The Syntax and Compositional Semantics of English *ONE*[1]

Gerhard Schaden — Université de Lille & CNRS UMR 8163

Abstract. In this paper, I analyse the syntax and semantics of the unity cardinal *one* in English. I argue that an NP-ellipsis account is not able to provide a unified account of the major uses, and propose to adopt a variable-free analysis.
Keywords: *one*, predicate anaphora, unity cardinals, variable-free semantics.

1. Introduction

Unity cardinals (like English *one*) are an important source in the grammaticalisation of indefinite articles. Unfortunately, rather little work has been done on the compositional semantics of such cardinals (but see Barbiers, 2005, 2007; Borer, 2005). The present paper aims to give an explicit and monosemic account of its uses, in order to serve as a point of departure for further investigating the meaning and use of such expressions. This paper focuses on *one*, since English provides a clear morphological distinction between the unity cardinal and the indefinite article — contrary to Romance languages, where these uses may be prosodically different, but use the same form. This is illustrated in for French in (2), which can correspond to either (1a) or (1b).

(1) a. Ethel has seen a girl.
b. Ethel has seen one girl.

(2) Cunégonde a vu une fille.
C. has seen UN girl

One feature of unity cardinals is that they generally seem to have "adnominal" and "pronominal" uses, as is illustrated in (3) for (late) Latin:

(3) a. [. . .] non potes unum capillum album facere aut nigrum [Matthew 5:36]
NEG can.2SG ONE hair white make or black
'you cannot make (even) one hair white or black'
b. nemo potest duobus dominis servire aut enim unum odio habebit et alterum
no one can two master serve either indeed one hate have.FUT and other
diliget [. . .] [Matthew 6:24]
loves
'No one can serve two masters. Either you will hate the one and love the other . . . '

I therefore take it that an account for *one* should be able to deal with all of its uses.

[1]I would like to thank Kathleen O'Connor and Chris Piñon for their judgments and for discussing the examples with me. I had the opportunity to present a previous version of this talk at *NISM 2016*, and I would like to thank the organizers and the audience there, and especially Nicolas Asher, Jeremy Kuhn and Hedde Zeijlstra, for their feedback. I also presented a version of this paper at the seminar of the UMR 7023 Structures formelles du langage, and I would like to thank the audience there, and especially Claire Beyssade, Patricia Cabredo Hofherr, Giorgio Magri, Laurent Roussarie, and Anne Zribi-Hertz. All errors and omissions are mine alone.

2. The Syntacs of ONE

2.1. Basic Data on Adnominal & Pronominal Uses in English

In this section, I will try to show that English *one* has at least three syntactically differing uses of *one*, namely the determiner use (see 4), the pronominal use (see 5), and the prosortal use (see 6).

(4) Ethel saw one rabbit.

(5) Ethel saw one.

(6) John read a Greek philosopher; Fred read a German one.

In the determiner use, *one* has the distribution familiar from determiners; in the case of the pronominal use, *one* seems to have the distribution of a DP. The prosortal use is the one familiar from the *one-replacement* test, and has the distribution of an NP. The term *prosortal* is taken from Brandom (1994: 438), as is example (6).[2]

While the determiner and the pronoun use seem to be perfectly identical to other cardinals (see (7a-b), which reproduce (4) and (5)), the prosortal uses are not as easily reproduced.

(7) a. Ethel saw two | three | *n* rabbits. b. Ethel saw two | three | *n*.

First, the prosortal alternates in the plural with *ones*, whereas the pronoun alternates with other cardinals:

(8) a. Fred read the German one.
b. Fred read the German ones.
c. ?* Fred read the German four.

(9) a. Fred saw one.
b. * Fred saw ones.
c. Fred saw three.

Second, while other cardinals can be pluralized (see (10), drawn from COCA), this process seems to be acceptable in a much more constrained fashion.

(10) a. [. . .] bad things happen in threes.
b. [. . .] they don't beat my jacks and my threes [. . .]

Typical meanings of pluralized cardinals are cards or dice throws carrying that number, or also groups consisting of *n* members. However, it is extremely difficult to get an arbitrary noun meaning for such examples, as is illustrated in (11).

[2] In fact, Brandom's classification is a semantic one, and does not deal with syntax. He does not distinguish between what I call the pronoun use and the prosortal use, and which is based in this paper on distributional facts. He is probably right in doing so as far as semantics are concerned, but for the moment, I will try to make this distinction explicit.

(11) *? Fred read the German fours.

(11) cannot mean that Fred read one (or several) set(s) of books of cardinality four.

Third, adjectives precede unproblematically the prosortal (which behaves like a common noun, see 12), but not the pronoun (which behaves like a personal pronoun, cf. 13):

(12) a. Fred saw the cute one.
b. Fred saw the cute bear.

(13) a. * Fred saw cute one.
b. * Fred saw cute him.

Finally, the prosortal combines felicitously with *bona fide* cardinals (see 14), which is not the case for any other cardinal (see, e.g., 15):

(14) a. Throughout France, stairwells and elevators are cramped. Pack two or three small bags rather than one big one.[3]
b. Fred read the three German ones.

(15) a. * Fred read three German four(s).
b. * Fred read three German three(s).
c. * Fred read four German three(s).

I will assume that an account for *one* should be able to deal with the determiner, the pronominal and prosortal uses — and hopefully, in a unified manner. In the next section, I will investigate whether this is possible, and what the cost is for such a move.

2.2. The Simplest Possible Analysis, and Its Limits

There is a simple and particularly obvious analysis that might give us a potentially unified analysis of the determiner and the pronominal uses, by assuming that in case of sentences like (16a), we face an NP-ellipsis, in analogy to what we see in (16b).

(16) a. Ethel saw one t.
b. Ethel saw one rabbit.

Under this assumption, *one* is not in itself an anaphoric element, but combines with a trace. Now, the trace seems to sit in a place where it replaces a common noun (or an NP), which indicates that the trace should be itself of type $\langle e,t \rangle$ (that is, some predicate), which will then be provided somewhere in the context.

