

Structural ambiguity in DPs with quantity nouns*

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Abstract DPs with quantity nouns (QDPs), like *that amount of nuts*, can combine with predicates of quantities, as in *That amount of nuts is low*, or with predicates of entities, as in *Bo ate that amount of nuts*. One account of such selectional flexibility, inspired by Selkirk (1977) and Rothstein (2009), assumes that the two types of predication are transparently encoded through two types of syntactic structures. In this paper, we draw attention to a syntactic challenge for this account of QDPs, viz. that in certain cases it requires two interpreted occurrences of an entity noun like *nuts* even though only one is pronounced. We argue, however, that this challenge must be met and cannot be avoided by abandoning the structural approach. We make this case by arguing against an alternative analysis of the selectional flexibility of QDPs developed in Scontras 2017. On this alternative, quantity predication and entity predication with QDPs are derived from a uniform syntax, and entity predication with QDPs parallels entity predication with DPs with *kind*, like *that kind of nuts*, under the classic Carlsonian account (Carlson 1977) as developed in Chierchia 1998. We argue that Scontras’ analysis is mistaken, both in positing a unified syntax for the two types of predication with QDPs, and in unifying the analysis of QDPs with the Carlsonian analysis of *kind*-DPs.

Keywords: definite DPs, quantity predicates, pseudo-partitives, kind predication, scope

1 Introduction

Scontras (2017) draws attention to the observation that DPs with *amount*, like (1), participate in two types of predication. They can saturate predicates of abstract quantities, like *be low*, in (2a), or predicates of ordinary entities, as in (2b), where *eat* applies to concrete nuts.

(1) that amount of nuts

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- (2) a. **Quantity predication**
 [DP That amount of nuts] is low.
 b. **Entity predication**
 Bo ate [DP that amount of nuts].

Amount is a representative of a larger class of “quantity nouns”, which also includes, for example, *number*, *range*, *rate*, *proportion*, or *count*. The “selectional flexibility” illustrated in (2) for the DP in (1) is a general property of DPs with such quantity nouns (QDPs). However, like [Scontras \(2017\)](#), we will in the following focus on data with *amount* for illustration.

What might be the source of selectional flexibility QDPs like (1)? In one conceivable approach, the two types of predication go along with two different syntactic structures that transparently encode the respective type of interpretation. Quantity predication would arise from a structure for the DP in (1) where the highest NP is headed by the quantity noun *amount*, as sketched in (3a), while entity predication would be due to a “pseudo-partitive” structure where the NP is headed by the entity noun *nuts*, as in (3b). In the former case, the determiner *that* heads the main DP. In the latter case, *that* and *amount* form a constituent that modifies *nuts* within the main NP, a constituent here labelled “measure phrase” (MP). As signalled by the dots, the head of the DP is not overtly realized.¹

- (3) a. [DP that [NP [[N **amount**] [PP of [NP nuts]]]]]
 b. [DP ... [NP [MP that amount] of [N **nuts**]]]

This structural approach to the selectional flexibility of QDPs parallels a proposal in the literature about DPs with container nouns like *glass*, as in (4). [Landman \(2004\)](#) observed that such DPs can participate in two types of predication (cf. [Selkirk 1977](#)). In the “container predication” in (5a), the predicate *break* intuitively applies to glasses, whereas in the “substance predication” in (5b), the predicate *drink* is understood to apply to a portion of wine.

- (4) three glasses of wine

¹ While (3a) posits that *of* projects a PP, for the pseudo-partitive structure sketched in (3b) we assume that the presence of *of* is due to late insertion and does not project a PP. These assumptions extrapolate from proposals in [Selkirk 1977](#) and [Rothstein 2009](#) about DPs with “classifier nouns”, including container nouns like *glass*, to which we turn below. The absence of a PP layer in (3b) makes it possible for the entity noun to project the main NP. While convenient for exposition, this assumption is not crucial for our purposes. What is crucial is that the NPs in cases like (3b) denote a property of ordinary entities.

- (5) a. [_{DP} Three glasses of wine] broke.
 b. Bo drank [_{DP} three glasses of wine].

Extending proposals in Selkirk 1977, Rothstein (2009) suggests that these two types of predication arise from two different parses of the DP. On her analysis, container predication arises from a structure where the highest NP is headed by the container noun, *glasses* in (6a), and substance predication from a structure where the NP is headed by the substance noun, *wine* in (6b). In the latter case, *three glasses* is parsed as a measure phrase, and the head of the DP is not overtly realized.

