Experiments Reveal that Scope is Not Frozen in English Double Object Constructions

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Abstract

Since Larson (1990), the literature has accepted the claim that scope is frozen in English double object constructions. Larson (2014) suggests that double object constructions behave like passives in this respect, while Harley & Jung (2015) suggest instead that double object constructions are behaving like the verb of possession, *have*. This paper reports on two experiments on scope interpretations run on naive English speakers using Amazon Mechanical Turk. The two experiments show that scope is not in fact frozen in English double object constructions. Naive English speakers permit inverse scope in double object constructions as readily as they do in simple active transitive clauses. Double object constructions also do not pattern like either passives or the verb *have*.

1 Introduction

Since Larson (1990), the literature has accepted the claim that scope is frozen in English double object constructions (Larson credits the observation to David Lebeaux). The claim is that a sentence like (1a) lacks a distributive reading, where the universal quantifier distributes over the indefinite. This reading is present in the prepositional dative in (1b), so that there are as many bones as dogs.

(1) a. The woman gave a dog every bone.
b. The woman gave a bone to every dog.

The distributive reading is an *inverse scope* reading, in that the quantifier that comes second in linear order is taking scope over the quantifier that comes first. English double object constructions are claimed to lack inverse scope readings, in contrast with both simple transitives (e.g., *a dog buried every bone*) and prepositional dative constructions like (1b).

The literature that reports this claim and discusses it in theoretical terms includes, among others, Larson (1990), Aoun & Li (1993), Bruening (2001, 2010b), Larson et al. (2019). With few exceptions (for instance, Goldberg 2014), the literature has accepted the lack of inverse scope readings in double object constructions as a fact. To my knowledge, however, no one has ever tested such sentences on naive speakers of English to see if it is true of the broader population. That is the goal of the present work.

This paper reports on two experiments run using the Amazon Mechanical Turk tool (see Gibson et al. 2011, Sprouse 2011). Perhaps surprisingly, both experiments, each using a different task,

show that scope is apparently not frozen in double object constructions for the broader English-speaking population. In the first experiment, the same percentage of speakers report that sentences like (1a) have an inverse scope reading as report that simple transitive sentences do (roughly 72%). The second experiment, using a different task, finds that inverse scope is *more* readily available in double object constructions than it is in simple transitives. The overall conclusion is that there is no support for the claim that scope is frozen in double object constructions.

The experiments also compared double object constructions to two other constructions, because of claims made in the theoretical literature. Larson (2014) suggested that double object constructions pattern with passives in their scope possibilities; he then argued that this is support for his derivational theory of double object constructions according to which they involve a passive-like operation (Larson 1988). Harley & Jung (2015) claimed instead that the scope facts with double object constructions are the same as we see with the verb of possession *have*; this is then support for the HaveP account of double object constructions (Harley 1997, 2002, 2008, Beck & Johnson 2004). The experiments here therefore also tested scope with passives and the verb *have*, to see if either patterns with double object constructions. The finding is that they do not. Passives actually more easily allow an inverse scope reading than either active transitives or double object constructions, as Kurtzman & MacDonald (1993) also found; in contrast, the number of subjects who allow an inverse scope reading with *have* is far lower than it is with the double object construction. Double object constructions therefore pattern neither with passives nor with *have*, suggesting that we should not analogize them to either.

The paper begins with some background on experimental investigations of scope (section 2). Sections 3 and 4 describe the two experiments. Section 5 concludes with discussion and implications.

2 Some Background on Experiments with Scope

An extensive experimental literature has looked at scope readings in English and some other languages. I will cite only a few recent experiments. All of them conclude that simple active transitive sentences like *a boy kicked every ball* allow an inverse scope reading in English, although this is not the preferred reading. For instance, Anderson (2004) found that, given a sentence in isolation, English speakers choose the inverse scope reading 19% of the time (her study 1). However, where such a sentence is embedded in a context that supports the inverse scope interpretation, participants choose it 96% of the time (her study 2). Similar findings have been reported by other studies: inverse scope is readily accessed in a supportive context, but is not the preferred reading of a simple active transitive sentence out of the blue. As another example, Scontras et al. (2017) used pictures accompanied by a descriptive sentence (the same pictures that will be used here in Experiment 1; see section 3). They found that English-speaking adults allow inverse scope in simple transitive clauses like *a shark attacked every pirate* (but Mandarin-speaking adults do not).