[3] Example from COCA: News – Houston Chronicles. A search on "`one [j*] one`" yields 213 hits.

Before moving on, let me try to justify the assumption of it being a predicate-element, and not an e-type element.[4] Let us start by considering a sentence like (17a). Its truth-conditional representation should arguably be something like (17b).

(17) a. Every poor farmer$_i$ met a rich [one_]$_i$.[5]
b. $\forall x[\textbf{farmer'}(x) \wedge \textbf{poor'}(x) \rightarrow \exists y[\underline{\textbf{farmer'}(y)} \wedge \textbf{rich'}(y) \wedge \textbf{meet'}(x,y)]]$

The one element that is missing in (17a) and present in (17b) is the second occurrence of the predicate *farmer*.

A second argument comes from possible antecedents of *one*. Contrary to personal pronouns like *him*, an antecedent can occur under the scope of negation, where they do not introduce any referential element.

(18) a. Fred doesn't own a dog$_i$, but he wants [one_]$_i$.
b. * Fred doesn't own [a dog]$_i$, but he wants him$_i$.

(18b) cannot be interpreted in a way where the indefinite is under the scope of negation. However, this is no problem for (18a).

Finally, the antecedent and *one* are fully quantificationally independent:

(19) a. There are many obvious answers$_i$ but no easy [ones_]$_i$ in this matter.[6]
b. There is no perfect solution$_i$, but many possible [ones_]$_i$.

The anaphora in (19a) might be interpreted as a dynamic expansion: among the many obvious answers, there is no easy one. However, such an interpretive strategy is not available for the anaphora in (19b), since its antecedent is empty (**among the absence of perfect solutions, there are a few possible ones*).

In this simplest possible analysis, we can assume the following semantics for *one*:

[4]As pointed out to me by Nicolas Asher (p.c.), one might get away with using some more abstract *e*-type element, like a kind. However, a kind can be interpreted as a reification of an intensional set, and is therefore a disguised predicate. Using kinds would require furthermore to create possibly arbitrary kinds, only to unwrap them afterwards. It seems to me that using predicates is the more parcimonious assumption.

[5]In order to remain uncommited for the moment to the anaphoric element (*one* itself or rather a trace *t* that *one* combines with), I will note the element [one_], and leave open all possibilities.

[6]Example from COCA, query: `[j*] [nn*] [cc*] no [j*] ONE`

(20) $[\![\text{one}]\!] = \lambda x.[\text{card}(x) = 1]$[7]

In case of the determiner use, (20) will be combined with an NP by predicate modification (see, e.g. Heim and Kratzer, 1998). Notice that the predicate in question can be in principle arbitrarily complex, see (21), taken from Carnie (2006: 152), even though I will be dealing in this article only with rather simple cases where the antecedent is a common noun.

(21) I bought the big [book of poems with the blue cover]$_i$ not the small [one_]$_i$.

Furthermore, I will assume a Reinhart-Winter style analysis (following Reinhart, 1997; Winter, 2001) for the determiner case: *one* occupies D°, combines with a lexical NP, and that a Skolem-function applies subsequently in Spec DP.[8]

Skolem functions in this tradition are generalisation of choice-functions. They take a predicate (and possibly one or more arguments of type e) and yield an entity satisfying the predicate:

(22) a. f_o(cat) = Garfield (type $\langle\langle e,t\rangle,e\rangle$, choice-function)
b. f_1(cat, Gerhard Schaden) = Akané (type $\langle\langle\langle e,t\rangle,e\rangle,e\rangle$)
c. f_2(cat, Jerry, Spike) = Tom (type $\langle\langle\langle\langle e,t\rangle,e\rangle,e\rangle,e\rangle$)

The arity of the Skolem-function allows to model scopal (in-)dependence, without depending on syntactic mechanism such as movement. This is illustrated in (23).

(23) a. $\forall x[\text{mouse}(x) \rightarrow \text{knows}(x, f_0(\text{cat}))]$
There is a single cat such that every mouse knows him (Garfield).
b. $\forall x[\text{mouse}(x) \rightarrow \text{knows}(x, f_1(\text{cat, x}))]$
Every mouse knows some (possibly different) cat.
c. $\forall y[\text{dog}(y) \rightarrow \text{claim}(y, \forall x[\text{mouse}(x) \rightarrow \text{knows}(x, f_2(\text{cat, x, y}))])$
Every dog claims that every mouse knows some cat (cats varying with both dog and mouse).

Let us now consider how such an analysis would work for the determiner use: *one* combines by predicate-modification with the NP *farmer*, and is then taken as an argument by the skolem-