- (6) a. [_{DP} three [_{NP} [_N **glasses**] [_{PP} of [_{NP} wine]]]]
 b. [_{DP} ... [_{NP} [_{MP} three glasses] of [_N **wine**]]]

Given the similarity in syntactic form between DPs like (1) and (4), if selectional flexibility with cases like (4) is credited to flexibility of syntactic structure, then a parallel structural analysis of selectional flexibility with QDPs like (1) seems both viable and theoretically parsimonious.

A structural analysis of selectional flexibility gives nevertheless rise to a challenge once a broader range of QDPs is considered. One common type of QDP, illustrated by (7), is introduced by the definite article *the* and features a relative clause following the entity noun. As illustrated in (8), QDPs like (7) exhibit the very same sort of selectional flexibility illustrated above with example (1).

- (7) the amount of nuts that Ai ate
 (8) a. **Quantity predication**
 [_{DP} The amount of nuts that Ai ate] is low.
 b. **Entity predication**
 Bo ate [_{DP} the amount of nuts that Ai ate].

In this case, however, the assumption that entity predication is due to a syntactic structure that transparently encodes it gives rise to a challenge. As we will show, the challenge is that in such a structure, the entity noun would have to be duplicated for interpretation: as sketched in (9), the structure for (8b) would need to feature an interpreted occurrence of *nuts* within the measure phrase-internal relative clause, in addition to an interpreted occurrence of *nuts* that heads the main NP.

- (9) Bo ate [_{DP} ... [_{NP} [_{MP} the amount of nuts that Ai ate] of [_N nuts]]]

The main objective of our paper is to make a case that despite this challenge, the structural account is correct, hence that the duplication challenge must be met, and cannot be avoided by abandoning this approach.

We make our case by arguing against an alternative analysis of the selectional flexibility of QDPs developed in [Scontras 2017](#). To analyze the selectional flexibility of QDPs, Scontras proposes to capitalize on a similar flexibility of DPs containing the noun *kind* (KDPs), DPs of the form illustrated by (10). KDPs can saturate not just predicates of kinds, like *rare* in (11a), but also predicates of ordinary entities, like *eat* in (11b).

(10) that kind of nuts

(11) a. **Kind predication**

[_{DP} That kind of nuts] is rare.

b. **Entity predication**

Bo ate [_{DP} that kind of nuts].

On the classic analysis proposed in [Carlson 1977](#), further developed in [Chierchia 1998](#), the selectional flexibility of KDPs is captured under the assumption that these DPs uniformly denote kinds, and have, furthermore, the same surface syntax in kind predication and entity predication. Under this view, entity predication with KDPs is taken to emerge from principles of semantic composition alone, without being transparently encoded in the syntactic structure.

[Scontras \(2017\)](#) proposes to extend this analysis of KDPs to QDPs. On this view, which we are going to refer to as *the uniformity account*, QDPs uniformly denote quantities, and quantity predication and entity predication are based on the same uniform surface syntax.

We will challenge Scontras' proposal on the basis of observations which we take to indicate that neither of the two unifications that his proposal achieves is ultimately desirable. In [Section 4](#), we argue that entity predication with QDPs and KDPs should not be unified, since the two types of DPs have different scope properties in cases of entity predication. Then, in [Section 5](#), we argue that the availability of entity predication with QDPs is restricted in a way that cannot be understood if quantity predication and entity predication had a unified syntax. These findings lead us to conclude, in [Section 6](#), that the structural account is correct, and that therefore the duplication puzzle needs to be contended with, rather than avoided.

[Section 2](#) and [Section 3](#) set the stage for these arguments. [Section 2](#) explains why the structural account runs into the duplication challenge, then [Section 3](#) goes over the uniformity account, which presents itself as an initially appealing way to avoid the duplication challenge.

2 The duplication challenge

Consider again the selectional flexibility of definite QDPs like (12), illustrated in (13) below:

(12) the amount of nuts that Ai ate

(13) a. **Quantity predication**

[_{DP} The amount of nuts that Ai ate] is low.

b. **Entity predication**

Bo ate [_{DP} the amount of nuts that Ai ate].

We said above that for QDPs of this form, entity predication requires a structure with two interpreted occurrences of the entity noun. For example, the structural account is committed to assigning (13b) an interpreted structure like (14).

(14) Bo ate [_{DP} ... [_{NP} [_{MP} the amount of nuts that Ai ate] of [_N nuts]]]

To see why this is so, let us first consider the desired denotation of (12) for the purposes of quantity predication, as in (13a). As an argument of the quantity predicate *be low*, the target denotation for the DP is an abstract quantity. For example, in a world w_1 where Ai ate exactly 100g of nuts, the desired DP denotation would be the weight quantity 100g. More generally, the quantity denotation of (12) can be stated in the format in (15).

