Situation Economy

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Abstract Researchers often assume that possible worlds and times are represented in the syntax of natural languages (see Cresswell, 1990; Percus, 2000; Kusumoto, 2005; Keshet, 2008). However, Percus (2000), among others, has noted that such a system can overgenerate. This paper proposes a constraint on systems where worlds and times are represented as situation pronouns. The Intersective Predicate Generalization, based on and extending work by Musan (1997), states that two items composed via Predicate Modification, such as a noun and an intersective modifier, must be evaluated in the same world and time. To explain this generalization, a rule of Situation Economy is advanced, which holds that structures must have the fewest number of situation pronouns possible. Strong DPs require a situation pronoun to receive a de re reading, and therefore a restriction on the type of strong determiners is proposed, which supercedes Situation Economy in this case. Finally, the paper shows how the Situation Economy approach explains an unrelated phenomenon involving bare plurals and examines the connection between this new rule and the grammar of natural language in general.

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This paper begins with the assumption that possible worlds and times are represented as situation pronouns in natural language (see Cresswell 1990, Percus 2000, Kusumoto 2005, Keshet 2008). For simplicity, situations are construed to be world-time pairs, and a predicate taking such a pair as an argument is evaluated in the world and the time specified. The next question after whether such items exist is whether there are any constraints on their distribution and indexing. To answer this question, it is instructive to examine the least restrictive theory possible concerning the distribution and indexing of situation pronouns. This null hypothesis might be as in (1):

(1)   **Free Situation Pronoun Hypothesis**: A situation pronoun may be freely inserted and indexed wherever it is the complement to a node of type $\langle s, \alpha \rangle$.

Researchers such as Percus (2000) have noted that this hypothesis overgenerates. In this paper, I will explore a constraint on situation pronouns based on and extending work by Musan (1997).

Musan notes that certain noun phrases must be evaluated at the same time as the main predicates of the sentences in which they appear.

(2)   #There were <u>many professors</u> in kindergarten in the '80s.

For instance, (2) sounds odd because the underlined NP must be evaluated at the same time as its main predicate, and therefore (2) entails that some people were both professors and in kindergarten at the same time. This restriction poses a problem for the Free Situation Pronoun Hypothesis, which predicts that all situation-dependent expressions should in theory be able to be evaluated at any world or time.

Section 1 below proposes the Intersective Predicate Generalization, which extends Musan's observations to include possible worlds as well as times. Also, whereas Musan's work only discusses one pair of expressions, a weak NP and its main predicate, the Intersective Predicate Generalization extends these observations to cover all pairs of expressions which are interpreted intersectively. Evidence is given for three such pairs: the postcopular NP and predicate in the Existential There Construction, a noun and an intersective modifier, and a depictive and the VP it modifies. Section 2 proposes an economy principle to capture this new generalization. This principle, Situation Economy, states that structures with fewer situation pronouns are preferred over alternatives with more such items. This section also explores why strong DPs are allowed to take situation pronouns, proposing a restriction on the type system which supercedes the economy principle in this case. Last, section 3 provides evidence for Situation Economy from an apparently unrelated area: bare plural subjects. This section argues that the fact that bare plural subjects must be interpreted as kinds is predicted with no further assumptions in the Situation Economy system.

1 Intersective Predicate Generalization

Milsark (1977) discusses the fact that certain NPs can appear in the Existential There Construction (ETC), and certain others cannot, as shown below:

(3)   a.   There is a/some student in that room.
          b.   There are two/three/some/many/several students in that room.

(4)   a.   *There is the/this/that/every/each/Smith's student in that room.
          b.   *There are the/these/those/both/all/most students in that room.

(5)   a.   **Weak**: a, some, many, several, two, three, …
         b.   **Strong**: the, this, these, that, those, both, each, every, most, all, ….

He calls the NPs that can appear in the ETC weak NPs and those that cannot, strong NPs.[1]

    Musan (1997) makes the further observation that while strong NPs can be evaluated at a time independent from the main predicate of their clause, weak NPs must be evaluated at the same time as this main predicate:

(6)   **Musan's Generalization**: A noun phrase can be temporally independent if and only if it is strong ($\approx$ Musan's (10), p. 60).[2]

(7)   **Definitions**: A noun phrase is **temporally dependent** if and only if its time of evaluation must be the same as the time of evaluation for the main predicate of its sentence. Otherwise, the noun phrase is **temporally independent**.

Take the following sentences, for instance, which are adaptations of Musan's examples:

(8)   Some members of congress knew each other in college. In fact, …
         a.   … three U.S. Senators were attending Harvard together in 1964.
         b. #… there were three U.S. Senators attending Harvard together in 1964.

(9)   The professors in this department are quite young. In fact, …
         a.   … many professors were in kindergarten in the '80s.
         b. #… there were many professors in kindergarten in the '80s.

In (8-a), the subject *three U.S. Senators* may be evaluated in the present, meaning something like *three current U.S. Senators*. The VP *were attending Harvard together*, on the other hand, is evaluated in the year 1964. If the two were instead evaluated at the same time, the sentence would sound odd, since most college students are too young to be senators (who must be at least 30 years old according to the U.S. constitution). And, in fact, (8-b) does sound odd for this very reason: the two contradictory descriptions are required to hold at the same time. According to Musan, this odd reading is due to the fact that *three U.S. Senators* is a weak NP in (8-b), as evidenced by the fact that it appears in the ETC. Since it is weak, the NP must be evaluated at the same time as its main predicate, *attending Harvard together*. Similarly, in (9-a), *many professors* can refer to the speech time and *in kindergarten* to the '80s; but in (9-b), the weak version of the NP *many professors* and the VP *in kindergarten* both must refer to the '80s, yielding an odd reading for the sentence in which people are both professors and kindergartners at the same time and world.

    Musan's generalization links the world and time in which two items must be evaluated: a weak NP and its main predicate. I will go one step further and argue that several other pairs of items are also linked in this way. Researchers have held for some time that the meanings of certain phrases combine intersectively with others (see Jackendoff 1977, among others). Considering the phrase *brown bag*, for instance, if the meaning of *brown* is conceived of as the set of brown things and the meaning of *bag* as the set of all bags, then you might compute the meaning of *brown bag* as the intersection of these two sets. For the rest of this section, I will provide evidence that any two predicates interpreted intersectively are always

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[1]Although Milsark discusses weak NPs outside of the ETC, he notes that such NPs, once they are outside of this construction, can have similar readings to strong NPs. I will therefore mostly rely on cases where an NP is in the ETC to furnish examples of weak NPs.

[2]Musan later revises this generalization to include facts about existence-independent predicates like *is famous*; I will ignore such predicates. Also, please see Keshet (2008) for explanations of several apparent exceptions to Musan's generalization.

evaluated at the same world and time as one another. Musan's Generalization, which deals only with one case of intersective predicates, is then a special case of this generalization. A statement of this broader generalization, which will guide the discussion below, is given in (10):

(10) **Intersective Predicate Generalization**:
Two predicates interpreted intersectively may not be evaluated at different times or worlds from one another.

1.1 Existential There Construction

Since the Existential There Construction provides much of the support for Musan's Generalization, I will examine this construction first to provide evidence for the Intersective Predicate Generalization. First, no matter which analysis of the ETC you prefer, it must account for the fact that the NP and predicate in the ETC are interpreted intersectively. Consider a generic example like (11):

(11)   There are students in the conference room.

(11) asserts the existence of a certain set of individuals. This set is formed by taking the intersection of the set of students with the set of individuals in the conference room.

In the next two subsections, I will examine evidence that the Intersective Predicate Generalization holds in the ETC: first showing that the elements of the ETC must be evaluated at the same possible worlds and then that they must be evaluated at the same times. In the last subsection, I will present data involving the Have Construction, which turns out to be very similar to the ETC.

1.1.1 Worlds in the Existential There Construction

Musan (who credits von Fintel, p.c., for this observation) predicts that her generalization will extend to possible worlds as well as times. And indeed, this extension seems to obtain:

(12)   a.   Mary thinks someone in this room is outside.
         b.   #Mary thinks there's someone in this room outside.

(13)   a.   Mary thinks three professors are (still) in college.
         b.   #Mary thinks there are three professors (still) in college.

(14)   a.   Mary thinks many fugitives are in jail.
         b.   #Mary thinks there are many fugitives in jail.

Take (14), for instance. Example (14-a) is true in a scenario where there are many real-life fugitives that Mary mistakenly believes to be safely locked up in jail; the reading that makes it true is one where *many fugitives* is *de re* and *in jail* is *de dicto*. Under the Free Situation Pronoun Hypothesis, this reading should also be available for (14-b); but in fact, as captured by the Intersective Predicate Generalization, this reading is unavailable. (14-b) sounds odd because it entails that Mary has a contradictory thought, namely that a number of people are both fugitives and in jail in the same world (and at the same time).

1.1.2 Times in the Existential There Construction

(15)   a.   In 1984, three MIT professors were in kindergarten.
       b.   #In 1984, there were three MIT professors in kindergarten.

(16)   Some members of congress knew each other in college. In fact, ...
       a.   ... three U.S. Senators were attending Harvard together in 1964.
       b.   #... there were three U.S. Senators attending Harvard together in 1964.

In sentence (8), repeated in (16-a), the NP *three U.S. Senators* is evaluated at a time after the year 1964 (most probably the speech time), whereas the VP *were attending Harvard together* is evaluated in the year 1964. Similarly, in (15-a), *three MIT professors* is probably evaluated at the speech time while *in kindergarten* is evaluated in 1984.[3] As captured by the Intersective Predicate Generalization, however, these readings in which the two predicates in question are evaluated at different times are not available for the (b) sentences above, where the sentences use the ETC. In this way, the Intersective Predicate Generalization subsumes Musan's Generalization, which only covers this particular case.

1.1.3 The Have Construction

(17)   John has a daughter in college.

In the Have Construction, as in the ETC, two expressions are interpreted intersectively. In (17), for instance, the existence is asserted of a member of the set obtained by intersecting the set of the speaker's daughters with the set of individuals in college. (How exactly this meaning arises is the topic of section 2.6.3.) It is worth checking, therefore, if the same restrictions on the world and time of the NP and the following predicate apply here as in the ETC:

(18)   a.   #In 1995, there was an 18-year-old in kindergarten.
       b.   #Mary thinks there is an infant in college.

(19)   a.   #In 1995, John had an 18-year-old daughter in kindergarten.
       b.   #Mary thinks John has an infant daughter in college

Indeed, in both the ETC in (18) and the Have Construction in (19), the NP and the predicate following it must be evaluated at the same world and time. The (a) sentences above sound odd since they entail that someone is both 18 years old and in kindergarten in the same world and time. Similarly, the (b) sentences entail that someone is both an infant and in college in the same world and time.