Very little experimental work has examined any clause type other than a simple active transitive. In the only experimental investigation of the passive that I can find, Kurtzman & MacDonald (1993) found that subjects also allow inverse scope in passive sentences, in fact more readily than they do in active sentences. This is particularly interesting, because Chomsky (1957: 100–101) claimed that inverse scope is completely unavailable in the passive. This was denied by Katz & Postal (1964: 72) and subsequent literature, but many native speakers have expressed the intuition that

passives are unambiguous. This seems to be what is behind the claim of Larson (2014), reported above, that scope in double object constructions should be related to scope in passive sentences. However, the claim that inverse scope is unavailable in passives is not borne out by the experiment in Kurtzman & MacDonald (1993), nor is it what is found in the two experiments reported here.

Regarding ditransitives, I have only been able to find one work that experimentally tested quantifiers in double object constructions. However, this work looked at variable binding, not scope. This was Viau (2007), who found that adults and children behave like the literature says on variable binding. That is, the first object can bind a pronoun in the second object, but not vice versa (Barss & Lasnik 1986 and subsequent). However, this does not mean that English speakers will not allow the second object to take scope over the first. Variable binding requires scope, but scope does not necessarily enable variable binding, as the phenomenon of weak crossover attests. In fact, numerous researchers have argued that variable binding requires linear precedence in addition to scope (e.g., Shan & Barker 2006, Barker 2012, Bruening 2014). If this is true, then the fact that the second object cannot bind a pronoun in the first is due only to linear order, and not to a failure of scope taking. We should therefore not conclude from Viau's findings on variable binding that naive English speakers will agree with the syntactic literature in their scope judgments.

This sets the stage for the current experiments: there have been no experimental investigations testing whether inverse scope is available in the double object construction. There has also only been one experiment on the passive, and none of the experiments on the active transitive used the verb *have*, to my knowledge. The current experiments compare all of these constructions.

3 Experiment 1: Picture Truth Value Judgment

Experiment 1 was a picture truth value judgment task. Subjects were shown a picture which was accompanied by a sentence. They were asked to say whether the sentence could be true of the picture or not. This was a forced-choice task, with the two possible choices being "could be true" and "definitely false."

The experiment followed a 5x2 design, with factors *Construction* and *Quantifier Order*. The five constructions tested were Active, Passive, Double Object Constructions (DOC), Prepositional Datives (PP), and Have. Quantifier order described the relative order of an indefinite with *a* and a universal quantifier, always *every*. *Every* was either first (EFirst) or last (ELast). The ELast conditions are the ones of interest: the distributive reading will be an inverse scope reading.

3.1 Items

Experimental items were constructed around pictures from the *Scope Fieldwork Project* (pictures created by Benjamin Bruening for testing scope, available at http://udel.edu/~bruening/scopeproject/scopeproject.html). For instance, a set of DOC and PP items were constructed in a set like the following, for the picture shown:

(2)

a. DOCEFirst: The woman gave every girl a dog.
b. DOCELast: The woman gave a girl every dog.
c. PPEFirst: The woman gave every dog to a girl.
d. PPELast: The woman gave a dog to every girl.

A set of four Act(ive) and Pass(ive) items was also constructed around a single picture:

(3)

a. ActEFirst: Every girl caught a rabbit.
b. ActELast: A girl caught every rabbit.
c. PassEFirst: Every rabbit was caught by a girl.
d. PassELast: A rabbit was caught by every girl.

Finally, two Have items were constructed for a single picture:

(4)

a. HaveEFirst: Every man has a bottle.

b. HaveELast: A man has every bottle.

These experimental items were divided into four lists so that no subject saw more than one from each set. Because the number of pictures available was limited, and to keep the experiment to a manageable size, each subject saw only one item from each experimental condition. This means that each subject saw ten experimental items. There were four different DOC/PP sets, four different Active/Pass sets, and two different Have sets. The complete list of items appears in the Appendix.

In addition to the ten experimental items, each subject was also presented with 20 fillers. Each of these was also a picture accompanied by a sentence. An example appears below:

(5)

Filler: Three birds are perching in trees.

The filler items did not use quantifiers of the sort being tested but instead attempted to describe the pictures in other ways (for instance, with numerals, as here). Half of the fillers were true and half were false, in obvious ways. They were used as a check to make sure that subjects were attending to the task. Subjects who got more than 25% of the fillers wrong were removed from the analysis.