(15) $\max\{q: \exists x[\text{nuts}(x) \wedge \mu(x) = q \wedge \text{ate}(\text{Ai}, x)]\}$

In (15), q is a variable ranging over quantities, which are taken to be primitives in an ordered domain, such as the weight quantity 100g; μ is a variable ranging over measure functions, mapping entities to quantities; and \max is a function that maps a set of quantities to its largest member. Suppose now that μ specifically maps entities to their weight. In the world w_1 described above, the expression in (15) then picks out the intended weight quantity 100g.

Assuming the DP denotation in (15), the quantity predication in (13a) straightforwardly invokes nothing more than functional application, yielding the truth conditions stated in (16).

(16) **Quantity predication**

low((15))

But what about the entity predication in (13b)? Consider again the world w_1 , where Ai ate exactly 100 grams of nuts. The conditions for the truth of (13b) in this world can be rendered as an existential statement, that *there is* a plurality of nuts weighing

100g that Bo ate. More generally, the truth conditions for the entity predication sentence in (13b) can be stated with reference to (15) as in (17), stating that Bo ate at least a plurality in the set in (18), the set containing all pluralities of nuts measuring the quantity in (15).

(17) **Entity predication**

$\exists x[x \in (18) \wedge \text{ate}(\text{Bo}, x)]$

(18) $\{ y: \text{nuts}(y) \wedge \mu(y) = (15) \}$

These existential truth conditions allow for (13b) to be true in a world where Bo ate a larger amount of nuts than Ai did. Like Scontras (2017), we take this to be correct, given, for example, the fact that (13b) permits felicitous continuations like (19).

(19) In fact, he ate a larger amount of nuts than she did.

The observation that (13b) has the truth conditions in (17) leads to the question of what syntactic structure these truth conditions might arise from. Under the structural account, this entity predication arises from a structure where *nuts* serves as the head of the main NP. To flesh out such a structure further, it will be helpful to once again consider the statement that there is a plurality of nuts weighing 100g that Bo ate, now rendered as a formula in (20), which refers to the set in (21). Intuitions suggest that this statement provides the truth conditions of the sentence in (22a). As sketched in (22b), the latter sentence features a pseudo-partitive DP in object position, where the sequence *one hundred grams* is naturally analyzed as a measure phrase modifying the entity noun *nuts*.

(20) $\exists x[x \in (21) \wedge \text{ate}(\text{Bo}, x)]$

(21) $\{ y: \text{nuts}(y) \wedge \mu(y) = 100\text{g} \}$

(22) a. Bo ate one hundred grams of nuts.

b. Bo ate $[_{DP} \dots [_{NP} [_{MP} \text{one hundred grams}] \text{ of } [_{N} \text{nuts}]]]$

Now consider the sentence in (13b), repeated in (23). Given our discussion of (22a), we are led to attribute the truth conditions in (17) for sentence (23) to the parallel structure in (14) above, repeated in (24) below, where now the entire sequence in (12), repeated in (25), is parsed as a measure phrase modifying the entity noun *nuts*.

(23) Bo ate $[_{DP} \text{the amount of nuts that Ai ate}]$.

(24) Bo ate $[_{DP} \dots [_{NP} [_{MP} \text{the amount of } \boxed{\text{nuts}} \text{ that Ai ate}] \text{ of } [_{N} \boxed{\text{nuts}}]]]$

(25) the amount of nuts that Ai ate

The structure in (24) for the entity predication in (23) raises the challenge previewed above. While (24) features two interpreted occurrences of the entity noun *nuts*, in sentence (23) *nuts* is pronounced only once.

Note that it is not viable to dispense with noun duplication by simply denying that each of these nouns is interpreted. Structures where one of the two nouns is omitted yield unattested truth conditions. Omitting *nuts* from the measure phrase would yield the wrong quantity, viz. the amount of all things, nuts and non-nuts, that Ai ate; and omitting the higher occurrence of *nuts* would yield truth conditions that are too weak, incorrectly permitting truth in a world where Bo didn't eat nuts.²

3 The uniformity analysis

Scontras (2017) offers an alternative to the structural account of selectional flexibility with QDPs. The central assumption that underlies this alternative—which we call “the uniform analysis”—is that the denotation of a QDP is not a primitive quantity like 100g, not even in cases of quantity predication. Instead, a QDP’s denotation is taken to be constructed from ordinary entities.

Suppressing momentarily certain details of Scontras’s implementation, for the sake of exposition, the uniformity analysis construes the denotation of a QDP as a set of ordinary entities that all share a certain measure. To illustrate this idea, let us attend to the definite QDP in (12), repeated again in (26). The denotation that the uniformity analysis assigns to (26) is given in (27) with reference to (28).