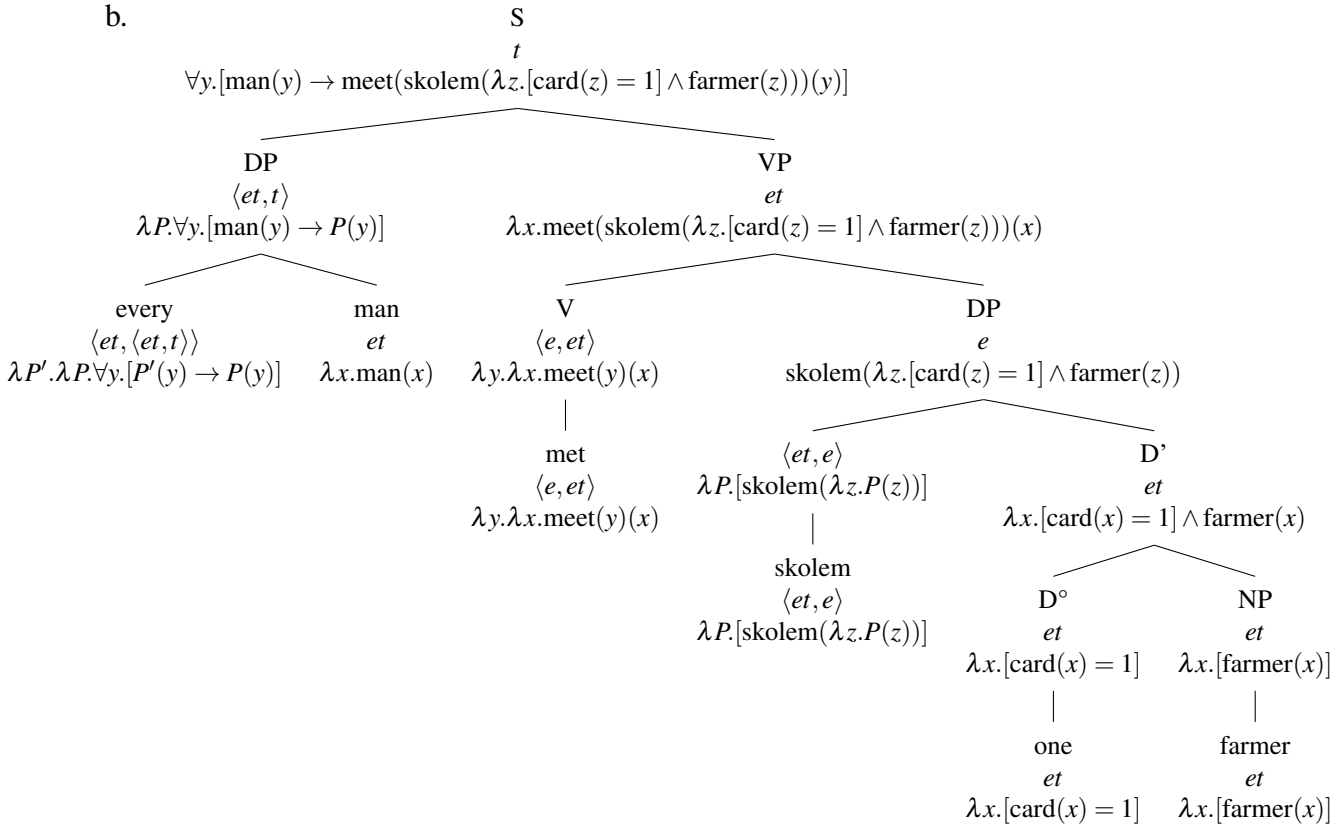
[7] This is not the only possible semantics for *one*, and we will revise it. It is, however, the one that assumes the lowest possible type for *one* (that is, $\langle e,t\rangle$ rather than $\langle\langle e,t\rangle,\langle e,t\rangle\rangle$). Adopting (20) implies that the cardinality predicate can apply to Linkian sums.

[8] Arguably, *one* should be placed initially lower in order to allow the D° to be occupied by a definite determiner. For want of space, I will not discuss this issue any further.

function in Spec DP. This can be illustrated for the sentence (24a) in (24b), where tense and aspect have been ignored.

(24) a. Every man met one farmer. [one farmer > every man]

b.



The case with NP-ellipsis is then a very similar one: the only difference is that instead of combining with an overt NP, *one* combines with a trace t of type $\langle e,t \rangle$ (which is illustrated in 25b for 25a). This trace might then be lambda-bound, or it can be resolved in another way (which I will not get into here).

(25) a. Every man met one t.

b. $[_{\text{S}}$ $[_{\text{DP}}$ Every man] $[_{\text{VP}}$ $[_{\text{V}^\circ}$ met $[_{\text{DP}}$ skolem $[_{\text{D'}}$ one $[_{\text{NP}}$ t]]]]]]

So far, so good. However, an analysis of anaphoric *one* as NP-ellipsis assumes that *one* can combine in all circumstances with an NP. While this is the case for the pronominal use — even when there is a definite determiner in front of it, see (26) —, it is not appropriate for the prosortal use (see 27).

(26) a. Fred read one t.

b. Fred read one book.
c. Either you will hate the one *t* and love the other *t* ...
d. Either you will hate the one master and love the other master...

(26ac) can be analyzed as containing a trace because they allow common noun in the same position (see 26bd). This is not the case for the prosortal case, as attests the agrammaticality of (27b).

(27) a. Fred read one | a | every | the German one *t*.
b. * Fred read one | a | every | the German one philosopher.

There is potentially a further problem with the prosortal and the idea that it will combine with a trace, and this involves the fact that it can take a plural. Notice that only the prosortal allows for a plural in current English:

(28) a. * John saw ones rabbits.
b. * John saw one rabbits.
c. * John saw ones.
d. John read the German ones.

The impossibility of *one* carrying a plural mark in the determiner case may simple be a fact about English morphosyntax: number is marked only once, and only on the noun (which is why (29) is agrammatical):

(29) * John saw thes beautifuls rabbits.

However, if the prosortal was some kind of determiner use in disguise, how could it carry all of a sudden a plural mark? I take the grammaticality of (28d) as evidence that in the prosortal use, *one* occupies (at least at some point in the derivation) the position of N°.

The question is how to evaluate the evidence and its relation to the proposed analysis. On the one hand, it is simple (in any case, much simpler than what I will propose afterwards) and unifies elegantly the determiner and pronominal uses, but it does not carry over easily to the prosortal uses. So, one option at this point would be to declare this to be a desirable feature of the analysis, and to abandon a unified analysis for all uses of *one* in English. After all, we have seen in section 2.1 that the prosortal sets apart *one* from the other cardinals.

However, assuming two different kinds of *one* in English does not seem to be optimal. In cases of NP-ellipses and determiner uses, it is not in itself anaphoric, whereas in the prosortal use, it seems to be anaphoric in nature. Certainly, it would be more economic to have only one type of *one*. I take it that it would be difficult to apply an ellipsis-type analysis to the prosortal case. However, as I will

show in the remainder of the paper, there are tools in our arsenal where we can treat an element as intrinsically anaphoric, and at the same time, as being able to combine with an NP-predicate.