Each subject saw 10 experimental items plus 20 fillers, for a total of 30. They judged all 30 to be either true or false. The order of the 30 items on each list was randomized.

3.2 Subjects

20 subjects were recruited for each of the four lists using Amazon Mechanical Turk, for a total of 80 subjects. Participation was limited to people with an IP address in the United States. Subjects were paid $1.00 for completing the survey. Two subjects were removed from the analysis for reporting a language other than English as their native language. Another eight were removed for getting less than 75% of the fillers correct. Another one was removed for answering only 7 of the 30 questions. This left 69 subjects whose data entered the analysis. Of these, 71% were male, with an average age of 34.

3.3 Results

The results of the experiment are shown in Table 1, in the form of the percentage of "could be true" answers. Since the picture depicted a distributive situation, this answer indicates that participants took the sentence to have a distributive reading.

Table 1: Results of Experiment 1

Condition	Percent True
ActEFirst	92.8
ActELast	72.5
DOCEFirst	89.4
DOCELast	72.5
HaveEFirst	98.6
HaveELast	50.7
PPEFirst	89.9
PPELast	98.6
PassEFirst	97.1
PassELast	88.4

As can be seen, all of the EFirst conditions have rates of True answers above 89%, as would be expected. Rates generally go down in the ELast conditions, except with the PP condition. This also ought to be expected, as inverse scope is known to be more difficult than surface scope, except with PPs. Since at least Pica & Snyder (1995), it has been recognized that a quantifier inside a PP can easily take scope over a preceding quantifier.

The rates of True answers in the Active conditions are as one would expect. ActEFirst has a True rate above 90%, while ActELast drops down to 72.5%. This is in line with previous experiments on English-speaking adults, which find that inverse scope is more difficult than surface scope. The two Passive conditions are also in line with the findings of the one previous experiment that looked at passives, Kurtzman & MacDonald (1993). This work found that subjects readily permit inverse scope readings with passives. This was true in the current experiment, too, with

the rate of True answers in the PassELast condition being right up there with EFirst conditions at 88.4%.

The Have conditions reveal a strong asymmetry. HaveEFirst has a rate of True answers close to 100%, but HaveELast drops to the lowest in the experiment at only 50.7%. This indicates that inverse scope is not readily available with the verb *have*, as was noted by Satoshi Tomioka (cited in Bruening 2010a: note 16). However, it does not seem to be ruled out absolutely, as it was still said to be True 50% of the time.

Most surprising are the DOC conditions. These patterned almost exactly like the Active conditions, with DOCEFirst at 89% and DOCELast dropping down to 72.5%. This indicates that inverse scope is available in double object constructions just as it is in simple active transitives, contrary to most of the literature on the topic. It is difficult to reject this finding, as the findings on the other conditions are as would be expected from previous experimental work on quantifier scope.

3.4 Discussion

Experiment 1 found that scope is not frozen in double object constructions for naive speakers of English. Double object constructions patterned exactly like active transitive clauses, where the literature overwhelmingly agrees that inverse scope is available but somewhat dispreferred. Since the subjects' responses on the other conditions are in line with what would be expected based on previous research, it is not possible to simply reject these results.

A second important finding involves the comparison between the DOC condition and the Pass and Have conditions. As noted above, Larson (2014) claimed that scope in double object constructions patterns with passives, while Harley & Jung (2015) claimed that it patterns with the verb *have*. Neither claim was borne out by the results of Experiment 1. Inverse scope in passives was more easily available than it was in double object constructions, while inverse scope with *have* was much less readily available than it was in double object constructions. In other words, all three constructions patterned differently. The construction that double object constructions patterned with most closely was simple active transitive clauses. The results of Experiment 1 therefore provide no support for analyzing double object constructions as involving either a passive-like operation (Larson 1988) or the verb *have* (Harley 1997).

4 Experiment 2: Forced Choice Task

Experiment 2 was intended as a replication of the results of Experiment 1, but using a different task. This was also a forced choice task, but without a picture. Instead subjects were presented with a sentence like the following, accompanied by a question:

(6) There were three players and I kicked every player a soccer ball.
How many soccer balls were there? A: three B: one

The two choices reveal whether the sentence is interpreted distributively or not. If soccer balls vary with players, then the answer is *three*. If the universal quantifier does not scope over the indefinite and distribute over it, then the answer is *one*. The idea is that if there is some grammatical constraint against the universal quantifier taking scope over the indefinite, then this will be reflected in fewer

choices of the *three* answer. (Note that a similar *How many?* task was used in Experiment 6 of Anderson 2004.)