1.2 Nouns and Intersective Modifiers

Having seen evidence for the Intersective Predicate Generalization in the ETC and the Have Construction, we turn in this section to the quintessential case of two phrases being composed via Predicate Modification: a noun and an intersective modifier (Jackendoff 1977). The next two subsections will show evidence that the Intersective Predicate Generalization

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[3]Due to the confounding factors discussed in Keshet (2008), I have constructed examples of Musan's Generalization where the NP in question is evaluated at a time after the time at which the main predicate of the sentence is evaluated and hence cannot make use of the silent *former* operator posited therein.

holds for nouns and their intersective modifiers, first relative to times and then relative to possible worlds.[4]

1.2.1 Times of Nouns and their Modifiers

(20)   a.   #In 1964, every U.S. Senator (then) at Harvard got straight A's.
           b.   #In 1984, the professor in kindergarten learned how to fingerpaint.

(21)   Every U.S. Senator who was at Harvard in 1964 got straight A's in college.[5]

If the noun *U.S. Senator* in (20) and its modifier *at Harvard* could hold at different times, then the sentence in (20-a) might mean the same as (21). However, pursuant to the Intersective Predicate Generalization, this reading is not available. The sentence sounds odd since it entails that there were people who were sitting senators and at Harvard at the same time. Similarly, (20-b) is odd since it entails that a particular person is or was a professor and a kindergartner at the same time.

     Now let's look at a slightly more complex sentence:[6]

(22)   a.   Two years ago, my 10-year-old classmate was in a different class.
           b.   Two years ago, a 10-year-old in my class was in a different class.

Presuming a student cannot be in two classes at once (in grade school at least), the subject NPs *my 10-year-old classmate* and *a 10-year-old in my class* must be evaluated at a time other than the time at which *was in a different class* is evaluated; in this case, the most salient reading is where these NPs hold at the speech time. Under the Free Situation Pronoun Hypothesis, it should be possible for *classmate* and *in my class* to be evaluated at different times than *10-year-old*. If this were true, then the sentences in (22) should have readings where the speaker's classmate is now twelve years old and was in a different class when he was ten. However, these readings are simply not available, confirming again the Intersective Predicate Generalization.

1.2.2 Worlds of Nouns and their Modifiers

(23)   a.   #Mary thinks the married bachelor is confused.
           b.   #Mary thinks the professor in college is too young to teach.

(24)   a.   Mary thinks a baby from Mars is an adult.
           b.   Mary thinks a baby Martian is an adult.

The reasoning follows similarly for the cases in (23) and (24). In (23-a), *bachelor* and *married* must be in the same world, despite the fact that it leads to an odd reading. Similarly, in (23-b), *in college* and *professor* must be interpreted in the same world. In (24), since nothing – not even an alien – can be a baby and an adult, neither *a baby from Mars* nor *a baby Martian* can be evaluated at the same world as *is an adult*. Therefore, in both cases, the subject must be *de re*, evaluated in the real world. Under the Free Situation Pronoun Hypothesis, part of each subject (i.e., *from Mars* or *Martian*) might still be *de dicto*. If this possibility were available, perhaps the word *baby* alone could be *de re*. As captured by the

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[4]A suggestion along these lines was first made to me by Jon Gajewski, p.c.

[5]In this sentence, the noun holds at the same time as the entire modifier *who was at Harvard in 1964*; the phrase *at Harvard* holds at the time shifted backwards by the past tense on *was*.

[6]Thanks to Danny Fox for suggesting this kind of example.

Intersective Predicate Generalization, though, this is simply not the case; a speaker uttering either sentence in (24) must believe in Martians, and therefore *from Mars* and *Martian* must be *de re* as well.

1.2.3 Relative Clauses

Full relative clauses, as we have seen, do allow a little more disparity between the time at which they are evaluated and the time at which the nouns they modify are evaluated. For instance, a relative clause in the past tense (such as that in (21)) can shift the time of evaluation for items beneath this tense to a time earlier than that of the whole clause, and hence earlier than the time of evaluation of the noun that the relative clause modifies. However, certain relative clauses pose a larger problem for the Intersective Predicate Generalization, as shown in (25):

(25)   a.   A year ago, I met a bachelor who is now married.
        b.   Five years ago, Jill married a 30-year-old who made partner two years later.

(25-a) poses a problem because someone cannot be a bachelor and married at the same time. (25-b) is a problem because the noun describing Jill's husband is *30-year-old* and yet the action inside the relative clause takes place when he is probably 32 years old.

Let us first consider (25-a). I will follow Ogihara (1996) (who is following Kamp (1971), among others) in assuming that the present tense operator PRES is indexical to the time of utterance.[7] What this means is that the noun *bachelor* and the relative clause *who* PRES *is now married* can both be evaluated at some time in the past, even when *married* itself is evaluated at the speech time. In this way, (25-a) is no longer a problem for the Intersective Predicate Generalization, because the relative clause as a whole is evaluated at the same time as the noun it modifies.

(25-b) is a little trickier. For this case, I will modify a proposal due to Kusumoto (2005) and assume that the relative clause has an indexical present tense operator above the past tense. Therefore, the noun *30-year-old* can be evaluated at the same time as the relative clause *who* PRES PAST *made partner two years later*; but PAST *made partner* is evaluated at the speech time, and hence *made partner* is evaluated at a time prior to the speech time – namely two years after the matrix past tense time (the time of the marriage). In this way, any modifier with its own tense can circumvent the Intersective Predicate Generalization through a form of indexicality.

1.3 Depictives

So far, we have seen evidence for the Intersective Predicate Generalization coming from the ETC and from intersective modifiers of nouns. This section turns to the area of depictive secondary predicates.

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[7]See Keshet (2008) for why the word *now* is required in this context. I assume that it is the tense, rather than the *now* itself, creating this reading due to the oddness of the following sentence:

(i)   #There was a now/current professor in kindergarten in the '80's.

Under this analysis, since there is no tense on the phrase *now professor*, it cannot be shifted in time, and therefore the professor must be a kindergartner at the same time. And indeed the sentence sounds odd for this reason.

I will first look at the simpler case of subject depictives, where the meaning of a depictive intersects with the meaning of the entire verb phrase. For instance, take (26):

(26)   Bob left the meeting angry.
        (≈ Schultze-Berndt and Himmelmann (2004) (1))

In (26), the meaning of *left the meeting* – i.e., the set of people who left the meeting – is intersected with the meaning of *angry* – i.e., the set of people who were angry – before being applied to the individual *Bob*. In short, (26) means that as Bob left the meeting, he was angry. Subject depictives are canonically described as holding at the same time as the VP of the sentence (Schultze-Berndt and Himmelmann 2004). For instance, as shown in (27-a), Bob must be angry at the same time that he left the meeting. However, evidence suggests that depictives also must hold in the same world as their VPs. For instance, *angry* cannot be *de re* in (27-b). Instead, the depictive and the VP must be evaluated at the same world and time.

(27)   a.   Bob left the meeting angry, #but he was happy when he left.
        b.   Mary thinks my brother left angry, #but she doesn't know that he was angry.

Therefore, the Intersective Predicate Generalization holds for subject depictives: these items must be evaluated in the same time and world as the VP.

I will now turn to the more complex case of object depictives. These phrases do not intersect with the entire verb phrase, I will argue, but rather a component of the verb phrase. Take (28), for instance:

(28)   Jones cut the bread hot. (= Rapoport (1999) (2b))

Here it is a little less clear what the meaning of *hot* could be intersected with. I will argue, though, in section 2.7.2 that sentences which support object depictives are decomposable into two parts: in this case, one applying to *Jones* as the causer of the event and one applying to *bread* asserting that the bread becomes cut. It is this second part that is intersected with the meaning of *hot*: the bread is hot and becomes cut. In this way, (28) means that Jones cut the bread when the bread was hot, not when Jones was hot.

Given this analysis, consider the following sentences:

(29)   a.   Jones cut the bread hot, #but it was cold at the time.
        b.   Smith thinks Jones cut the bread hot, #but Smith thinks it was cold at the time.

Similarly to subject depictives, object depictives also may not be evaluated at a world or time differing from the evaluation world and time of the VP. For instance, (29-a) shows that the bread must be hot at the same time as when it is cut, and (29-b) shows that it must be hot in the same world as that in which it is cut.

1.4 Summary

This section has shown that several pairs of linguistic expressions must be evaluated at the same time and world as one another: the postcopular NP and the predicate in the ETC and Have Construction, an intersective modifier and the noun it modifies, and a depictive and the VP (or part of a VP) with which it combines. The Intersective Predicate Generalization was proposed to link these phenomena together: the generalization assumes that each of the pairs in this list comprises two nodes which are interpreted intersectively and claims that no

item of such a pair may be evaluated at a world or time different from its pair-mate. The next section will argue explicitly that each of these pairs is evaluated via Predicate Modification and proposes an explanation for the Intersective Predicate Generalization involving an economy condition on situation pronouns.

2 Situation Economy

Before making the proposal which captures the Intersective Predicate Generalization, I will explore the syntax and semantics of intersective predicates a little further. Nouns and their modifiers have long been analyzed as two nodes composed via the rule of Predicate Modification (cf. Heim and Kratzer 1998). However, what if all of the pairs of predicates discussed above as being interpreted intersectively were composed via a generalized version of the Predicate Modification rule? Such a generalization is given in (32).[8]

(30)   Conjoinable type:

    a. $\langle t \rangle$ is a conjoinable type.

    b.   if τ_1 is a conjoinable type, then for any type τ_2, $\langle \tau_2, \tau_1 \rangle$ is a conjoinable type.

(31) $\sqcap$ **Operator**
    For any functions f and g of conjoinable type τ, $f \sqcap g =$

    a. $f \wedge g$, if $\tau = t$, or

    b. $\lambda a \in D_\alpha \, . \, f(a) \sqcap g(a)$, if $\tau = \langle \alpha, \beta \rangle$.

(32)   **(Generalized) Predicate Modification**[9]:
    If α is a branching node, $\{\beta, \gamma\}$ is the set of α's daughters, and $[\![\beta]\!]$ and $[\![\gamma]\!]$ are both functions of conjoinable type τ, then $[\![\alpha]\!] = [\![\beta]\!] \sqcap [\![\gamma]\!]$.
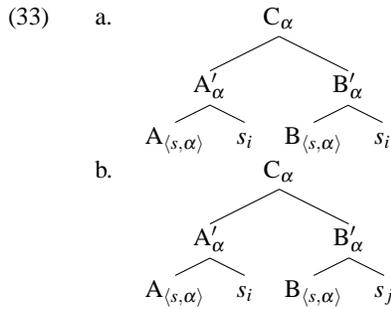
(32) is a rule of composition that combines the meanings of two predicates having the same type, call it τ, into a new predicate of type τ which intersects the meanings of the two original predicates. I will argue below that indeed all of the intersective pairs discussed above are composed via Predicate Modification.