The idea comes from work by Jacobson (1996), who assumes that anaphoric constituents behave syntactically in one way, and semantically in another. The idea is that sentences like "*John saw one*" are indeed sentences, but that they are semantically of type $\langle e,t \rangle$, since it lacks an object DP (and this is written as S^{DP}: a sentence that will be semantically complete once it has gotten a DP). Similarly, the constituents formed by *one* in the pronominal and the prosortal case would be of type illustrated in (30c).

(30) a. John saw him: S^{DP} b. one rabbit: NP c. one: NP^{NP} or DP^{NP}

I will apply this type of analysis to *one*, assuming that it can be either a NP lacking an NP (in the prosortal case), or a DP lacking an NP (in the pronominal case). In this way, we will be able to treat all uses of *one* in a unified manner.[9] I will also show that the fact of pluralization of the prosortal does not pose any particular problem for this kind of analysis.

3. A Variable-Free Proposal

Before moving on, it will be necessary to slightly change the lexical entry for *one* in order to be able to accommodate the meanings we will need. I will assume that it is a predicate modifier of type $\langle\langle e,t \rangle, \langle e,t \rangle\rangle$ (see Ionin and Matushansky, 2006), yielding (31).

(31) $[\![\text{one}]\!] = \lambda P.\lambda x[P(x) \wedge \mathbf{card}(x,P) = 1]$[10]

The idea behind the formula is that the cardinality of an object depends on the predicate, and that one and the same entity can have different cardinalities according to different predicates (think of *heap of sand* vs. *grains of sand* or *cup* vs. *tea-set*).

3.1. The Determiner Case

The determiner case is basically identical to what we have seen before, with the small difference of *one* taking the nominal predicate as its argument, instead of being combined by predicate-

[9] Well, we will see that some residual uses do not fit that easily, but it will be an important step into the right direction.

[10] For the compositional account to work from the type-perspective, it is important to assume that *one* is of type $\langle\langle e,t \rangle, \langle e,t \rangle\rangle$. Therefore, one other possibility would be to assume that it is something like (1), where the cardinality measures a set, rather than something like (31):

(1) $[\![\text{one}]\!] = \lambda P.\lambda x[P(x) \wedge \mathbf{card}(P) = 1]$

modification. This is illustrated in (32b). The rest of the analysis (with the use of Skolem-functions) remains identical to what we have seen in (24) on page 6.

(32) a. John met one man.
b. $[\![\text{one}]\!]([\![\text{man}]\!]) = \lambda x.[\text{man}(x) \wedge \text{card}(x, \text{man}) = 1]$

While this example illustrates a simple noun as argument of *one*, the proposed semantics (like the one illustrated before) could cope very well with an arbitrarily complex NP (such as *crazy old man from Tyrol with lederhosen and a big moustache*).

3.2. Pronominal and Prosortal Uses

I assume that the representation of *one* for the prosortal and pronominal uses is also (31). The basic idea is — following in this Jacobson (1996) — that the predicate can either be immediately specified by functional application, as was illustrated in (32b) for the determiner case, or it can be passed along upwards in the derivation by a type-shifting mechanism that will be specified.

Therefore, *one* itself can become an anaphoric expression, and I will not have to stipulate the existence of a trace. In this way, we can treat both the pronoun and the prosortal use with exactly the same semantics. One type of evidence is that they both seem to require the same type of antecedent predicate, namely a count one.

(33) We have no $[\text{car}]_i$, but our neighbour owns one_i.

In a context where the antecedent predicate is not countable, and where it cannot be coerced into something countable, the anaphora with *one* is not appropriate.[11] Imagine (34ab) uttered in the context of a flash-flood, where some houses in a town have been flooded, but not all.

(34) a. * We have no $[\text{water}]_i$ in our basement, but our neighbour has one_i.
b. * We do not even have clean $[\text{water}]_i$ in our basement, but our neighbour has (a) dirty one_i.

As stated above, in the variable-free analysis of *one*, the unity cardinal is analyzed as either a D' or a NP constituent lacking an NP, that is, constituents that are D'^{NP} or NP^{NP}. The lambda-abstracted predicate will be passed along in the derivation in will have to be bound at some time. A general