(26) the amount of nuts that Ai ate

(27) $\{ y: \text{nuts}(y) \wedge \mu(y) = (28) \}$

(28) $\max\{ q: \exists x[\text{nuts}(x) \wedge \mu(x) = q \wedge \text{ate}(\text{Ai},x)] \}$

The set in (27) contains pluralities that are quantity-uniform, in the sense that all are mapped to the same output by the measure function μ , viz. the quantity that μ also outputs for the totality of nuts that Ai ate. To make this more concrete, suppose again

² To some extent, the argument that led us to the duplication challenge with definite QDPs with a relative clause could be reproduced for QDPs without a relative clause, like *that amount of nuts*. For entity predication, the same path of reasoning presented in the main text could have led us to a parse like (i). However, in this case, one could perhaps deny that the noun *nuts* must be interpreted within the measure phrase. Perhaps *that amount*, without *nuts*, can pick out the same quantity that *that amount of nuts* would pick out in (i), e.g. 100g. If so, a parse like the one sketched in (ii), proposed in Section 1, will express the intended meaning, hence a parse like (i) will not be needed.

(i) $[_{DP} \dots [_{NP} [_{MP} \text{that amount of } \boxed{\text{nuts}}] \text{ of } [_N \boxed{\text{nuts}}]]]]$

(ii) $[_{DP} \dots [_{NP} [_{MP} \text{that amount}] \text{ of } [_N \text{nuts}]]]$

that μ maps entities to their weight. The set in (27) is then the set of nut pluralities that have the same weight as the totality of nuts that Ai ate. For example, in the world w_1 from above, where Ai ate exactly 100g of nuts, (27) would be the set of all nut pluralities that weigh 100g.

We have encountered the set in (27) above. It is the set of pluralities that the structural account posits as the denotation of NP under a pseudo-partitive parse. Crucially, however, the uniformity account posits this set as the denotation of the sole parse of DP, not as the denotation of NP on one of two parses.

We will not review the internal semantic composition that in Scontras' analysis derives the DP denotation in (27). However, this composition is based on a structure for the QDP where the head of the main NP is *amount*. Crucially, despite the fact that the meta-language expression in (27) references the nuts property twice, in the composition the entity noun *nuts* is interpreted only once. This means that the uniformity analysis does not require the sort of noun duplication needed under the structural account.

Denotations like (27) can be assumed to directly serve as the arguments of quantity predicates. If so, the truth conditions of (29), in (30), would simply result from applying the quantity in (27) to the predicate *low*.

(29) **Quantity predication**

[_{DP} The amount of nuts that Ai ate] is low.

(30) $\text{low}((27))$

Because quantities are construed as sets of ordinary entities, the uniformity analysis makes it possible to understand entity predication in terms of existential quantification over the QDP's denotation. The truth conditions of (31) are then as in (32). These truth conditions are the very same truth conditions derived above under the structural account.

(31) **Entity predication**

Bo ate [_{DP} the amount of nuts that Ai ate].

(32) $\exists x[x \in (27) \wedge \text{ate}(\text{Bo}, x)]$

As foreshadowed above, the uniformity analysis of QDPs parallels a classic analysis of KDPs, DPs with the noun *kind* like (33). Carlson (1977) proposed that KDPs uniformly denote kinds. Kind predication is then captured directly. For example, assuming that (33) denotes the kind *Anacardium occidentale* (cashews), the truth conditions of (34a) can be stated as in (34b), where the predicate *rare* directly applies to the kind *Anacardium occidentale*.

(33) that kind of nuts

- (34) a. **Kind predication**
 $[_{DP}$ That kind of nuts] is rare.
 b. rare(anacardium-occidentale)

As for entity predication, Carlson proposes to appeal to existential quantification over ordinary entities that *instantiate* the kind denoted by the KDP, as in (35b).

- (35) a. **Entity predication**
 Bo ate $[_{DP}$ that kind of nuts].
 b. **Entity predication**
 $\exists x$ [x instantiates the kind Anacardium Occidentale \wedge ate(Bo,x)]

The parallel of the uniformity analysis of QDPs to the Carlsonian analysis of KDPs is apparent. In fact, Scontras proposes to assimilate the two analyses further by building on an elaboration of the Carlsonian analysis given in Chierchia 1998. Chierchia suggests that rather than being ontological primitives, kinds are “nominalized” properties of ordinary individuals. The underlying assumption is that any property of individuals can be mapped to a kind by a nominalizing operator \cap , and any such kind can be mapped back to the corresponding property by a denominalizing operator \cup . This reconstruction of kinds makes it possible to explicate the instantiation relation invoked in the Carlsonian analysis: to say that x instantiates k is to say that x has the property $\cup k$, that is, the property that k is the nominalization of. Given this, the truth conditions in (35b) can be restated as in (36).