2.1 An Economy Principle

Once we have shown below that the phrases in question compose via predicate modification, we will be able to propose a principle that explains why they abide by the Intersective Predicate Generalization. To this end, consider two nodes **A** and **B** of type $\langle s, \alpha \rangle$. Suppose each of these nodes combined with a situation pronoun (via Function Application) to form two nodes **A′** and **B′** of type α. Next, suppose that **A′** and **B′** combined via Predicate Modification to form a node **C**, also of type α, as shown in (33). The situation pronouns might be coindexed (as shown in (33-a)), constraining **A** and **B** to be evaluated at the same world and time since the two co-indexed pronouns must be bound by the same higher s-λ or, if free, must refer to the same situation. Alternatively, the pronouns might be indexed differently (as shown in (33-b)), allowing the possibility that **A** and **B** be evaluated at different worlds and times since each pronoun might be bound by a different s-λ operator.

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[8]This rule is adapted from definition in Winter (1996), who cites Gazdar (1980), Keenan and Faltz (1985), and Partee (1987).

[9]The Predicate Modification rule given in example (6) on p. 65 of Heim and Kratzer (1998) only covers phrases of type *et*. This generalization allows, e.g., phrases of type *set* to combine.

(33)   a.

$$C_\alpha$$
$$A'_\alpha \qquad B'_\alpha$$
$$A_{\langle s,\alpha\rangle} \quad s_i \quad B_{\langle s,\alpha\rangle} \quad s_i$$

    b.

$$C_\alpha$$
$$A'_\alpha \qquad B'_\alpha$$
$$A_{\langle s,\alpha\rangle} \quad s_i \quad B_{\langle s,\alpha\rangle} \quad s_j$$

The structure in (33-a), where the situation pronoun arguments to the two intersective predicates are coindexed, is consistent with the Intersective Predicate Generalization, whereas the structure in (33-b), where the pronouns have different indices, is not.

Another structure that combines the two original nodes **A** and **B** to eventually form a node of type α is shown in (34). This structure is equivalent in meaning to (33-a), because there is only one situation pronoun and therefore the two predicates are necessarily evaluated at the same world and time.

(34)

$$C'_\alpha$$
$$C_{\langle s,\alpha\rangle} \qquad s_i$$
$$A_{\langle s,\alpha\rangle} \quad B_{\langle s,\alpha\rangle}$$
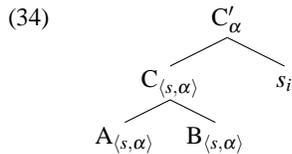
The proposal defended below is not that (33-a) is preferred over (33-b), but rather that (34) is preferred over both structures in (33). This breaks from the Free Situation Pronoun Hypothesis, under which all of these structures should be available.

One way to allow (34) but not (33) would be to restrict the Predicate Modification Rule to apply only to items of type $\langle s,\alpha\rangle$. However, as we will see in section 2.8.3 below, we need Predicate Modification to apply to items with other types, such as *et*. Therefore, instead of restricting Predicate Modification, I will argue for an economy rule restricting situation pronouns themselves. As we will see in section 3, this economy rule also correctly predicts facts about an unrelated phenomenon: the interpretation of bare plurals.

2.2 Types of Economy

Researchers have long preferred linguistic analyses with fewer steps and less structure over those with more complexity. Chomsky, in outlining his Minimalist Program, states the following:

(35)   Derivations and representations ... are required to be minimal ... with no superfluous steps in derivations and no superfluous symbols in representations (Radford 1997, quoting Chomsky (1989)).

Of course, exactly which steps in derivations or symbols in representations are superfluous is an open question, and numerous economy principles have been proposed to answer this question. Many such economy principles rule out structures entirely, explaining why certain sentences are grammatical and others are not. But other principles sometimes end up instead deciding between two derivations which yield different interpretations for a single

grammatical sentence. Since this work is concerned with restricting the possible meanings of grammatical sentences, it is this latter type of economy principle to which I will eventually appeal.

Sauerland (2000) distinguishes between two types of economy principles, either of which can restrict the interpretations available to a grammatical sentence. The first type, which he calls *interface economy* after Reinhart (1995), may be violated if it leads to a different interpretation. See Fox (1999) for an extensive analysis of quantifier interpretation using interface economy principles. Sauerland's second type of economy principle, *syntactic economy*, is different from *interface economy* in that it cannot be violated, even if it would lead to a new interpretation. The Intersective Predicate Generalization acts to limit the possible interpretations of sentences with time- and world-sensitive predicates. It is therefore a syntactic economy principle to which I will appeal to explain this generalization.

2.3 Definition

In order to ensure the use of structures like that in (34) (and therefore account for the Intersective Predicate Generalization), I propose the economy principle in (36), which favors structures having fewer situation pronouns over alternatives having more. The relevant definition of alternative is given in (37).

(36)   **Situation Economy**: Rule out a structure α if there is a grammatical alternative to α that has fewer situation pronouns.
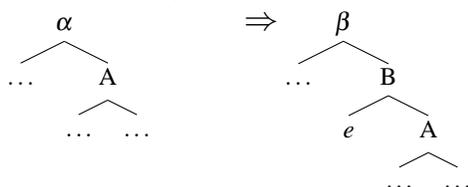
(37)   **Alternatives**: β is an alternative to α if β is derivable from α via one or more applications of the following two operations:
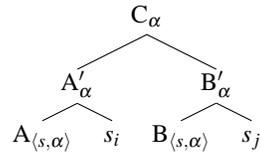
   a.   *Null item deletion*:
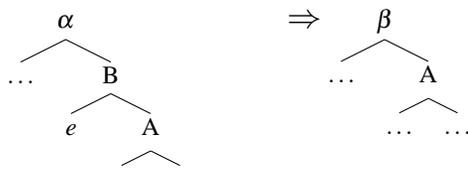
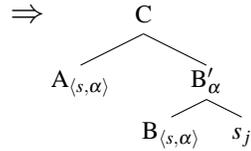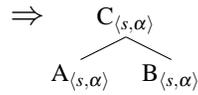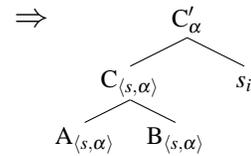   A node **B** in α, one of whose daughters is an unpronounceable item e, is replaced by the other daughter of **B**.

   b.   *Null item insertion*:

   A node **A** in α is replaced by a node **B**, one of whose daughters is an unpronounceable item e and the other of which is **A**.

To take a simple example, assume that the α being evaluated for Situation Economy is the structure in (33-b), repeated in (38-a). Through the following applications of the operations of null item deletion and null item insertion defined above, the structure in (34) is obtained:

(38) a. *Original*

$$C_\alpha$$
$$A'_\alpha \qquad B'_\alpha$$
$$A_{\langle s,\alpha\rangle} \quad s_i \qquad B_{\langle s,\alpha\rangle} \quad s_j$$

b. *Deletion* $\Rightarrow$

$$C$$
$$A_{\langle s,\alpha\rangle} \qquad B'_\alpha$$
$$B_{\langle s,\alpha\rangle} \quad s_j$$

c. *Deletion* $\Rightarrow$

$$C_{\langle s,\alpha\rangle}$$
$$A_{\langle s,\alpha\rangle} \quad B_{\langle s,\alpha\rangle}$$

d. *Insertion* $\Rightarrow$

$$C'_\alpha$$
$$C_{\langle s,\alpha\rangle} \qquad s_i$$
$$A_{\langle s,\alpha\rangle} \quad B_{\langle s,\alpha\rangle}$$

So, (34) is a grammatical alternative with fewer situation pronouns, and therefore (33-b) is ruled out under Situation Economy.
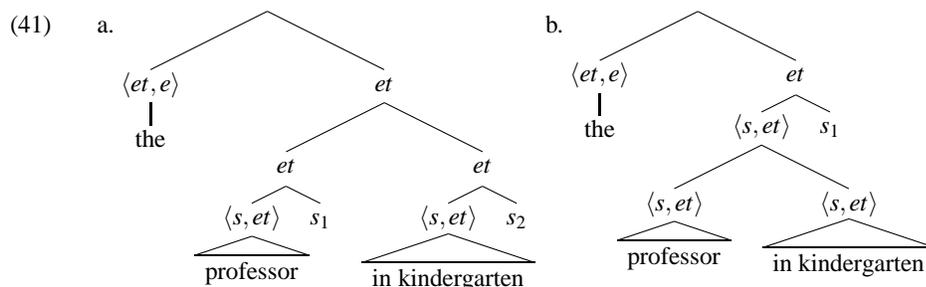

2.4 Preview: Nouns and Modifiers

Before I detail the assumptions needed for my proposal, I will present how Situation Economy applies in the case of nouns and modifiers, as a preview of the analysis below. In section 1.2 above, I argued that a noun and an intersective modifier, such as *professor* and *in kindergarten* in the phrase *the professor in kindergarten*, cannot be evaluated at different times or worlds. Some relevant examples are repeated in (39):

(39) a. #In 1984, the professor in kindergarten learned how to fingerpaint.
      b. #Mary thinks the professor in college is too young to teach.

The sentences in (39) are odd because *professor* and *in kindergarten/college* must be evaluated at the same time and world as one another, and it is pragmatically strange to imagine a professor still being in kindergarten or even college.

Assuming the definitions in (40), this fact falls out directly from Situation Economy. The structure in (41-a), where *professor* and *in kindergarten/college* could be evaluated at different worlds or times, is ruled out by the existence of the alternative structure in (41-b) which has fewer situation pronouns:

(40) a. $[\![\textbf{the}]\!] = \lambda P_{et}$. if there is only one x such that $P(x)$ then this x; otherwise, undefined.
      b. $[\![\textbf{professor}]\!] = \lambda s_s$. λx_e . x is a professor at s.
      c. $[\![\textbf{in kindergarten}]\!] = \lambda s_s$. λx_e . x is in kindergarten at s.
      d. $[\![\textbf{in college}]\!] = \lambda s_s$. λx_e . x is in college at s.

(41) a.

$\langle et, e \rangle$ et

the

et et

$\langle s, et \rangle$ s_1 $\langle s, et \rangle$ s_2

professor   in kindergarten

b.

$\langle et, e \rangle$ et

the $\langle s, et \rangle$ s_1

$\langle s, et \rangle$ $\langle s, et \rangle$
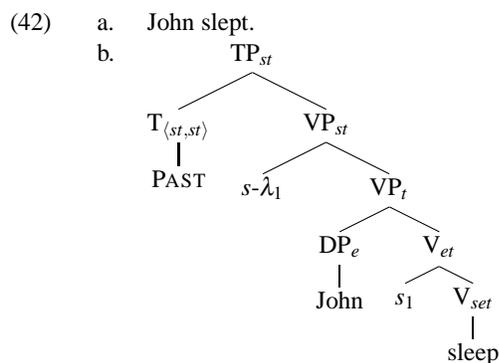
professor   in kindergarten

Any other noun and modifier that combine in an analogous way (such as those discussed in section 1.2) will also be subject to Situation Economy in a similar manner and therefore also conform to the Intersective Predicate Generalization.