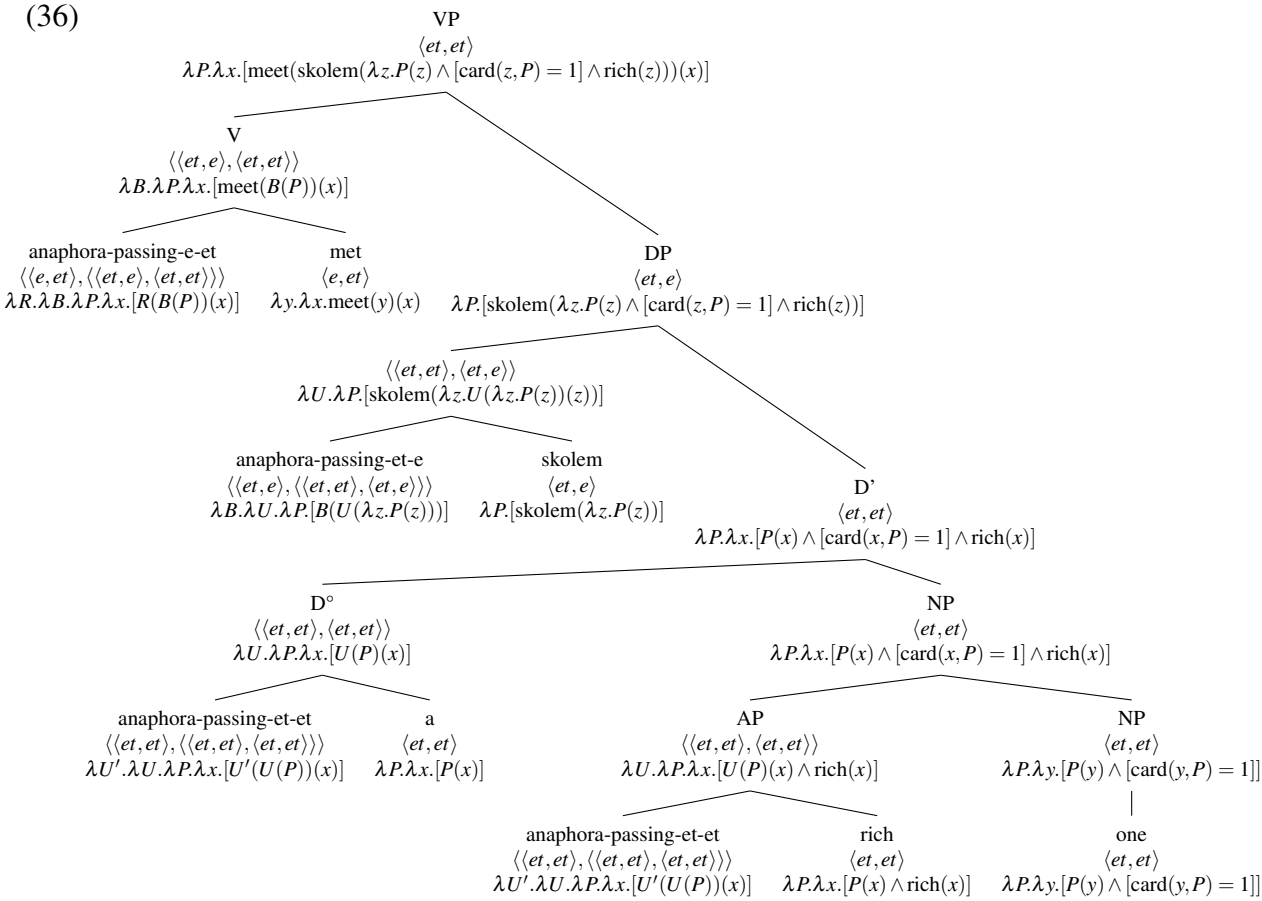
[11] This is where Brandom's *prosortal*-terminology comes from.

advantage of such an analysis is that any constituent has a model-theoretic interpretation — there is no mixing with assignment functions, see Barker and Jacobson (2007). However, it comes at the cost of type-shifting, since functions that have as an argument normally something of type α must be able to take also an anaphoric constituent of type $\langle\langle e,t\rangle,\alpha\rangle$. Generally, the type-raising operation can be formulated as follows:

(35) **Anaphora-Passing** (def.): $\langle\alpha,\beta\rangle \Rightarrow \langle\langle\langle e,t\rangle,\alpha\rangle,\langle\langle e,t\rangle,\beta\rangle\rangle$

Anaphora raising simply states that a function normally taking a constituent of type α as an argument and yielding β has to be shifted from the normal type $\langle\alpha,\beta\rangle$ to a new type that can take as an argument the constituent containing *one*, which is $\langle\langle e,t\rangle,\alpha\rangle$, and it also must yield a function $\langle\langle e,t\rangle,\beta\rangle$, instead of simply β, in order to pass along the missing predicate. I will illustrate this type of shifting in the derivation of the VP "*met a poor one*," as illustrated in (36). The raising-functors are written as *anaphora-passing-*α-β, where — like in (35) — α denotes the type of its domain, and β the type of its range.

(36)



The crucial advantage for this type of analysis is that it does not require different strategies for

dealing with the determiner, the pronominal, and the prosortal case, and that one and the same meaning of *one* can perform the role of a function and of an anaphoric element.

Now, while we have no a satisfying analysis for dealing with the anaphoric part of *one*, we have only resolved half the problem: we still lack a way of dealing with the binder predicate. Notice that this problem is completely independent of the anaphora issue, that is, however one may want to deal with *one* (by going variable-free, as I did, or rather using a trace-based analysis), this does not commit oneself to a particular version of the binder-proposal (as long as the idea of a predicate-anaphora is maintained).

3.3. Analyzing the Binder

Since the constituent containing *one* lacks a predicate, the scope-taking element that needs to get passed along also should be an element of type $\langle e,t \rangle$ (e.g., *dog*, or *book of poems with the blue cover*).

Ideally, the solution for the binder should be dynamic (or have dynamic potential, since there are no restrictions on sentence-boundaries, and c-command is not required), as is shown in (37).

(37) a. No red tile fell on a green one.
b. Everybody wants to have a Surface-Ultrabook. But nobody wants to buy one.

It also seems to be possible to scope out of deeply embedded contexts:

(38) All my neighbours pretend that a really huge dog$_i$ had a crap on their lawns, . . .
a. . . . but I only ever saw a relatively small one$_i$.
b. . . . but I think that it really is a rather small one$_i$.

For (38), there is no reason to assume that something like "there exists a really huge dog" outscopes "pretend", because there is no guarantee that this dog even exists.

There does not even seem to be a clear restriction on the binder occurring necessarily before the bindee, as is illustrated in (39).[12]

(39) Brad Pitt carries one$_i$ in his car; George Clooney has one$_i$ in his bathroom. What is it about the new [Gizmo 3300]$_i$ craze?

[12]Tentatively, one might say that like proper nouns, predicates always seem to scope at top-level.

I take it therefore that any solution to the binder-problem needs to be maximally flexible. There are at leat three different approaches to the binder-problem that could be applied to the case at hand: i) Charlow (2012) and his compositional DRT approach (building on Muskens (1996)). ii) Charlow (2014), using monads. iii) Barker and Shan (2014), using continuations.

The DRT-approach relies on constructing a discourse-referent out of a predicate, and could be certainly adopted without problems; I will however implement here a very simple version of monads. The same idea could certainly also be implemented with continuations.