It should be noted before continuing that Experiment 2 is expected to yield lower rates of inverse scope answers than Experiment 1. This is because, in Experiment 1, participants were instructed to say whether a sentence "could be true" of a picture or was "definitely false." If a given participant accesses both readings of an ambiguous sentence, they should choose "could be true," even if they strongly prefer one of those reading over the other (assuming that they are being cooperative). They should only answer "definitely false" if they do not access the distributive reading at all. In contrast, in Experiment 2, participants were instructed to choose the "best or mostly likely answer" to the question. Even if a participant accesses both readings, they may decide that the non-distributive one is better or more likely, especially if that reading is not isomorphic to the word order, and so choose that one even if both are in principle available. Given this, we expect rates of inverse scope readings to go down. Nevertheless, the comparison across the constructions considered here will still be instructive. We should expect to see similar patterns as in Experiment 1.

The experiment followed the same 5x2 design as Experiment 1, with factors *Construction* and *Quantifier Order*. The five constructions tested were again Active, Passive, Double Object Constructions (DOC), Prepositional Datives (PP), and Have. Quantifier order described the relative order of an indefinite with *a* and a universal quantifier, always *every*. *Every* was either first (EFirst) or last (ELast) again.

4.1 Items

A set of four minimally different items was constructed for the Active-Passive conditions, as exemplified below:

(7) a. ActEFirst: There were five visitors and every visitor poured a drink.
How many drinks were there? A: five B: one

b. ActELast: There were five drinks and a visitor poured every drink.
How many visitors were there? A: five B: one

c. PassEFirst: There were five drinks and every drink was poured by a visitor.
How many visitors were there? A: five B: one

d. PassELast: There were five visitors and a drink was poured by every visitor.
How many drinks were there? A: five B: one

Two minimally different items were constructed for the Have condition:

(8) a. HaveEFirst: There were three wine lovers and every wine lover had a bottle.
How many bottles were there? A: three B: one

b. HaveELast: There were three bottles and a wine lover had every bottle.
How many wine lovers were there? A: three B: one

Four minimally different items were constructed for the DOC and PP conditions, as exemplified below:

(9) a. DOCEFirst: There were three players and I kicked every player a soccer ball.
How many soccer balls were there? A: three B: one

b. DOCELast: There were three soccer balls and I kicked a player every soccer ball.
How many players were there? A: three B: one

c. PPEFirst: There were three soccer balls and I kicked every soccer ball to a player.
How many players were there? A: three B: one

d. PPELast: There were three players and I kicked a soccer ball to every player.
How many soccer balls were there? A: three B: one

In all cases, the number of items in the first conjunct (e.g., "there were three players…") was either three, four, or five. Universal quantifiers were always phrases with *every* again, while indefinites were always a form of the indefinite article, as in the examples above. In the DOC and PP conditions, the additional argument (the subject) was always *I* or *we*.

These experimental items were divided into four lists so that no subject saw more than one from each set. To keep the experiment to a manageable size, each subject saw only one item from each experimental condition. This means that each subject saw ten experimental items. There were four different DOC/PP sets, four different Active/Pass sets, and two different Have sets. The complete list of items appears in the Appendix.

In addition to the ten experimental items, each subject also saw 20 fillers. Eight of these were items for another, unrelated experiment. This experiment tested Binding Condition C by asking about the referent of a pronoun, as in the following example:

(10) The hostess introduced him to the woman Paul would eventually marry.
Who was introduced to the woman? A: Paul B: someone else

This experiment was a 4x2 design, with each subject answering a question about two exemplars of each condition, for a total of eight. The other twelve fillers were simply there to check whether subjects were attending to the task. They were typically sentences taken from online newspaper articles, with a two-choice question that had an obvious answer. An example follows:

(11) People are being asked to spend 15 minutes in a sunny spot anywhere in the UK, counting the butterflies they see before submitting sightings online or via an app.
What are people being asked to count? A: bees B: butterflies

Half of these had "A" as the correct answer, and half "B." Subjects were discarded if they did not get 75% of these filler items correct.