2.5 Argument Structure

Before analyzing the rest of the intersective predicate cases in terms of Situation Economy, I will outline, in this section, the assumptions I am making about the syntax and semantics of predicates and arguments.

First, I will assume that all one-place predicates, whether they are verbs, nouns, adjectives, or prepositions, are of type *set*. Furthermore, I assume that verbs obligatorily combine with a situation pronoun which is bound by a λ operator[10] at the top of the clause. This assumption is an implementation of a constraint on situation pronouns due to Percus (2000). (See Keshet (2008) for extensive discussion of this constraint.) So, for instance, the verb *sleep* is of type *set*, but when it combines with the situation pronoun s_1, it forms a node of type *et*, as shown in (42). This higher node is now of the proper type to combine with an argument, such as *John* below. To simplify the structures, I assume that this subject reconstructs to a position within the VP before LF.

(42) a. John slept.
     b.

TP_{st}

$T_{\langle st, st \rangle}$ VP_{st}

PAST $s\text{-}\lambda_1$ VP_t

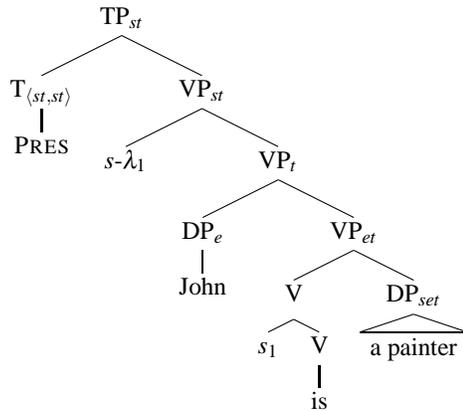DP_e V_{et}

John s_1 V_{set}

sleep

DPs, APs, and PPs lack this situation pronoun and therefore may not combine directly with a type-*e* subject, as shown in (43). Instead, English provides a special verb, the copula,

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[10]Remember that what I will represent as a λ in example structures is essentially the same as the numerical indices assumed in Heim and Kratzer (1998).

which has no meaning, but provides the requisite situation pronoun to fill these phrases's situation arguments and allow them to combine with a subject, as shown in (44).[11]

(43) a. *John a painter.
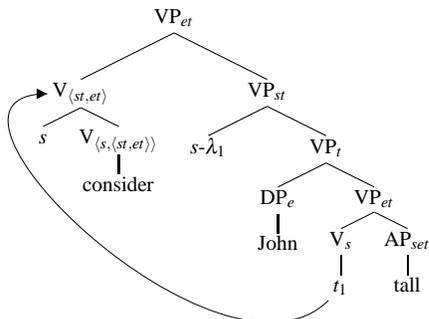   b. *John tall.
      c. *John in the garden.

(44) a. John is a painter.
      b.

$$
\begin{array}{l}
\text{TP}_{st} \\
\quad \text{T}_{\langle st,st\rangle} \quad \text{VP}_{st} \\
\quad\quad \text{PRES} \\
\quad\quad\quad s\text{-}\lambda_1 \quad \text{VP}_t \\
\quad\quad\quad\quad\quad \text{DP}_e \quad \text{VP}_{et} \\
\quad\quad\quad\quad\quad \text{John} \quad \text{V} \quad \text{DP}_{set} \\
\quad\quad\quad\quad\quad\quad\quad s_1 \quad \text{V} \quad \text{a painter} \\
\quad\quad\quad\quad\quad\quad\quad\quad\quad \text{is}
\end{array}
$$

---

[11] Under certain verbs, such as *consider* and *find*, it seems as though no copula is needed to combine a DP, AP, or PP with a subject (see (i)). One possible explanation for this might be that the verb itself moves, leaving a type-*s* trace fulfilling the role of the copula in other sentences; such a structure is shown in (ii).

(i)   a. I consider John tall.
      b. I found John immature.
      c. I consider John in a class of his own.

(ii)

$$
\begin{array}{l}
\text{VP}_{et} \\
\quad \text{V}_{\langle st,et\rangle} \quad\quad \text{VP}_{st} \\
\quad s \quad \text{V}_{\langle s,\langle st,et\rangle\rangle} \quad s\text{-}\lambda_1 \quad \text{VP}_t \\
\quad\quad\quad \text{consider} \quad\quad \text{DP}_e \quad \text{VP}_{et} \\
\quad\quad\quad\quad\quad\quad\quad \text{John} \quad \text{V}_s \quad \text{AP}_{set} \\
\quad\quad\quad\quad\quad\quad\quad\quad\quad t_1 \quad \text{tall}
\end{array}
$$

This would also explain why such verbs may never take a simple DP or NP complement, while verbs that take a truly clausal argument often may:
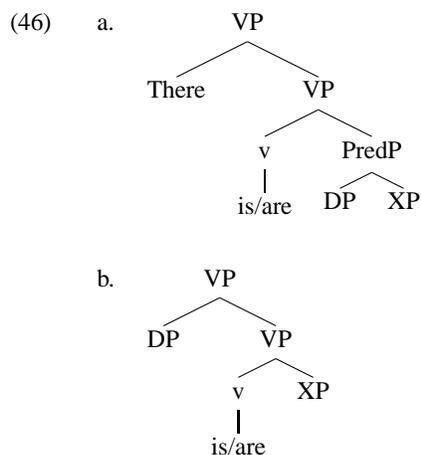
(iii) a. I believe that rumor/story.
      b. I used to think that.
      c. I want that, too.

(iv) a. *I consider/found that state of affairs.
      b. *I used to consider/find that, too.

2.6 Existential There Construction

With these assumptions in place, I will now turn to another application of the Intersective Predicate Generalization: the Existential There Construction. I will take Milsark's (1974) dissertation as the starting point for my analysis of the ETC. Milsark concludes, after exhaustive analysis, that an ETC such as (45-a) is derived from an underlying structure like (45-b) via one or more movement rules (such as lowering the subject and inserting the expletive *there*):

(45)   a.   There is a man in the garden.
        b.   A man is in the garden.

Sentences like these can be schematized as in (46):

(46)   a.

                    VP
           There   VP
                  v   PredP
               is/are   DP XP

        b.

                  VP
          DP   VP
                  v   XP
               is/are

Milsark then introduces a special interpretation rule for ETC sentences, under which they are basically interpreted with existential closure:

(47)   The structure in (46-a) is interpreted: the class C denoted by DP has at least one member c such that $P(c)$ is true, where P is a predicate and P is the reading of XP ($\approx$ 58, p. 190).

The analysis I will present in this section tries to remain true to the spirit of Milsark's proposal, while bringing it in line with a few more recent assumptions about syntax and semantics. First, in keeping with the VP-internal subject hypothesis and rules against syntactic lowering, I assume that both structures in (46) are derived from a common ancestor, rather than one being derived from the other. This common structure is given in (48) (see Stowell 1978):

(48)

                 VP
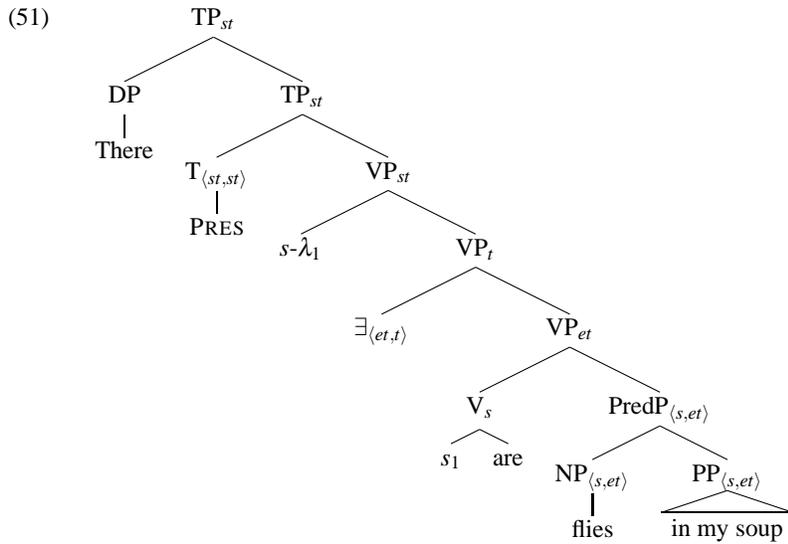   v   PredP
        is/are   DP XP
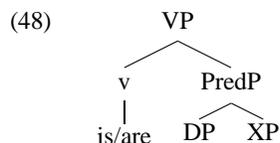
Given this underlying structure, the two structures in (46) only differ syntactically in that the subject position (Spec,TP) is filled in the ETC (46-a) by inserting the expletive *there*, whereas this subject is filled in the non-ETC sentence (46-b) by raising the DP in (48).

Under my analysis, deriving the meaning of an ETC sentence will require no special interpretation rule. Instead, I propose that the DP and XP in an ETC, both being predicates of type *set*, are combined via Predicate Modification. Then, as described in section 2.5, the copula fills the situation argument of this complex predicate, allowing a freely insertable existential closure operator ($\exists$) to apply. To take a simple example, consider the following sentence, definitions and structure[12]:

(49)   There are flies in my soup.

(50)   a. $[\![\mathbf{flies}]\!] = \lambda s_s \,.\, \lambda x_e \,.\, x$ comprises flies in s
        b. $[\![\mathbf{in\ my\ soup}]\!] = \lambda s_s \,.\, \lambda x_e \,.\, x$ is in my soup in s
        c. $[\![\exists]\!] = \lambda P_{et} \,.\, \exists x_e \,.\, P(x)$

(51)

Ignoring the present tense, the derivation proceeds as follows.

(52)   a. $[\![[_{PredP} \mathbf{flies\ in\ my\ soup}]]\!] =$
              $\lambda s_s \,.\, \lambda x_e \,.\, x$ comprises flies in s and x is in my soup in s
        b. $[\![[_{VP} s_1 \mathbf{\ flies\ in\ my\ soup}]]\!] =$
              $\lambda x_e \,.\, x$ comprises flies in s_1 and x is in my soup in s_1
        c. $[\![[_{VP} \exists s_1 \mathbf{\ flies\ in\ my\ soup}]]\!] = 1$ iff
              $\exists x_e \,.\, x$ comprises flies in s_1 and x is in my soup in s_1
        d. $[\![[_{VP} s\text{-}\lambda_1 \exists s_1 \mathbf{\ flies\ in\ my\ soup}]]\!] =$
              $\lambda s_s \,.\, \exists x_e \,.\, x$ comprises flies in s and x is in my soup in s

Therefore, the meaning of (49) is:

(53) λs . There is an x such that x comprises flies in s and x is in my soup in s

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[12]I assume that the bare plural *flies* is an NP, not a DP. Also, I assume the existence of plural individuals as defined by Link (1983).