The way I will be dealing with the binder is a version of Church-encoding of an ordered pair representing a monad (see Church, 1936; Champollion, 2015; Charlow, 2014) as illustrated in (40):

(40) a. $\langle$ binder-predicate; compositional meaning $\rangle$
b. $\lambda X.[X(\text{binder-predicate})(\text{compositional meaning})]$

The idea is to separate the binder-predicate on the one side (which needs to be prevented from undergoing semantic composition from the standard compositional meaning of the sentence (which it has entered at some stage).

As far as I see, we don't need to overwrite the binder-stack and manipulate/update it. The only necessity is to get a binder-predicate into the stack and get rid of it after it has done the required binding.

Dealing with elements like (40b) involves two operations, and two further kinds of type-shifting. First, we need to populate the binder-stack, and at the end, we need to move from a higher-type meaning for a sentence to its habitual truth-conditions. This is done by *predicate-reduplication* and *s-closure*, respectively.

(41) $[\![\text{predicate-reduplication}]\!] = \lambda P.\lambda N.[N(P)(P)]$[13]

(42) $[\![\text{s-closure}]\!] = \lambda S.[S(\lambda P.\lambda p.[p])]$

Sentences containing a binder-predicate (see 43a, with its semantic representation 43b) will not be of type t, but of type $\langle\langle\langle e,t\rangle,\langle t,t\rangle\rangle,t\rangle\rangle$. Such a representation is perfect if we want to pass on the predicate *farmer* to the next sentence.

(43) a. John met a poor [farmer]$_i$.

[13]Notice that predicate-reduplication is essentially a type-shifted version of the **W**-operator by Curry and Feys (1958), as cited by Szabolcsi (2003).

b. $\lambda W.[W(\lambda x.[\text{farmer}(x)])(\text{meet}(\text{skolem}(\lambda z.\text{farmer}(z) \wedge \text{poor}(z)))(j))]$

At some point however, we will want to access only the truth-conditional part, and dispose of the binder-predicate. Here is where *s-closure* enters into play: it throws away the predicate and retrieves the truth-conditions of the sentence. Since it will ever only apply to sentences, it can be given the unique representation in (42).

One might ask why taking the trouble of having a sentence-meaning that has such a complicated type, instead of getting rid of the stack at the earliest possible occasion. The problem is that — like with any other kind of anaphora — it might be necessary to reuse the stack, as is illustrated in (44).

(44) Over the years, a mythology has developed concerning certain colors of [M&M candies]$_i$. The green *ones*$_i$ are supposedly aphrodisiac; if a red *one*$_i$ is last to emerge from a bag, make a wish and it will come true; if the last *one*$_i$ is yellow, call in sick and stay home. [Example from COCA]

In cases like (44), the binder must be passed from deep inside a PP all the way through to the sentence level, before it can be applied. Therefore, it should not be automatically triggered once hitting a DP-level. Additionally, the same binder is used here three times.

Between filling in the binder-predicate and disposing of it, we will need to do two things with it: passing it along without modifying anything, and applying it to some other constituents. These will be more general operations of type-shifting, namely *binder-passing* and *binder-application*, respectively.

(45) a. **Binder-Passing** (def): $\langle \alpha, \beta \rangle \Rightarrow \langle \langle \langle \langle e,t \rangle, \langle \alpha, t \rangle \rangle, t \rangle, \langle \langle \langle e,t \rangle, \langle \beta, t \rangle \rangle, t \rangle \rangle$
b. **Binder-Application** (def): $\langle \alpha, \beta \rangle \Rightarrow \langle \langle \langle e,t \rangle, \alpha \rangle, \langle \langle \langle e,t \rangle, \langle \beta, t \rangle \rangle, t \rangle \rangle$

Then, there is a little quirk that might be interesting and concerns syntactic parallelism. In the pronominal case, the bindee has the distribution of a DP, and in the prosortal case, of an NP, which is typically modified by an adjective. Therefore, the question is whether there are restrictions on the type of antecedent that are possible with each of the cases. The short answer is that there do not seem to be many. In any case, one can take up elements with a pronominal one containing or not an adjective in the binder, and similarly with the prosortal.

(46) a. Nobody needs a Porsche, but everybody wants one.
b. Nobody needs a Porsche, but everybody wants a red one.
c. Nobody needs a red Porsche, but everybody wants one.

d. Nobody needs a red Porsche, but everybody should buy a blue one.

While there seems to be in principle nothing that requires the antecedent to c-command *one*, constrastive stress often turns out to be helpful, as is illustrated in the opposition between the examples in (47).

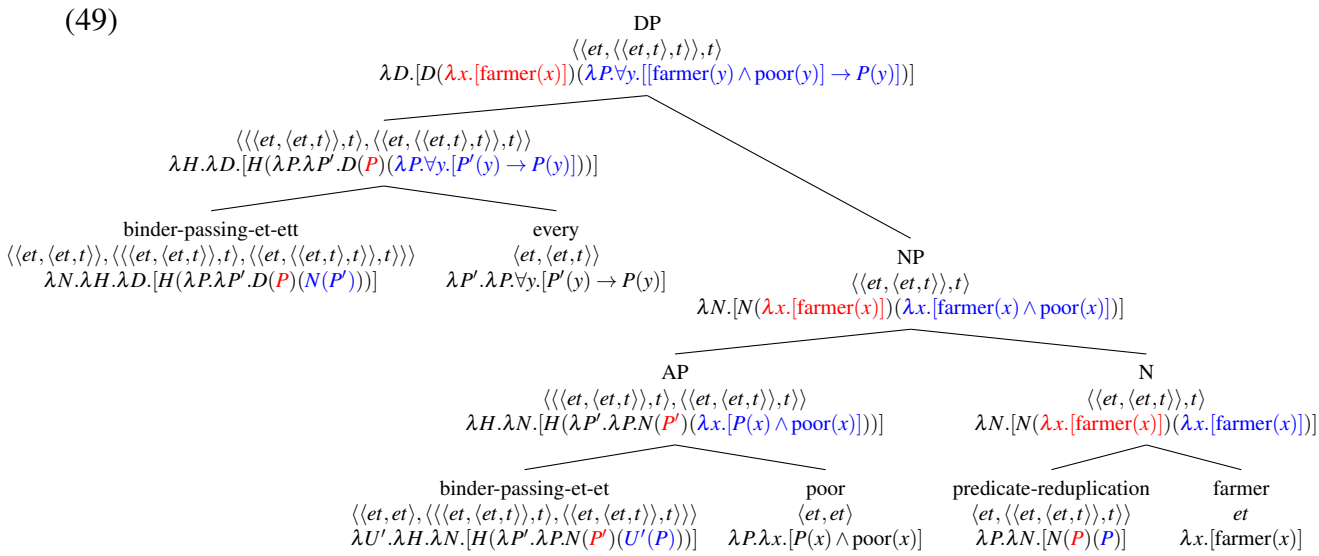
(47) a. Every RICH farmer$_i$ knows a POOR one$_i$.
b. ?* Every farmer$_i$ knows a poor one$_i$.