Each subject therefore saw 10 experimental items plus 20 fillers, for a total of 30. The order of the 30 items on each list was randomized.

4.2 Subjects

20 subjects were recruited for each of the four lists using Amazon Mechanical Turk, for a total of 80 subjects. Participation was limited to people with an IP address in the United States. Subjects were paid $1.00 for completing the survey. Three subjects were removed for getting less than 75% of the fillers correct. Another was removed for answering only three of the 30 questions. This left 76 subjects whose data entered the analysis. Of these, 61% were male, with an average age of 35.7.

4.3 Results

The results of Experiment 2 are shown in Table 2. Table 2 reports the percentage of distributive answers, that is, the answer "three," "four," or "five," as opposed to "one," the non-distributive answer.

Table 2: Results of Experiment 2

Condition	Percent Distributive
ActEFirst	100.0
ActELast	30.3
DOCEFirst	94.7
DOCELast	43.4
HaveEFirst	97.4
HaveELast	31.8
PPEFirst	51.3
PPELast	88.2
PassEFirst	75.0
PassELast	97.4

The results here are different from the first experiment in absolute terms, as expected: rates of inverse scope readings are much lower than they were in Experiment 1. However, the patterns across conditions are very similar, confirming the results of Experiment 1. First, the EFirst conditions have very high rates of distributive answers, as would be expected, while the ELast conditions are lower, with the exception of the PP and Pass conditions. With PPs, ELast actually favors inverse scope much more than EFirst favors surface scope. While the contrast is much larger for PPs in Experiment 2, the overall pattern is similar. The two Pass conditions are also similar to Experiment 1, although in this case the preference reversed, with PassELast having a higher rate of distributive answers than PassEFirst. Putting the two experiments together, the passive seems to be fully ambiguous, and even strongly favors inverse scope for a universal in the *by*-phrase. The same is true of the PP conditions: quantifiers in PPs easily take scope over object quantifiers that precede them, and in fact it appears that that is the preferred scope reading.

The Active conditions are also as expected, although the contrast between the EFirst and ELast orders is now much larger. Only 30.3% give the inverse scope answer in the ActELast condition, compared to 100% for the ActEFirst condition.

Importantly for the topic of this paper, the DOC conditions were not wildly different from the Active conditions. Inverse scope seemed to actually be *more* readily available in the DOCELast condition than in the ActiveELast condition (43.4% vs. 30.3%). Importantly, there is no evidence to support the claim that scope is frozen in the double object construction. It certainly seems to be no less frozen than in a simple active transitive, where the literature is unanimous in viewing inverse scope as available.

The two Have conditions patterned in Experiment 2 with the Active conditions. The distributive reading was chosen much less in the ELast order than in the EFirst order, but not less so than in the Active conditions. This is unlike Experiment 1, where HaveELast had the lowest rate of distributive readings.

4.4 Discussion

While the results of Experiment 2 differed somewhat from those of Experiment 1, the overall patterns are similar. The two experiments therefore confirm each other. Most importantly, there is no support for the claim that scope is frozen in English double object constructions. In Experiment 2, more participants responded with the inverse scope reading in the DOCELast condition than in the ActiveELast condition.

There was also no support in Experiment 2 for either the claim that double object constructions pattern with passives or the claim that they pattern with the verb *have*. As in Experiment 1, double object constructions patterned with neither. Passives readily allowed inverse scope in Experiment 2, and in fact they seem to do so more easily than any other construction except PPs (probably because one of the quantifiers is in a PP, the *by*-phrase). Double object constructions also did not pattern with the verb *have*; in both Experiments 1 and 2, participants chose the inverse scope reading of double object constructions much more than they did with the verb *have*. The only oddity in Experiment 2 was that active transitive verbs had a very low rate of inverse scope readings, as low as with the verb *have*. This may be an artifact of the particular items used, and probaby also has something to do with the task. As discussed above, in Experiment 1, participants were instructed to say whether a sentence "could be true"; if they saw both readings, they should choose "could be true" for the distributive picture. In contrast, in Experiment 2, they were instructed to choose "the best or most likely answer." If they perceived both readings, they might nevertheless choose the non-distributive one, because it seemed the best or most likely to them. This is certain to be the reason behind the large difference between the two experiments in how often participants chose the inverse scope reading in the ActiveELast condition. But then it is all the more striking that the inverse scope reading was selected more often in the DOCELast condition in Experiment 2. If there were a grammatical constraint against this reading, it should never have been selected, or only very rarely. Instead it seems to be a relatively preferred reading.