- (36) **Entity predication (KDP)**
 $\exists x$ [\cup anacardium-occidentale(x) \wedge ate(Bo,x)]

Building on this elaboration of the Carlsonian analysis of KDPs, Scontras proposes that quantities are also to be construed as nominalized properties, rather than as sets, as in the stripped down rendition given above. If so, the set in (27), repeated in (37), is to be replaced with the corresponding nominalized property in (38), and, accordingly, (32) must be updated as in (39).

- (37) { y: nuts(y) \wedge μ (y) = (28) }
 (38) $\cap \lambda x$. nuts(x) \wedge μ (x) = (28)
 (39) **Entity predication (QDP)**
 $\exists x$ [\cup (38)(x) \wedge ate(Bo,x)]

By reconstructing both kinds and quantities as nominalized properties, Scontras paves the way for a full unification of entity predication with QDPs and KPDs. In

particular, this reconstruction makes it possible to unify the sources of existential quantification in the two types of entity predication. Chierchia (1998) introduces a postulate of “derived kind predication.” Stated somewhat informally, for any property of ordinary entities P , and any kind k , derived kind predication maps P and k to the statement $\exists x[\cup k(x) \wedge P(x)]$, that is, that P holds of some entity that instantiates k . With quantities construed as nominalized quantities as well, derived kind predication can also be invoked for the analysis of QDPs.

If a Carlsonian approach of kind predication is accepted, extending an elaboration of this approach into an analysis of QDPs has the benefit of being theoretically parsimonious. One further notable feature of the uniformity analysis of QDPs is that no special demands are placed on syntactic structure. Both quantity predication and entity predication emerge from uniform structures where a QDP appears in the argument position of a lexical predicate, without the need for any structural ambiguity or covert structure. In particular, the uniformity analysis steers clear of requiring the sort of noun duplication needed for entity predication under the structural account.

4 Non-uniformity: entity predication with QDPs versus KDPs

While the unification of entity predication with QDPs and KDPs that is achieved under the uniformity analysis has the benefit of being theoretically parsimonious, this benefit is of course conditional on the assumption that the two types of entity predication indeed show the predicted parallel behaviour. Our goal in this section is to show that the two types of entity predication do not in fact seem to be fully aligned in the expected way. Specifically, they do not show uniform scope for the associated existential quantification.

Carlson (1977: sec. 2.3) reports that the existential force associated with KDPs in entity predication is restricted to taking scope under any accompanying operator. He illustrates this proposed generalization with a range of operators. For illustration, we will focus on the case of negation. Consider sentence (40), where the DKP *this kind of animal* saturates the entity predicate *in this room*. Carlson (1977: 436) observes that this sentence must be interpreted with negation outscoping the existential quantification associated with the DKP, conveying that there is no animal of this kind that is in this room. The reverse scope order, which could yield the meaning that there is an animal of this kind that is not in this room, is unavailable.

(40) This kind of animal is not in this room.

To confirm that negation in (40) is restricted to taking wide scope, Carlson notes that the sentence in (41) is judged to only have a contradictory reading.

- (41) This kind of animal is in this room, and this kind of animal is not in this room.

If the existential quantification associated with the entity predication in the second conjunct could scope above negation, the resulting reading would be a contingent statement conveying that there is an animal of the relevant kind that is in the room and that there is also one that is not in the room. Carlson points out, however, that the sentence cannot in fact be so understood. Instead, it can only be read as being contradictory. This is captured if existential quantification in the second conjunct scopes below negation. In that case, the second conjunct conveys that there is no animal of the relevant kind, and the two conjuncts are contradictories.

Carlson derives the narrow scope property of entity predication by assuming that existential quantification is introduced by the entity predicate itself. Similarly, in his elaboration of the Carlsonian analysis outlined above, Chierchia (1998) derives the narrow scope property from the assumption that derived kind predication can only apply to properties of ordinary entities expressed by lexical elements, not to properties expressed by derived structures.

Given the scope properties of KDPs, Scontras' uniformity analysis of QDPs makes a prediction, viz. that in entity predication with QDPs, the existential force associated with the QDP is likewise restricted to taking narrow scope. That prediction is not borne out. To illustrate, consider, for example, the sentence in (42), where the QDP *that amount of nuts* saturates the entity predicate *chopped*.