However, there are cases where there is no contrastive set in the context, as is illustrated in (48), taken from COCA.[14]

(48) According to a report recently released by the Census Bureau, the number of single fathers jumped 25% in three years [...] *That change$_i$ reflects a larger one$_i$*: Men are increasingly considered capable and effective single parents.

Let us now turn to how this is implemented. The binder must be duplicated and stored away, while undergoing simultaneously the standard compositional process of the sentence. This is what binder-passing does, and I will illustrate the process for the subject DP of the sentence "*Every poor farmer met a rich one*".

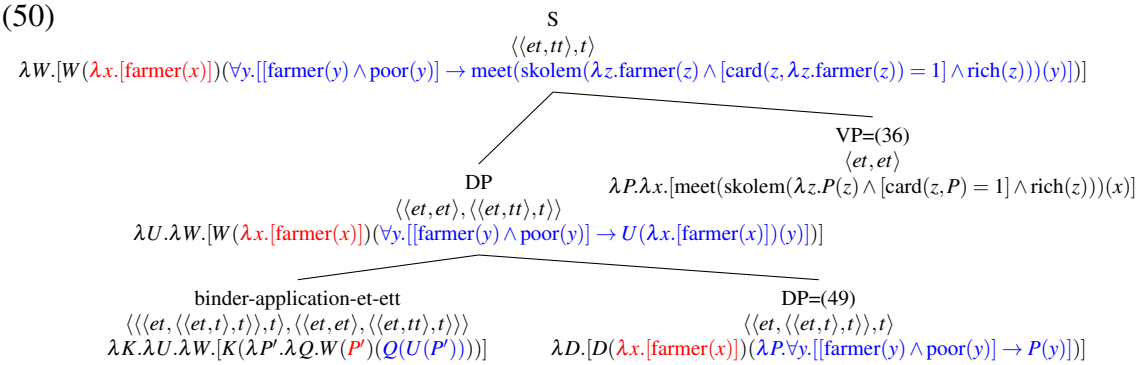
(49)



[14]The existence of such examples was pointed out to me by Laurent Roussarie (p.c.).

At this point, we don't simply want to combine the denotation of the predicate from (36), and leave the stack unchanged. We want the predicate *farmer* to bind the missing predicate in the VP. This is what the binder-application shift does for us, and is illustrated in (50). The result of this process can then be subjected to s-closure, in order to extract the truth-conditions, if the binder is no longer required.

(50)



3.4. The Pluralization of *One* — And How to Deal With It

Let us come back to the issue of pluralization, which seems intuitively to be a strong counter-argument for a monosemic account of *one* — which then would be an argument for the simpler analysis sketched in the beginning of the paper. The argument goes roughly as follows: If the meaning of *one* is "*the quantity is equal to 1*", how can it support pluralization, when a plural means "*the quantity is higher than 1*"? Taken together with the fact is that *one* can be pluralized only in its prosortal use, which is the one other cardinals lack, this might provide an argument for the ellipsis account — especially since prosortals are problematic for the ellipsis account.[15]

(51) a. * John saw ones rabbits.
b. * John saw ones.
c. John saw the green ones.

Still, there might be something in *one* that makes it inherently more amenable to pluralization than all the other cardinals. I will show that pluralization is in fact no a counter-argument against the analysis I have tried to provide here.

Let me first rehearse the basics. In Link (2000), the plural is defined as an operator on a predicate, taking a predicate P and returning the complete join-subsemilattice generated by P. That means

[15] This is also a fact that seems to lend support to people questioning the cardinality-status of *one*, see, e.g., Barbiers (2005, 2007); Crisma (2015).

that a plural combines with some generator-set, and yields a set containing the same set plus all sums of elements of the set. From a type-perspective, Link's *-operator is of type $\langle\langle e,t\rangle,\langle e,t\rangle\rangle$, and we can define the plural *-s* as follows:

(52) $[\![\text{-s}]\!] = \lambda P.[\text{plural}(P)]$

Normally, (52) will combine with a count noun, and give something like *plural(rabbit)*, whose denotation (in a low-rabbit world) are given below.

(53) a. $[\![\text{rabbit}]\!]^{W,g} = \{a,b,c\}$
b. $[\![\text{rabbit-s}]\!]^{W,g} = \{a,b,c,a\oplus b,a\oplus c,b\oplus c,a\oplus b\oplus c\}$

Sums like $a\oplus b$ are defined by Link as elements of type e, so we can use Skolem-functions on them.[16] But instead of directly applying (52) to a noun, we can also type-raise it by anaphora-passing, and apply it then to *one*, which will give the following:

(54) $([\![\text{anaphora-passing-et-et}]\!]([\![\text{plural}]\!]))([\![\text{one}]\!]) = \lambda P.\lambda x.[\text{plural}(\lambda y.[P(y)\wedge[\text{card}(y,P)=1]])(x)]$

The result of (54) will then be bound by some sortal predicate, e.g., *rabbit*. So, instead of having as generator set some (count) predicate, we have as generator set a predicate of that same predicate, with the additional constraint that the elements be of cardinality 1 with respect to that predicate. Now, as long as the predicate is indeed countable, the cardinality predicate does not actually do any work. Notice first that this would be very different with all other cardinals. And second, the premise of the anaphora being based on the predicate predicts that anaphora should be work accross singular-plural boundaries. This seems to be borne out:

(55) a. I met a few rich farmers, but no poor one. [Pl→Sg]
b. I met a rich farmer, but no poor ones. [Sg→Pl]
c. I met a few rich farmers, but no poor ones. [Pl→Pl]
d. I met a rich farmer, but no poor one. [Sg→Sg]

Therefore, the pluralization of the prosortal is perfectly compatible with *one* having a standard cardinal meaning.