5 Overall Discussion

The two experiments reported on here found, using two different experimental tasks, that naive speakers of English permit inverse scope in double object constructions. This contradicts almost all of the literature, where linguists have judged scope to be limited to the reading isomorphic to the linear order. It appears for this phenomenon that the judgments of professional linguists are not representative of the broader population. The question then arises of what is behind the judgments published by linguists.

I can see three possible answers to this question. The first is to say that the linguists are correct, and scope really is frozen in double object constructions, for all speakers of English. The responses from naive speakers in the two experiments here are coming not from the grammar, but from other cognitive processes, for instance logical or mathematical reasoning. The idea would be that someone would see a sentence like *There were three players and I kicked every player a soccer ball*, and their grammar would tell them that there are probably three soccer balls. Then when they see *There were three soccer balls and I kicked a player every soccer ball*, they ignore what their grammar tells them and reason by analogy to the first sentence, concluding that there must be three players. Linguists, being used to accessing linguistic judgments, are able to isolate

their grammar and refrain from using this logical or mathematical reasoning.

This is a possibility, but I see no way to confirm or disprove it. It basically comes down to a decision to trust linguists and ignore naive speakers when their judgments conflict. It seems to me to be a perilous road to take to construct models of language that account only for linguists' intuitions and ignore those of the majority of the population. Perhaps more importantly, this response is also unhelpful in accounting for the pattern of data found here. If the participants in the two experiments were simply ignoring their grammar, then there would be no reason for the different clause types to yield different patterns. There would be no reason that actives and passives would differ, for instance; participants should be ignoring their grammar at the same rate across those two conditions. They would then have to be ignoring their grammar and using analogical reasoning at different rates across the different conditions. Without a theory of how this interaction would take place, there is simply no explanation for the patterns that we have seen here. In contrast, if the responses directly reflect the participants' grammars, then much of the data falls into place; we just have to conclude that the majority of English speakers permit inverse scope in double object constructions.

The second possible reason for the divergence between the findings here and the published literature is that there are two dialects of English. One allows inverse scope in double object constructions, and the other does not. All the linguists who have published on the topic happen to speak the dialect that does not allow inverse scope. This possibility is difficult to evaluate on the basis of the evidence here, since each participant only saw one item from each condition. It is then difficult to say whether any of the ones who answered with the non-distributive answer in the DOCELast condition actually rule out the inverse scope reading. However, in Experiment 2, the majority of those who answered with the non-distributive reading in the DOCELast condition also answered with the non-distributive reading in the ActELast condition. Only 11 of 76 subjects gave the inverse scope answer in the Active but the surface scope answer in the double object construction. In Experiment 1, 14 out of 69 subjects answered "False" in the DOCELast condition but "True" in the ActELast condition. If there is a dialect that rules out inverse scope in the double object construction but allows it in the simple transitive, it seems to be a minority. But again, it is impossible to tell from the pattern of responses in these two experiments, where each subject saw only one item from each condition, whether there are in fact different dialects.

The third possible reason for the divergence between the literature and the present findings is that the prior published literature is wrong. Linguists have been misled, jumping from a very strong preference for surface scope to the conclusion that inverse scope is not available, when in fact it is. There is anecdotal evidence that this third option is the correct one. Some speakers that I have consulted report *I kicked a player every soccer ball* to be completely unambiguous, but then find that the inverse scope reading jumps out when they are presented with a text like, *There were three soccer balls and I kicked a player every soccer ball, so how many players were there?* It appears that for many speakers, inverse scope is generally so non-salient that it seems to be unavailable, but in specific contexts it does become salient and available. I therefore lean toward this third reason for the discrepancy, and tentatively conclude that inverse scope is made available by the grammar of every English speaker in double object constructions. Some English speakers, however, find it so lacking in salience in many contexts that it appears to be unavailable.

Having tentatively concluded that scope is not frozen in double object constructions, for any speaker, we can move on to the theoretical consequences of this finding. The most basic is that theoretical analyses that have been proposed to account for frozen scope are simply unnecessary.

For instance, the claim that covert quantifier raising is subject to superiority (Bruening 2001) is not motivated at all from English double object constructions. (See Larson et al. 2019 for further problems with this claim.) Nor is the theoretical apparatus built by Aoun & Li (1993).

