as such a linguistic repair mechanism necessarily looks outside the antecedent for additional material. It would be prudent to replicate these studies with a Salient context that does not include linguistic information, but still makes the relevant nonlinguistic information highly salient to verify that the effect is truly nonlinguistic in nature.

The experiments presented here represent a first attempt at exploring the interaction of linguistic and nonlinguistic information in the construction of VPE interpretations. Many questions about the nature of the VPE interpretation mechanism remain unanswered, and future research on this topic will no doubt be enlightening.

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