- (42) That amount of nuts wasn't chopped.

Suppose for concreteness that the quantity that the demonstrative *that* refers to in (42) is 100g. The sentence can then certainly be understood as conveying that there is no plurality of nuts weighing 100g that was chopped, a reading that arises from existential quantification scoping below negation. Crucially, however, the sentence can also be read as stating that there is a plurality of nuts weighing 100g that was not chopped. To confirm this judgment with a truth value intuition, consider a world w_2 where there are 200g of nuts, of which 100g was chopped and 100g wasn't, and suppose again that *that* picks out 100g. With negation scoping wide, sentence (42) would be false in w_2 , because there exists a 100g plurality of nuts that *were* chopped. With existential quantification scoping high, in contrast, (42) would be true in w_2 , because there exists a 100g plurality of nuts that were *not* chopped. Intuitively, (42) can indeed be judged true in w_2 , confirming that the existential quantification associated with the entity predication can be interpreted as outscoping negation.

The claim that QDPs permit wide scope existential quantification over entities can be further supported with naturally occurring data. In the context in which sentence (43) is embedded in the text in (44), the sentence is understood to convey

that there was aid in a significant amount that did not reach the refugees, a reading that is consistent with there are also being a significant amount of aid that did reach them.

- (43) A significant amount of aid was not reaching the refugees.
- (44) The claims seem at least partially borne out by an internal UNHCR report, which in December found that much of a 5,000 ton food shipment sent to Ingushetia through the Russian Ministry of Emergency Services went astray. The UNHCR responded by bringing in the Danish Refugee Council. “They realized that a significant amount of aid was not reaching the refugees,” says Mr. Trier.

(reliefweb.int)

Notably, the availability of this wide scope existential reading does not seem dependent on the fact that the QDP in (43) is introduced by the indefinite article, rather than a demonstrative or definite article. The reading appears to be preserved in demonstrative or definite variants of (43), as in, for example, *It is shocking that once again that amount of aid did not reach the refugees*. Moreover, sentence (45) is an attested demonstrative case with the quantity noun *number* where existential quantification clearly can take scope over negation. In the context in (46), (45) conveys that there was a certain number of “voters”, viz. 30, who did not cast a vote on the levy.

- (45) That number of voters didn’t cast a vote on the levy.
- (46) The final results found 347 voters casting a yes vote, while 351 said no to the levy. There was one over vote—meaning a person voted yes and no for the levy—and 30 under votes where that number of voters didn’t cast a vote on the levy.

(www.sidneydailynews)

We conclude that existential quantification in entity predication with QDPs cannot be analyzed in the way proposed in [Scontras 2017](#). While derived kind predication predicts such existential quantification with QDPs to always scope lowest, the evidence is clear that scope is not actually so restricted. Moreover, if existential quantification in entity predication with KDPs *is* confined to taking narrow scope, as originally reported in [Carlson 1977](#), then we can conclude that more generally, entity predication with KDPs and QDPs cannot be given a fully unified account.

5 Non-uniformity: quantity predication versus entity predication

The uniformity account of entity predication for QDPs not only aims for a unification with entity predication for KDPs, but also for a unification of the syntactic form of quantity and entity predication for QDPs. As noted, both types of predication are predicted to emerge without any further assumptions whenever a QDP occupies the argument position of a quantity predicate and entity predicate, respectively. In particular, there are no further syntactic conditions to be met for entity predication to be possible.

The unification of the syntactic form of quantity and entity predication of QDPs is, in principle, appealing, because it helps steer clear of the duplication challenge that arises under the structural account. However, we will now see that this move directly faces an overgeneration challenge.

The challenge arises with a type of QDP that seems to have escaped attention in the literature. These are QDPs where the complement of *of* is a finite clause that takes the form of an embedded *wh*-question asking for quantities or degrees, introduced by *wh*-phrases like *how much*, *how many*, or *how often*. We will accordingly refer to these QDPs as *wh-QDPs*. The bracketed DPs with *amount* in the list in (47), collected from the internet, are cases in point.

- (47) a. [The exact amount of how much sugar you should consume] depends on several factors.
b. Today I have exceeded [the amount of how many romcom's a single person can watch in one day].
c. Just multiply [the amount of how many bottles you need] by how many ounces are in a half gallon.
d. [The amount of how much filler usually needed to treat the upper face] is 1-2cc.

It is possible that the use of such *wh-QDPs* in English is confined to certain dialects. At the same time, their use seems productive. In particular, the naturally occurring examples in (48) suggest that *wh-QDPs* can be formed with any quantity noun that can feature in QDPs at large, including *number*, *range*, *rate*, *proportion*, and *count*.