The NP in (49) did not have a determiner or article of any kind – it was a bare plural. For NPs in the ETC having articles, I will adopt what Landman (2004) calls the Adjectival Theory of indefinite determiners, namely that the type of determiners in weak NPs is *set*. In fact, I will consider these to be adjectives, albeit syntactically special adjectives, and hence call their combinations with nouns NPs rather than DPs. Some limited data supporting this view follows, but see Landman (2004) for a complete argument:

(54)   a.   John was one/a/#every carpenter.
           b.   The visitors were two/three/?many/?several/#most carpenters.

(55)   a.   The one/#every man
           b.   The two/three/many/several/#most men.[13]

(54) shows that generalized quantifiers like *every* and *most* cannot be used as predicates, and (55) shows that they cannot appear under the definite determiner *the*. These positions are generally filled by predicates, so the fact that weak determiners can appear there, but quantifiers cannot, suggests that weak determiners[14] are in fact predicates.

The meanings of a few of these adjectival determiners are given in (56):

(56)   a. $[\![\mathbf{a}]\!] = \lambda s_s . \lambda x_e . |x| = 1$ in s
           b. $[\![\mathbf{two}]\!] = \lambda s_s . \lambda x_e . |x| = 2$ in s
           c. $[\![\mathbf{three}]\!] = \lambda s_s . \lambda x_e . |x| = 3$ in s
           d. $[\![\mathbf{few}]\!] = \lambda s_s . \lambda x_e . |x| < n$ in s,
                    for some contextually determined small n
           e. $[\![\mathbf{many}]\!] = \lambda s_s . \lambda x_e . |x| > n$ in s,
                    for some contextually determined large n

Under this theory, when a weak NP has a quantificational reading, it appears with a silent generalized quantifier determiner. For discussion of this determiner, see section 2.8.1 below. In the ETC, however, these NPs are analyzed as pure predicates:

(57)   a.

           b. $[\![(\textbf{57-a})]\!] = \lambda s_s . \lambda x_e . x$ comprises flies in s and $|x| = 1$ in s.

Any quantificational force for the NP comes from the existential closure operator above the copula in the ETC, not from the article *a*.[15]

The remainder of this section proceeds as follows. First, this analysis of the ETC is defended by exploring how it captures the properties of the ETC noted by Milsark (1974). The next subsection argues that the Situation Economy rule captures the effects of the Intersec-

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[13]The determiner *most* is allowed, of course, when it means *the highest number of*, but this is a different meaning from the generalized quantifier *most*.

[14]In informal usage, I will continue to call these items *weak determiners*, even though they are not formally determiners.

[15]This assumption does bring up a problem with the adjectival theory of weak NPs, involving non-monotone-increasing determiners. See Landman (2004) for a solution to this problem.

tive Predicate Generalization in the ETC, and the last subsection argues the same for the related Have Construction.

2.6.1 Properties of the ETC

In this subsection, I will go over a few major properties of the ETC that Milsark (1974) describes, and show how the proposal sketched above derives these properties. First, Milsark points out that in the ETC, there is always an NP after the copula.[16] This restriction is not surprising, though, under the view that the ETC starts its derivation the same way as any other copular sentence; and all such sentences require an NP in this position:

(58)   a.   The dog is nice.
        b.   Singing is nice.
        c.   *(Being) happy is nice.
        d.   *(Being) among friends is nice.

(58-a), which has an NP subject, and (58-b), whose subject is a nominal gerund, sound fine. However, even though APs and PPs have the same semantic type as an NP, copular sentences sound quite odd with AP and PP subjects, as in (58-c) and (58-d).[17] I will not offer an explanation for this restriction, but merely suggest that under this analysis, whatever accounts for this restriction in non-ETC copular sentences (and indeed in most sentences overall) will also account for the fact that the first post-copular phrase is an NP.

    Milsark also shows that only weak NPs may appear in the ETC; he calls this the Definiteness Restriction. The analysis given above explains this restriction neatly. I will argue below that a generalized quantifier is of type $\langle et, \langle et, t \rangle \rangle$, and hence a quantificational DP is of type $\langle et, t \rangle$. This type clearly will not combine properly with an XP of type set. But what if the DP had the type $\langle set, st \rangle$, and therefore could combine (via Function Application) with the XP? Then, the PredP combining the DP and the XP would have type st. Combining this PredP with the copula would form a node of type t, which could then be abstracted over by the s-λ with no need for existential closure, deriving the proper type for a clause, st. However, although a quantificational DP of type $\langle set, st \rangle$ might work for the ETC, it would no longer work for non-ETC sentences, since (intransitive) verbs are always of type et once they combine with the required situation pronoun, and therefore they could not combine with the DP, as shown in (59). Even if the DP raised to the very top of the sentence, it could not combine properly, as shown in (60).
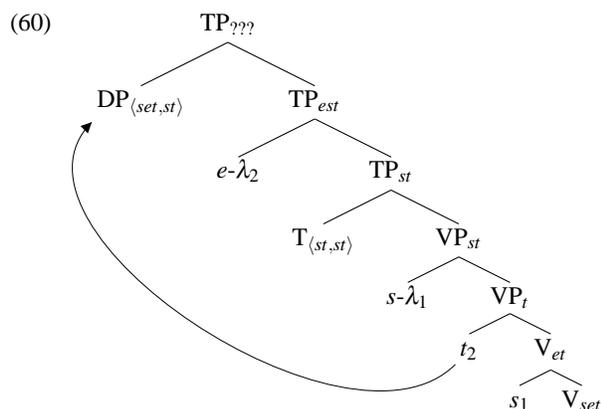
(59)   VP$_{???}$

      DP$_{\langle set, st \rangle}$ V$_{et}$

               s V$_{set}$

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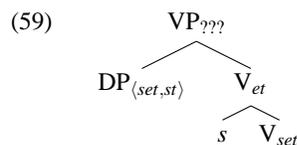
[16]For the purposes of this proposal, I am ignoring ETC sentences which do not have a copula, although I believe that the analysis could in theory be extended to these cases.

[17]Some poetic or stylistic examples allow the XP to appear in the subject position:

(i)   a.   Blessed are the meek.
       b.   On the table was my birthday present.
       c.   Extremely troublesome for the engineers were the cracks in the foundation.

However, Moro (1997) argues that even in these cases, the underlying structure is as in (48); the predicate then may raise to (Spec,TP) to become subject of the whole sentence.

(60)

$TP_{???}$
  $DP_{\langle set,st\rangle}$ TP_{est}
    $e\text{-}\lambda_2$ TP_{st}
      $T_{\langle st,st\rangle}$ VP_{st}
        $s\text{-}\lambda_1$ VP_t
          t_2 V_{et}
            s_1 V_{set}

Therefore, quantifiers must be of type $\langle et,\langle et,t\rangle\rangle$ rather than $\langle set,\langle set,st\rangle\rangle$ and hence cannot appear in the ETC.

Unlike Milsark, for whom the Definiteness Restriction arises due to the obligatory existential closure over the NP in his interpretation rule given in (47), this analysis derives the Definiteness Restriction from the types of the expressions involved – and the obligatory appearance of a situation pronoun on the verb. This analysis allows the existential closure operation to remain free, rather than obligatory as in Milsark's account.[18]

The last property of the ETC that I will examine is what Milsark calls the Predicate Restriction, which describes which XPs may appear in the ETC:

(61)   (cf. Milsark's (100), p. 210)
    a.   Can appear: *sick, drunk, hungry, stoned, tired, closed, alert, open, clothed, naked*, etc.
    b.   Cannot appear: all NPs, shapes, colors, *intelligent, beautiful, boring, crazy*, etc.

Milsark calls those that can appear in the ETC *states* and those that cannot appear *properties*, although most more recent work calls the former *stage-level predicates* and the latter *individual-level predicates* after Carlson (1977). Intuitively, stage-level predicates only hold for a limited time, while individual-level predicates are usually permanent. Milsark notes that even outside of the ETC, individual-level predicates may only be predicated of quantificational DPs:

(62)   ($\approx$ (107))
    a.   A man was sick.
    b.   #A man was tall.
    c.   Every man was sick.
    d.   Every man was tall.
    e.   Two men were sick.
    f.   Two men were tall.

So, with the weak NP *a man* only the stage-level predicate *sick* sounds good, whereas either predicate sounds fine with the strong DP *every man*. Interestingly enough, (62-f) sounds

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[18]It also allows a novel way of looking at Diesing's (1992) idea that items inside the VP are existentially closed: this could also be due to a type restriction, rather than an obligatory existential closure rule.

fine, but only under the quantificational reading of *two men*, namely, *two of the men under discussion were tall*. Therefore, Milsark proposes the following constraint:

(63)   ($\approx$ (109)) Individual-level predicates are only predicated of quantificational DPs. Stage-level predicates may be predicated of quantificational DPs, but may also be predicated of NPs without quantification.

Of course, the same constraint carries over to this analysis: whatever explains such a restriction in normal sentences (see, e.g., a recent proposal by Magri (2006)) should carry over to the ETC.

2.6.2 Situation Economy in the ETC

The last subsection defended the present analysis of the ETC, in which the only situation pronoun in the sentence whatsoever is on the verb. This subsection will show how this account of the ETC, plus Situation Economy, can explain why the DP and XP in the ETC must be evaluated at the same world and time. For instance, take the following sentence:

(64)   #In 1964, there were three MIT professors in kindergarten.

(64) is odd, since *three MIT professors* and *in kindergarten* must be evaluated at the same world and time.

To see how the analysis proceeds, consider the following structure, definitions, and meaning for (64). (I have only represented up to the VP.)