The comparison with passives and the verb *have* also have consequences for different theories of double object constructions. First, the two experiments found, in agreement with Kurtzman & MacDonald (1993), that naive speakers of English permit inverse scope more readily in the passive than they do in the active. This contradicts the original judgment of Chomsky (1957: 100–101), who claimed that passives were unambiguous, but agrees with Katz & Postal (1964: 72) and subsequent literature. Regarding theories of double object constructions, it contradicts the suggestion of Larson (2014) that frozen scope in the double object construction is to be explained in terms of a passive operation. Scope is not frozen in the passive, as Larson (2014) presupposes. It is also not frozen in the double object construction, but the two constructions nevertheless pattern very differently: inverse scope is much less salient in the double object construction than it is in the passive. This tells against Larson's passive-like account of double object constructions.

Second, both experiments also found that double object constructions pattern differently from the verb *have*, contradicting Harley & Jung (2015). In both experiments, participants chose the inverse scope reading with *have* much less frequently than they did with the double object construction. It appears that inverse scope is more readily available in the double object construction than it is with the verb *have*. This is not necessarily deadly for the HaveP theory of double object constructions, as one could perhaps point to the eventive nature of double object constructions versus the stative nature of *have* to explain the discrepancy. However, it does remove any *support* for the HaveP theory from the phenomenon of quantifier scope. Given real problems for the HaveP theory from depictive secondary predicates (Bruening 2018) and fixed expressions like idioms (Bruening 2019), one could take this finding as additional evidence against the HaveP theory.

Finally, various publications have reported that scope is frozen in double object constructions in other languages as well. For instance, Goro (2007) reports this for Japanese, while contradicting the usual claim that scope is also frozen in a simple transitive in Japanese. Kim (2015) reports that scope is frozen in Korean double object constructions, even under scrambling. Antonyuk (2015) reports that (some) ditransitive constructions in Russian also show frozen scope. The current findings should make us question such claims. Given what the current experiments have found in English, it seems highly likely that large-scale experiments run in these languages could have the same result.

Appendix A: Items from Experiment 1

Active and Passive conditions:

(12)

a. ActELast7: A girl caught every rabbit.
b. ActEFirst7: Every girl caught a rabbit.
c. PassELast7: A rabbit was caught by every girl.
d. PassEFirst7: Every rabbit was caught by a girl.

(13) 

a. ActELast8: A woman is riding every horse.
b. ActEFirst8: Every woman is riding a horse.
c. PassELast8: A horse is being ridden by every woman.
d. PassEFirst8: Every horse is being ridden by a woman.

(14) 

a. ActELast9: A woman picked up every tool.
b. ActEFirst9: Every woman picked up a tool.
c. PassELast9: A tool was picked up by every woman.
d. PassEFirst9: Every tool was picked up by a woman.

(15) 

a. ActELast10: A shark is attacking every person.
b. ActEFirst10: Every shark is attacking a person.
c. PassELast10: A person is being attacked by every shark.
d. PassEFirst10: Every person is being attacked by a shark.

DOC and PP conditions:

(16) 

a. DOCELast1: The woman gave a girl every dog.
b. DOCEFirst1: The woman gave every girl a dog.
c. PPELast1: The woman gave a dog to every girl.
d. PPEFirst1: The woman gave every dog to a girl.

(17) 

a. DOCELast2: The girl gave a dog every fish.
b. DOCEFirst2: The girl gave every dog a fish.
c. PPELast2: The girl gave a fish to every dog.
d. PPEFirst2: The girl gave every fish to a dog.

(18) 

a. DOCELast3: The woman gave a dog every dish.
b. DOCEFirst3: The woman gave every dog a dish.
c. PPELast3: The woman gave a dish to every dog.
d. PPEFirst3: The woman gave every dish to a dog.

(19) 

a. DOCELast4: The men are feeding a shark every fish.
b. DOCEFirst4: The men are feeding every shark a fish.

c. PPELast4: The men are feeding a fish to every shark.

d. PPEFirst4: The men are feeding every fish to a shark.

Have conditions:

(20)

a. HaveELast5: A man has every bottle.

b. HaveEFirst5: Every man has a bottle.

(21)

a. HaveELast6: A boy has every ball.

b. HaveEFirst6: Every boy has a ball.