[16] Whether this is a good idea cannot be explored here, but for reasons of expedience, I will assume this.

4. Conclusion and Perspectives

In this paper, I have presented a semantically unified account of English *one*, where the unity cardinal can be an anaphoric expression, but also directly combine with a (count) noun. This analysis was cast in a directly compositional, variable-free framework, with an explicit account of the binding mechanism using a simple monad.

While I have not discussed the generic use of *one* (see Moltmann, 2006), the present analysis could be extended to account for it. This would require a default interpretation/saturation of *one* with something like HUMAN (compare *no one, someone*) if binding fails — and would need to incorporate some theory of (probably indefinite) genericity (e.g., Corblin, 2012).

However, the present analysis has problems with (at least) two constructions involving *one*.

(56) We will be one.

(57) Neo is the One.

The meaning of *one* presented in (31) commits me to the question: *one what?* — which is arguably not an appropriate reaction to (56) when uttered in a romantic context. The 'messianic use' of *one* in (57) cannot be straightforwardly accounted for by the current analysis either; this seems however to be a reading that is highly idiosyncratic of English, and it is not as easily available for unity cardinals in other languages (as French or German).

Finally, other cases of predicate-anaphora, like French possessive pronouns (see 58), could probably be analyzed in the same way as *one*.

(58) Cunégonde n' a pas de voiture$_i$; elle utilise la mienne$_i$.
C. NEG has NEG of car; she uses the mine.
'Cunégonde has no car; she uses mine.'

References

Barbiers, S. (2005). Variation in the morphosyntax of ONE. *Journal of Comparative Germanic Linguistics 8*, 159–183.

Barbiers, S. (2007). Indefinite numerals ONE and MANY and the cause of ordinal suppletion. *Lingua 117*, 859–880.

Barker, C. and P. Jacobson (Eds.) (2007). *Direct Compositionality*. Oxford: Oxford University Press.

Barker, C. and C.-C. Shan (2014). *Continuations and Natural Language*. Oxford: Oxford University Press.

Borer, H. (2005). *In Name Only*. Oxford: Oxford University Press.

Brandom, R. B. (1994). *Making It Explicit. Reasoning, Representing, & Discursive Commitment*. Cambridge, MA: Harvard University Press.

Carnie, A. (2006). *Syntax. A Generative Introduction.* (2 ed.). Malden, MA: Blackwell.

Champollion, L. (2015). Back to events: More on the logic of verbal modification. In *University of Pennsylvania Working Papers in Linguistics*, Volume 21, Chapter 7.

Charlow, S. (2012). *Cross-Categorial Donkeys*, pp. 261–270. Berlin, Heidelberg: Springer Berlin Heidelberg.

Charlow, S. (2014). *On the Semantics of Exceptional Scope*. Ph. D. thesis, NYU, New York.

Church, A. (1936). An unsolvable problem of elementary number theory. *American Journal of Mathematics 58*(2), 345–363.

Corblin, F. (2012). The roots of genericity: Indefinite singulars vs. definite plurals. In A. Mari, C. Beyssade, and F. del Prete (Eds.), *Genericity*, pp. 352–371. Oxford: Oxford University Press.

Crisma, P. (2015). The "indefinite article" from cardinal to operator to expletive. In C. Gianollo, A. Jäger, and D. Penka (Eds.), *Language Change at the Syntax-Semantics Interface*, pp. 125–152. Berlin: Mouton De Gruyter.

Curry, H. B. and R. Feys (1958). *Combinatory Logic I*. Amsterdam: North-Holland.

Davies, M. (2008–). The corpus of contemporary american english: 520 million words, 1990–present. Available online at: http://corpus.byu.edu/coca/.

Heim, I. and A. Kratzer (1998). *Semantics in Generative Grammar*. Oxford: Blackwell.

Ionin, T. and O. Matushansky (2006). The composition of complex cardinals. *Journal of Semantics 23*, 315–360.

Jacobson, P. (1996). The syntax/semantics interface in categorial grammar. In S. Lappin (Ed.), *The Handbook of Contemporary Semantic Theory*, Oxford, pp. 89–117. Blackwell.

Link, G. (1983/2000). The logical analysis of plurals and mass terms: A lattice-theoretical approach. In P. Portner and B. H. Partee (Eds.), *Formal Semantics. The Essential Readings*, Oxford, pp. 127–146. Blackwell.

Moltmann, F. (2006). Generic *One*, arbitrary PRO, and the first person. *Natural Language Semantics 14*, 257–281.

Muskens, R. (1996). Combining Montague semantics and discourse representation. *Linguistics and Philosophy 19*(2), 143–186.

Reinhart, T. (1997). Quantifier scope: How labor is divided between qr and choice functions. *Linguistics and Philosophy 20*, 335–397.

Szabolcsi, A. (2003). Binding on the fly: Cross-sentential anaphora in variable-free semantics. In G.-J. Kruijff and R. Oehrle (Eds.), *Resource Sensitivity in Binding and Anaphora*, pp. 215–229. Dordrecht: Kluwer.

Winter, Y. (2001). *Flexibility Principles in Boolean Semantics*. Cambridge, MA: MIT Press.