(65)   a. $[\![\textbf{three}]\!] = \lambda s_s . \lambda x_e . |x| = 3$ in s
         b. $[\![\textbf{MIT professors}]\!] = \lambda s_s . \lambda x_e . x$ comprises MIT professors in s
         c. $[\![\textbf{in kindergarten}]\!] = \lambda s_s . \lambda x_e . x$ comprises students in kindergarten in s

(66)
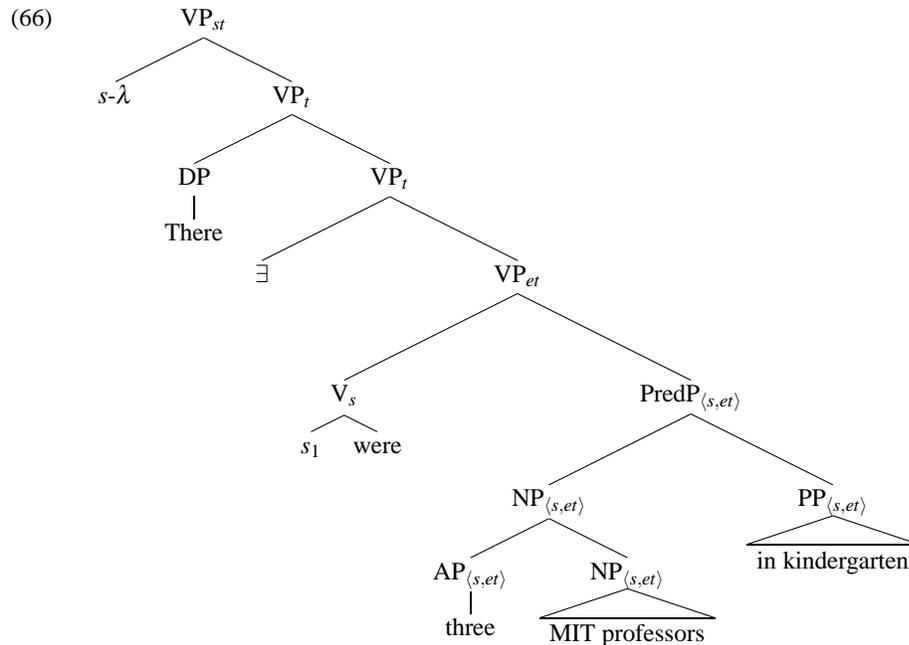
(67) a. $[\![_{NP} \textbf{ three MIT professors}]\!] =$
      $\lambda s_s \, . \, \lambda x_e \, . \, |x| = 3$ in s and x comprises MIT professors in s

   b. $[\![_{PredP} \textbf{ three MIT professors in kindergarten}]\!] =$
      $\lambda s_s \, . \, \lambda x_e \, . \, |x| = 3$ in s, x comprises MIT professors in s and x comprises students in kindergarten in s

   c. $[\![\textbf{(66)}]\!] = \lambda s$. there was an x such that $|x| = 3$ in s, x comprised MIT professors in s, and x comprised students in kindergarten in s.

Given this structure, the predicates *three MIT professors* and *in kindergarten* must be evaluated at the same time and world. However, consider another grammatical structure for the sentence[19]:

(68)
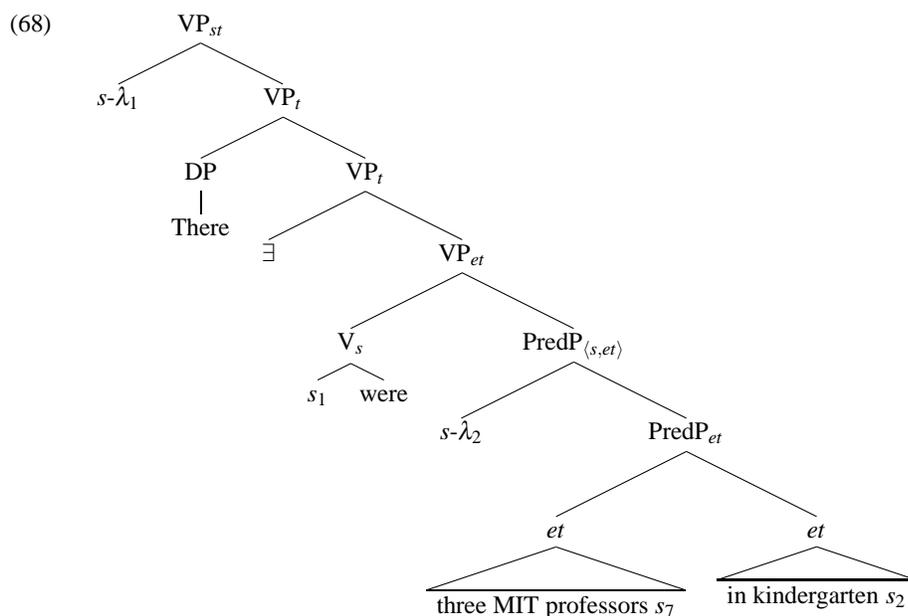
In (68), *three MIT professors* and *in kindergarten* take differently-indexed situation pronouns and therefore might be evaluated at different worlds or times from one another. However, under the definitions in (37), (66) is an alternative to (68) and (66) has fewer situation pronouns than (68); therefore, (68) is (correctly) ruled out by Situation Economy.


2.6.3 The Have Construction

As discussed in section 1.1.3, the Have Construction (HC) shares a number of important properties with the ETC. For instance, consider the example sentences in (69):

(69) a. #In 1995, there was an 18-year-old in kindergarten.
   b. #In 1995, John had an 18-year-old daughter in kindergarten.
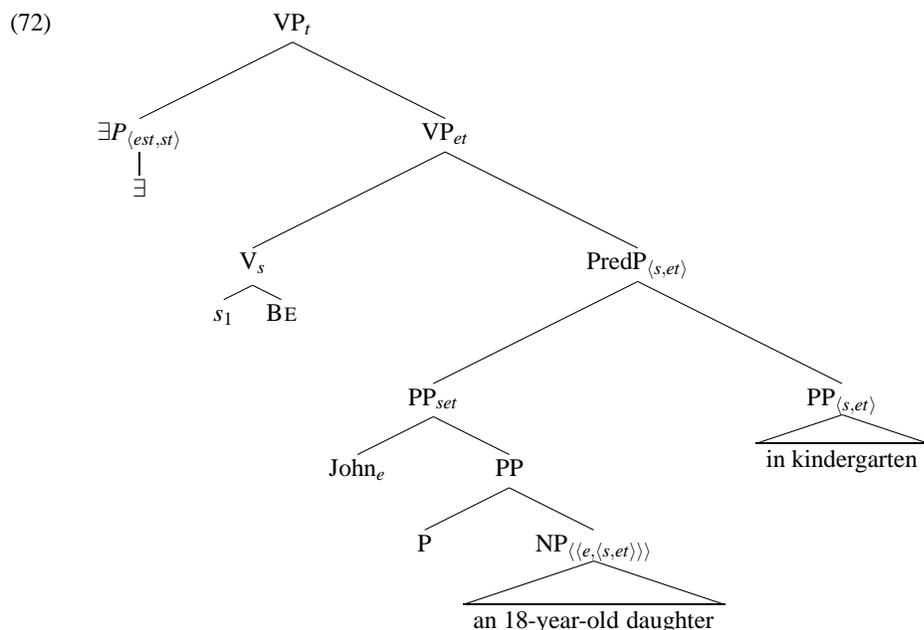
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[19]I assume the null hypothesis whereby a λ operator may appear freely and be interpreted by the rule of Predicate Abstraction (see Bittner 1994).

Just as (69-a) is odd due to the constraint that *18-year-old* and *in kindergarten* be evaluated at the same world and time, (69-b) is odd, presumably also since *18-year-old daughter* and *in kindergarten* must be evaluated at the same world and time.

I would like to suggest that under a particular analysis of the Have Construction, these similarities would be predicted. Kayne (2000), following Freeze (1992) and Benveniste (1966), analyzes the Have Construction as a copular construction, where the word *have*, underlyingly, is the copula *be* plus an incorporated preposition. The subject in his analysis begins as specifier of the Possesive Morpheme, and raises to be specifier of a silent preposition, as in (70). From here, the DP eventually moves to subject position, as it appears in (69-b). Also, the abstract preposition incorporates with the copula to form the verb *have*, as shown in (71).

(70)

(71)
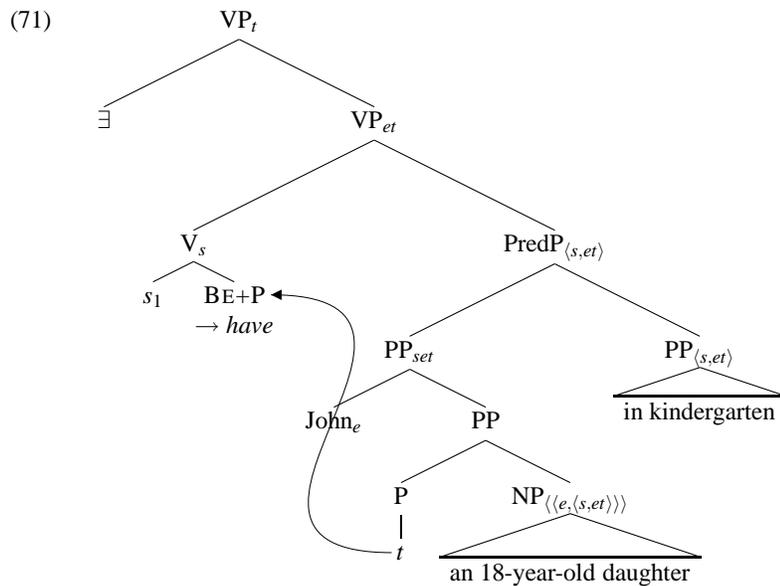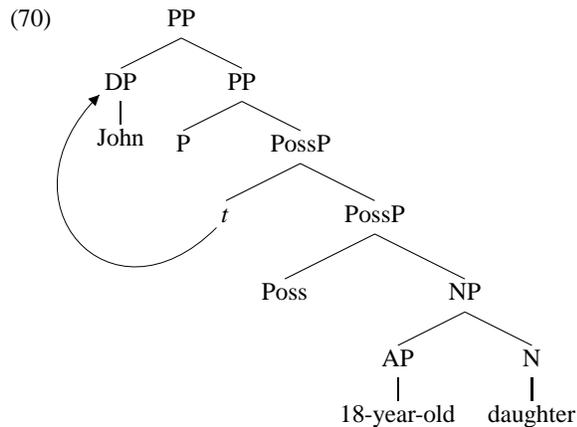
However, the structure which is interpreted at LF is the following:

(72)

$$\text{VP}_t$$
$$\exists P_{\langle est,st \rangle} \qquad \text{VP}_{et}$$
$$\exists$$
$$\text{V}_s \qquad \text{PredP}_{\langle s,et \rangle}$$
$$s_1 \quad \text{B\scriptsize E}$$
$$\text{PP}_{set} \qquad \text{PP}_{\langle s,et \rangle}$$
$$\text{John}_e \quad \text{PP} \qquad \text{in kindergarten}$$
$$\text{P} \quad \text{NP}_{\langle \langle e, \langle s,et \rangle \rangle \rangle}$$
$$\text{an 18-year-old daughter}$$

Obviously, many details would need to be fleshed out to turn this into a full proposal. For instance, above I assumed that the post-copular phrase is always an NP (or DP) and Kayne assumes it can be a PP. However, the similarities between the Have Construction and the ETC are highly suggestive that some structure like Kayne's might be correct for the Have Construction.