Appendix B: Items from Experiment 2

Active and Passive conditions:

(22) a. ActEFirst9: There were five picnickers and every picnicker packed a corkscrew. How many corkscrews were there? A: five B: one

b. ActELast9: There were five corkscrews and a picnicker packed every corkscrew. How many picnickers were there? A: five B: one

c. PassEFirst9: There were five corkscrews and every corkscrew was packed by a picnicker. How many picnickers were there? A: five B: one

d. PassELast9: There were five picnickers and a corkscrew was packed by every picnicker. How many corkscrews were there? A: five B: one

(23) a. ActEFirst10: There were four visiting ambassadors and every visiting ambassador planted a sapling. How many saplings were there? A: four B: one

b. ActELast10: There were four saplings and a visiting ambassador planted every sapling. How many visiting ambassadors were there? A: four B: one

c. PassEFirst10: There were four saplings and every sapling was planted by a visiting ambassador. How many visiting ambassadors were there? A: four B: one

d. PassELast10: There were four visiting ambassadors and a sapling was planted by every visiting ambassador. How many saplings were there? A: four B: one

(24) a. ActEFirst3: There were five visitors and every visitor poured a drink. How many drinks were there? A: five B: one

b. ActELast3: There were five drinks and a visitor poured every drink. How many visitors were there? A: five B: one

c. PassEFirst3: There were five drinks and every drink was poured by a visitor. How many visitors were there? A: five B: one

d. PassELast3: There were five visitors and a drink was poured by every visitor. How many drinks were there? A: five B: one

(25) a. ActEFirst7: There were four passengers and every passenger grabbed a parachute. How many parachutes were there? A: four B: one

b. ActELast7: There were four parachutes and a passenger grabbed every parachute. How many passengers were there? A: four B: one

c. PassEFirst7: There were four parachutes and every parachute was grabbed by a passenger. How many passengers were there? A: four B: one

d. PassELast7: There were four passengers and a parachute was grabbed by every passenger. How many parachutes were there? A: four B: one

Have conditions:

(26) a. HaveEFirst4: There were four baristas and every barista had a bag of coffee beans. How many bags of coffee beans were there? A: four B: one

b. HaveELast4: There were four bags of coffee beans and a barista had every bag of coffee beans. How many baristas were there? A: four B: one

(27) a. HaveEFirst8: There were three wine lovers and every wine lover had a bottle. How many bottles were there? A: three B: one

b. HaveELast8: There were three bottles and a wine lover had every bottle. How many wine lovers were there? A: three B: one

DOC and PP conditions:

(28) a. DOCEFirst1: There were four children and we threw every child a paper airplane. How many paper airplanes were there? A: four B: one

b. DOCELast1: There were four paper airplanes and we threw a child every paper airplane. How many children were there? A: four B: one

c. PPEFirst1: There were four paper airplanes and we threw every paper airplane to a child. How many children were there? A: four B: one

d. PPELast1: There were four children and we threw a paper airplane to every child. How many paper airplanes were there? A: four B: one

(29) a. DOCEFirst2: There were three players and I kicked every player a soccer ball. How many soccer balls were there? A: three B: one

b. DOCELast2: There were three soccer balls and I kicked a player every soccer ball. How many players were there? A: three B: one

c. PPEFirst2: There were three soccer balls and I kicked every soccer ball to a player. How many players were there? A: three B: one

d. PPELast2: There were three players and I kicked a soccer ball to every player. How many soccer balls were there? A: three B: one

(30) a. DOCEFirst5: There were three teaching assistants and I assigned every teaching assistant a book. How many books were there? A: three B: one

b. DOCELast5: There were three books and I assigned a teaching assistant every book. How many teaching assistants were there? A: three B: one

c. PPEFirst5: There were three books and I assigned every book to a teaching assistant. How many teaching assistants were there? A: three B: one

d. PPELast5: There were three teaching assistants and I assigned a book to every teaching assistant. How many books were there? A: three B: one

(31) a. DOCEFirst6: There were five department store santas and I brought every department store santa a candy cane. How many candy canes were there? A: five B: one

b. DOCELast6: There were five candy canes and I brought a department store santa every candy cane. How many department store santas were there? A: five B: one

c. PPEFirst6: There were five candy canes and I brought every candy cane to a department store santa. How many department store santas were there? A: five B: one

d. PPELast6: There were five department store santas and I brought a candy cane to every department store santa. How many candy canes were there? A: five B: one

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