- (48) a. [_{DP} The number of how many trees are cut down each year] is staggering.
b. [_{DP} The range of how many colds is considered normal] is quite broad.
c. The Transportation Security Administration in 2020 doubled [_{DP} the rate of how often agents caught firearms in travelers' luggage].
d. [_{DP} The proportion of how much of your payment goes toward interest and principal] will change each month due to amortization.

- e. The app allows you to display [_{DP} the count of how many people wishlisted the products].

Note that in all of the examples in (47) and (48), the wh-QDP sits in the argument position of a quantity predicate: *depend on*, *exceed*, *multiply*, *be 1-2cc*, *staggering*, *double*, *change*, *display*.³ We take it that in each of these cases, the wh-QDP could be replaced with a more ordinary definite QDP without a change in meaning or felicity. For example, each of the sentence in (49) seems equivalent to its counterpart in (47).

- (49) a. [_{DP} The exact amount of sugar that you should consume] depends on several factors
 b. Today I have exceeded [_{DP} the amount of romcom's that a single person can watch in one day].
 c. Just multiply [_{DP} the amount of bottles that you need] by how many oz are in a half gallon.
 d. [_{DP} The amount of filler usually needed to treat the upper face] is 1-2cc.

Given these equivalencies, the conclusion seems inescapable that a wh-QDP can refer to a quantity, in fact that it can denote the very same quantity that its non-wh counterpart can denote. We are led to conclude, for example, that the ordinary QDP in (50a) and its wh-QDP counterpart in (50b) denote the same quantity.

- (50) a. the amount of yogurt Ai ate
 b. the amount of how much yogurt Ai ate

Under the uniformity analysis of QDPs, this conclusion about wh-QDPs now leads to a prediction. Precisely in virtue of not tying entity predication to any syntactic conditions, this analysis predicts that wh-QDPs should participate in entity predication no less than other QDPs. When a QDP appears in the argument position of an entity predicate, whether it is a wh-QDPs or not, derived kind predication should be invoked and derive existential quantification over ordinary entities.

However, the prediction that wh-QDPs should participate in entity predication is not borne out. To illustrate, consider the cases in (51), where the DPs in (50) serve

³ While these predicates instantiate a natural class for our purposes, the class of quantity predicates, we acknowledge that they seem diverse in terms of how exactly they compose with their arguments. For example, the QDP arguments of *depend on* (47a) and (49a) are so-called concealed questions. Under one prominent analysis (e.g., Heim 1979, Romero 2005, Frana 2017) the DP argument in such cases contributes an individual concept, here a function from possible worlds to quantities. Other quantity predicates in our examples, like *multiply* in (47c) and (49c), more plausibly apply to a quantity picked out in the actual world directly. We leave a more detailed investigation of the lexical semantics of quantity predicates for another occasion.

as the complement of *eat*. The entity predication in (51a) is once again perfectly acceptable and has the expected meaning, that Bo ate yogurt in the amount that Ai ate. In contrast, however, the attempted entity predication (51b) clearly fails, as the sentence is judged sharply unacceptable.

- (51) a. Bo ate [_{DP} the amount of yogurt Ai ate].
 b. # Bo ate [_{DP} the amount of how much yogurt Ai ate].

Notably, this judgment is aligned with the fact that we have not found any naturally occurring instance of a wh-QDP that unambiguously occupies the argument position of an entity predicate. The fact that all of the data in (47) and (48) feature quantity predication does not seem accidental, but reflects a clearcut limitation in how wh-QDPs can enter into the semantic composition.

We interpret these findings as showing that the uniformity analysis is mistaken in positing a general mechanism, like derived kind predication, that allows for any quantity denoting DPs to enter the composition in the argument position of an entity predicate. The wh-QDP data show that such a general mechanism overgenerates entity predication.

6 Non-uniformity under the structural account

While the data examined in the last two sections pose a challenge for the uniformity account of QDPs, they are unsurprising under the structural account.

Recall first that the structural account credits entity predication to parses of the QDP where the main NP is headed by the entity noun. For example, the entity predication cases in (52) are assumed to invoke the structures for the QDPs that are sketched in (53).

- (52) a. Bo ate [_{DP} that amount of nuts].
 b. Bo ate [_{DP} the amount of nuts that Ai ate].
- (53) a. [_{DP} ... [_{NP} [_{MP} that amount] of [_N nuts]]]
 b. [_{DP} ... [_{NP} [_{MP} the amount of nuts that Ai ate] of [_N nuts]]]

Consider now the observation reported in the last section, and illustrated again in (54), that wh-QDPs cannot participate in entity predication.