2.7 Depictives

Another pair of phrases that must be evaluated at the same world and time as one another is a depictive and the VP to which it attaches. I will first describe how Situation Economy explains this phenomenon for subject depictives, which are a little more straightforward than their cousins, object depictives.

2.7.1 Subject Depictives

Depictives, also known as secondary predicates, are predicates other than the main VP of a sentence that modify a DP in that sentence (Schultze-Berndt and Himmelmann 2004):

(73) a. John left the room angrily, but he wasn't really angry.
      b. #John left the room angry, but he wasn't really angry.

The adverb *angrily* modifies the action in the VP in (73-a), not the subject, John. It is conceptually possible for someone to leave a room in an angry manner, without actually being angry; hence the acceptability of (73-a). However, the depictive *angry* in (73-b) is predicated of John directly, and therefore it is anomalous to assert (73-b), which entails that John was both angry and not angry at the same time.

One of the defining features of a depictive is that it is evaluated at the same time as the VP (Schultze-Berndt and Himmelmann 2004). But, as discussed in section 1.3 above, the depictive also has to be evaluated in the same world as the VP:

(74) a. Mary thinks my brother left angry, but she doesn't know that he's my brother.
      b. #Mary thinks my brother left angry, but she doesn't know that he was angry.

In (74-a), it is possible for *my brother* to be *de re*, and therefore be evaluated in the real world, rather than in Mary's thought worlds. However, as shown in (74-b), it is not possible for the depictive *angry* to be *de re*: once you assert that Mary thinks my brother left the room angry, it sounds odd to deny that she knows he was angry. I will analyze this fact as indicating that the depictive must be evaluated at the same world and time as the VP, which in turn is constrained by Percus's (2000) Generalization X to be *de dicto*.

The analysis that I will present for depictives is a simplification of the one found in Pylkkänen (2002).[20] The main idea of the analysis is that a depictive combines with the verb via Predicate Modification.[21] In the case of a subject depictive, the node resulting from this combination later combines with the subject via Function Application, and therefore the subject is the argument of both the verb and the depictive.

In order to adapt this proposal to the current system, a small change will be necessary. In previous subsections, the required situation pronoun in the VP has combined directly with the verb, as in (75).
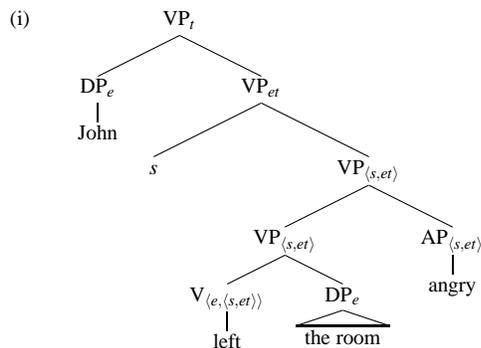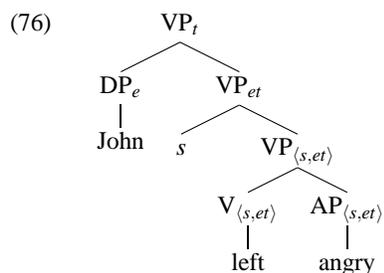
(75) $[_{V_{et}}$ leave$_{set}$ $s]$

Instead, we must assume that the verb combines first with the depictive via Predicate Modification, and then the verb-plus-depictive complex combines with the situation pronoun:[22]

---

[20]Pylkkänen's analysis assumes event arguments and many more projections in the VP. Although I believe both of these assumptions would be compatible with this proposal, I am ignoring them for the sake of simplicity.
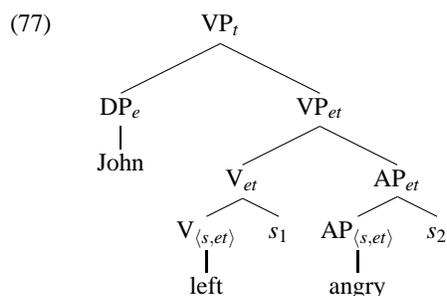
[21]Pylkkänen credits Yatsushiro (1999) with having a similar proposal.

[22]This gets a little complicated for transitive verbs. For now, I will assume that transitive verbs have the type $\langle e, \langle set \rangle \rangle$, as shown in (i):

(i)

(76)

```
              VP_t
            /      \
         DP_e      VP_et
          |       /    \
        John     s    VP_⟨s,et⟩
                      /      \
                V_⟨s,et⟩    AP_⟨s,et⟩
                   |           |
                 left        angry
```

Once again, any alternative structure with more situation pronouns, such as (77), will be ruled out by Situation Economy:

(77)

```
                 VP_t
               /      \
            DP_e       VP_et
             |        /     \
           John    V_et      AP_et
                  /   \      /    \
            V_⟨s,et⟩  s_1  AP_⟨s,et⟩  s_2
                |            |
              left        angry
```
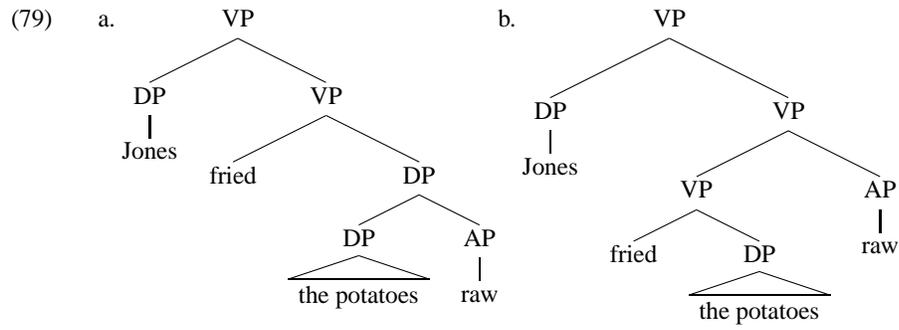
In this way, given this analysis of depictives, Situation Economy predicts that these secondary predicates must be evaluated at the same time and world as the main predicate of the sentence.
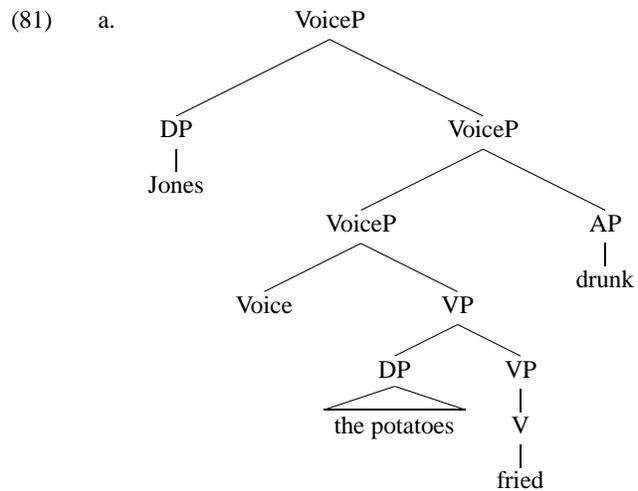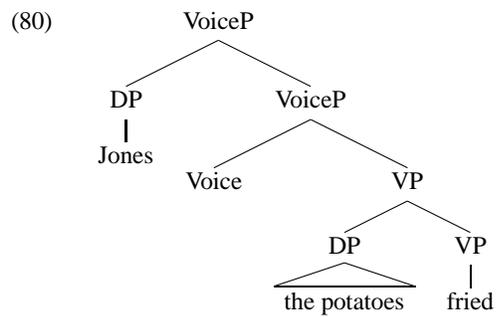
2.7.2 Object Depictives

Sometimes a depictive modifies an object rather than a subject, as shown in (78). (I have used boldface to indicate the depictive and the DP that it modifies.)
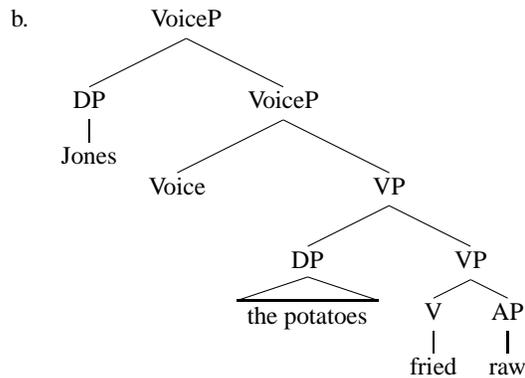
(78)   (= Rapoport (1999) (2))
   a.   Jones fried **the potatoes raw**.
   b.   Jones cut **the bread hot**.
   c.   Jones chopped **the wood wet**.
   d.   Jones froze **the juice fresh**.
   e.   Jones boiled **the lobster alive**.
   f.   Jones bought **the dog sick**.

In (78-a), it is the potatoes that are raw, not Jones. On the face of it, this seems to pose a problem for the simple analysis given above. Neither of the two naive structures for (78-a), given in (79), is compatible with our analysis of depictives. In (79-a), the depictive *raw* is not the sister to the VP, so it cannot combine with VP via Predicate Modification. And in (79-b), *raw* is the sister of the VP, but this is the same structure as for a subject depictive, so *raw* would be predicated of the subject, not the object in (79-b).

(79) a. VP

DP — VP
Jones
fried — DP
DP — AP
the potatoes   raw

b. VP

DP — VP
Jones
VP — AP
fried — DP   raw
the potatoes

This issue does not arise for Pylkkänen, though, because in her system, following Kratzer (1996), among others, the subject is not an argument of the verb, but rather a higher Voice head, as shown in (80). Therefore, a subject depictive may combine with the VoiceP, as shown in (81-a), and an object depictive may combine with the VP, as shown in (81-b):

(80) VoiceP

DP — VoiceP
Jones
Voice — VP
DP — VP
the potatoes   fried

(81) a. VoiceP

DP — VoiceP
Jones
VoiceP — AP
Voice — VP   drunk
DP — VP
the potatoes   V
fried

b.