- (54) # Bo ate [the amount of how much yogurt Ai ate].

Under the structural account, this calls for the assumption that wh-QDPs resist a parse where the entity noun serves as the head of the main NP. For (54), for example, the NP structure in (55) would be ill-formed.

(55) *_{[DP ... [NP [MP the amount of [CP how much yogurt Ai ate]] of [N yogurt]]}

At this point, in the absence of a detailed syntactic analysis of wh-QDPs, the unavailability of such parses does not fall out as a prediction. However, for our purposes it is enough to note that there is also no prediction that such structures *are* available. This is enough to establish that the structural account is *consistent* with the observation that wh-QDPs resist entity predication.

The structural account contrasts with the uniformity account, then, in that the former is compatible with the observation that wh-QDPs resist entity predication, while the latter isn't.

Returning now to the DP structures in (53), we observe that, in each case, we assumed that the main NP will denote a quantity-uniform set of pluralities of ordinary individuals, here nuts, which, in cases of entity predication, serves as the restrictor of existential quantification. A question left open so far is what the source of this quantification might be. Note that this question is not specific to QDPs, but more broadly arises with pseudo-partitive structures. For example, it needs to be understood how sentence (56) winds up conveying that *there is* a plurality of nuts weighing 100g that Bo ate.

(56) Bo ate _[DP one hundred grams of nuts].

One common answer to this question is that in the course of semantic composition, the NP predicate can be mapped to an existential generalized quantifier. This could be in virtue of the DP being headed by a silent existential determiner (cf., e.g., Hackl 2000), or because of a general type shifting principle that is not represented in the syntax (Partee 1987). In either case, a scope shifting mechanism could allow for the existential quantification to take scope over negation in data like those discussed in Section 4.

The more general point is that the structural account of entity predication is fully compatible with sources of existential quantification that allow for this quantification to outscope other operators. Moreover, by not positing a unification of QDPs with KDPs, the structural account is of course fully compatible with the view that entity predication with KDPs has the narrow scope property described in Carlson 1977.

7 Conclusion

We have seen that the uniformity account of entity predication with QDPs is subject to challenges that are avoided under the structural approach. It is therefore reasonable to hypothesize that the structural approach is on the right track.

However, we have seen that the structural approach faces a syntactic challenge, the duplication of the entity noun discussed in Section 2. If the structural approach is on the right track, we must then face the noun duplication challenge.

To recap, the challenge that the structural approach faces is this: we saw that in a structure that transparently reflects the entity predication in (57), the entity noun *nuts* is interpreted twice, once as the head of the main NP and once internal to the measure phrase. The interpreted structure of the main DP in (57), for instance, must look as sketched in (58).

(57) Bo ate [_{DP} the amount of nuts that Ai ate].

(58) [_{DP} ... [_{NP} [_{MP} the amount of nuts] [_{CP} that Ai ate]] (of) [_N nuts]]]

We should clarify that, if the preposition *of* had semantic content, it would also give rise to a duplication problem, given its two occurrences in (58). However, as indicated above, *of* in pseudo-partitives is plausible semantically vacuous (Selkirk 1977; Rothstein 2009) Therefore, neither of the two occurrences may actually be present in the interpreted structure.

What are the principles of syntax that allow for the noun duplication? While we will not be able to address this question in depth, we would like to briefly attend to one central issue, viz. the question of which of the two interpreted occurrences of the entity noun is the one that is actually pronounced.

At first sight, given the word order actually observed in (57), it may appear as though it is the MP-internal occurrence of *nuts* that must be pronounced, hence that the occurrence of *nuts* in the head of the main NP remains silent. However, we would like to point out that there is another possibility. It is conceivable that the relative clause *that Ai ate* in (57) is pronounced at the right edge of NP in virtue of having undergone extraposition. In that case, as sketched in (59), the two interpreted occurrences of (*of*) *nuts* would actually be contiguous in surface form. Deleting either of those occurrences would then yield the same surface string. So the observed word order would be compatible with the MP-internal occurrence remaining silent.

(59) [_{DP} ... [_{NP} [_{MP} the amount of nuts _____] (of) [_N nuts]]] [_{CP} that Ai ate]]

Such an analysis would render noun duplication in QDPs more similar to familiar instances of ellipsis in comparatives, as in *Bo ate more nuts than Ai did*, where the comparative clause is naturally analyzed as containing an unpronounced but interpreted occurrence of *nuts* (see Mendia 2017 for a parallel conclusion about Spanish definite DPs with quantity interpretations.) We leave this remark as a suggestion for now and defer an in-depth exploration of this possibility for another occasion.

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Structural ambiguity in QDPS

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