VoiceP

DP — Jones

VoiceP

Voice — VP

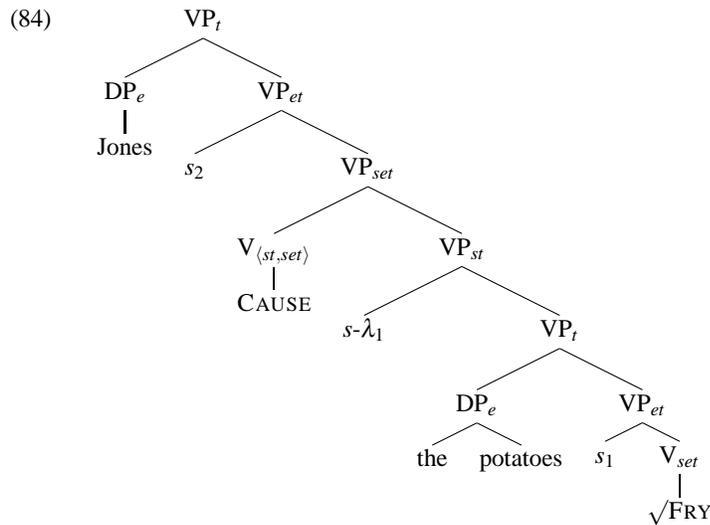DP — the potatoes

VP

V — fried

AP — raw

Although I believe this structure would be suitable for my purposes, for the semantics to work out, it would require the introduction of an event argument to link the the subject and the VP below (see Pylkkänen (2002) for details). Eventually, if situation pronouns were truly construed as situations along the lines discussed in Kratzer (2007), perhaps these pronouns themselves could take the place of such an event argument. For the time being, though, for simplicity and consistency with the rest of this proposal, I will assume a less complex version of Pylkkänen's structure for (78-a), akin to those proposed by Dowty (1979):

(82)   a.   Jones fried the potatoes.
       b.

Jones

CAUSE

the   potatoes

√FRY
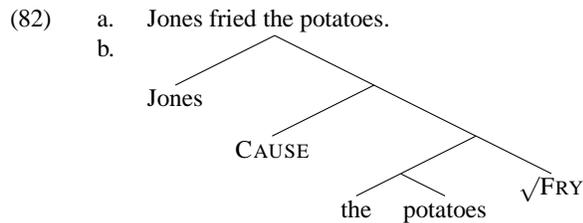
The surface structure for verbs supporting object depictives might arise via the following movement operation:
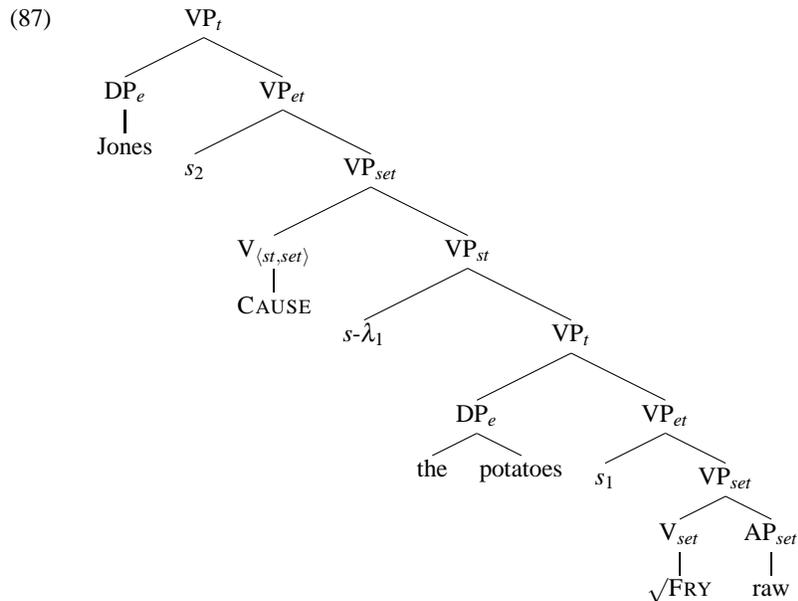
(83)

Jones

CAUSE+√FRY

the   potatoes t_1
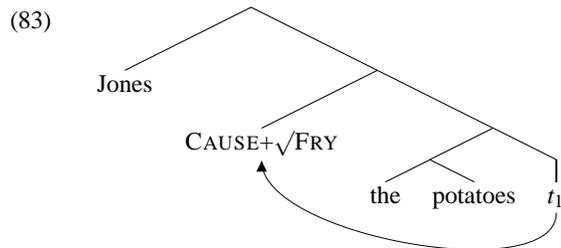
The complex head CAUSE+√FRIED is filled by a single lexical item *fried*. Semantically, though, the structure is interpreted as follows:

(84)

```
                    VP_t
             ┌───────┴───────┐
           DP_e            VP_et
            │          ┌─────┴─────┐
          Jones       s_2        VP_set
                            ┌──────┴──────┐
                        V_⟨st,set⟩       VP_st
                            │        ┌─────┴─────┐
                         CAUSE     s-λ_1        VP_t
                                          ┌──────┴──────┐
                                        DP_e           VP_et
                                      ┌───┴───┐      ┌───┴───┐
                                    the  potatoes  s_1    V_set
                                                           │
                                                         √FRY
```

(85) a. $[\![\sqrt{\text{FRY}}]\!] = \lambda s_s \,.\, \lambda x_e \,.\, x$ fries in s
      b. $[\![\text{CAUSE}]\!] = \lambda P_{st} \,.\, \lambda s_s \,.\, \lambda x_e \,.\,$ in every situation s' otherwise similar to s except for x's actions, $P(s')$ is false.

(86) λs . If Jones had not done what he did in s, the potatoes would not have fried.

Now, if the depictive attached to the lower VP in (84), it could modify the object, just as in Pylkkänen's structure:

(87)

```
                    VP_t
             ┌───────┴───────┐
           DP_e            VP_et
            │          ┌─────┴─────┐
          Jones       s_2        VP_set
                            ┌──────┴──────┐
                        V_⟨st,set⟩       VP_st
                            │        ┌─────┴─────┐
                         CAUSE     s-λ_1        VP_t
                                          ┌──────┴──────┐
                                        DP_e           VP_et
                                      ┌───┴───┐      ┌───┴───┐
                                    the  potatoes  s_1    VP_set
                                                        ┌───┴───┐
                                                      V_set   AP_set
                                                        │        │
                                                      √FRY      raw
```

Once again, any such structure with added situation pronouns will run afoul of the Situation Economy rule. This derives the fact that object depictives, like subject depictives must be evaluated at the same time and world as the (lower) VP.

I will make a few notes on these meanings before continuing. First, notice that for (78-a) to be true, the potatoes only have to be raw before they are fried, not afterwards. I will take this to be a general property of verbs like *fry*, that they are true of their starting times. For instance:

(88)   John fried the potatoes at 5:00, …
      a.   so he was done by 5:15.
      b. #so he started at 4:45.

(89)   When John fried the potatoes, they were raw.

As shown by its possible continuations, (88) cannot mean that John finished frying the potatoes at 5:00; it means that 5:00 is when he started. Similarly, (89) equates the time when John fried the potatoes with when they were raw, not when they were fried. I will appeal to whatever principle explains these data to explain the depictive's temporal properties. Second, notice that although both $\sqrt{\text{FRY}}$ and *raw* are in the scope of CAUSE, the only reading is that John caused the potatoes to fry, not that John caused the potatoes to be raw. In an analysis that has event variables or true situation variables, this CAUSE head could actually specifiy the subject (*Jones*) as the agent of the event described by $\sqrt{\text{FRY}}$. For now, I must assume that the subject is somehow pragmatically construed as the causer of the event of the potatoes frying in the complement of CAUSE, and not, for instance, as the causer of the state of the potatoes being raw.

2.7.3 Impossible Object DPs

(90)   (= Rapoport (3))
      a. *Jones phoned **Smith sad**.
      b. *Jones pushed **Smith sick**.
      c. *Jones chased **Smith angry**.
      d. *Jones slapped **Smith sober**.
      e. *I kicked **John depressed**.
      f. *The policeman punched **John drunk**.

The depictives in (90) can only refer to the subject, not the object, of these sentences.[23] I take this to indicate that the verbs in (90) do not have the same structure as those in (78). As seen above, the structure of the VP is very important to the analysis of the object depictive. Before we continue, consider the following sentences, which have explicitly complex VPs:

(91)   a. *Jones sent an email to **Smith drunk**.
      b. *Jones sent **Smith** an email **drunk**.

(91) shows that a depictive may not modify an indirect object, since *drunk* can only apply to Jones in these sentences, not to Smith. (See Pylkkänen (2002) for details on why the structures in (91) do not support (indirect) object depictives.) Interestingly, the verb form of the word *email* does not support an object depictive either:

(92)   *Jones emailed **Smith drunk**.

---

[23]Some of the adjectives in (90), when they are thought of as applying to the object, have a resultative meaning, for instance that Jones slapped Smith, causing him to become sober. These readings, though interesting, are not the subject of this section.

Once again, *drunk* can only modify *Jones*, not *Smith*. I take this to indicate that the underlying structure for the sentence in (92) is like those for the sentences in (91), and this is why (92) also may not support an object depictive. Simply put, the ostensive direct object in (92) is actually an indirect object underlyingly. The rest of the verbs that do not support object depictives, such as those in (90), also have underlyingly indirect objects rather than direct objects. Some evidence for this comes from paraphrases of the sentences in (90) which use indirect objects for the ostensive direct objects in (90):

(93) a. Jones made a phone call to Smith. / Jones gave Smith a phone call.
      b. Jones gave Smith a push.
      c. Jones gave chase to Smith.
      d. ?Jones gave Smith a slap.
      e. I gave John a kick.
      f. The policeman threw a punch at John.

I submit that these verbs underlying contain indirect objects, and no depictive may modify an indirect object, as shown in (91).

2.8 Situation Pronouns

To this point in the analysis, we have only seen structures with one single situation pronoun per clause: the obligatory pronoun on the VP. This dearth of situation pronouns has successfully explained several applications of the Intersective Predicate Generalization. In every case where an extra situation pronoun was possible, an alternative structure without such pronouns has been available, and therefore the structure with more pronouns is ruled out by Situation Economy. However, some structures do require additional situation pronouns, namely those involving *de re* readings of DPs. How these structures arise is the topic of this section.

I propose that situation pronouns only arise in structures schematized in (94):

(94)

$$
\begin{array}{c}
\mathrm{D}_\alpha \\
\diagup\diagdown \\
\mathrm{A}_{\langle\beta,\alpha\rangle} \qquad \mathrm{C}_\beta \\
\diagup\diagdown \\
\mathrm{B}_{\langle s,\beta\rangle} \quad s
\end{array}
$$
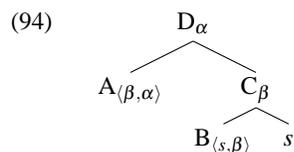
In (94), **A** calls for an argument of type β, but **B** is of type $\langle s,\beta\rangle$; therefore, before **B** can combine with **A**, **B** must take a situation pronoun and become of type β. I will argue below that strong determiners are items like **A** in that they call for a type-*et* argument, requiring NPs of type *set* to take a situation pronoun before combining with them.

In the next subsection, I will go over how this idea works for items that can be *de re*, namely strong DPs and quantificational readings of weak DPs. Next, I will make a hypothesis motivating the fact that these items in particular should require their arguments to be extensional. The last subsection explores a prediction made by this hypothesis.

2.8.1 Strong and Quantificational DPs

In a system with situation pronouns, all items that are interpreted *de re* must take a situation pronoun. So far, the only *de re* items we have seen have been quantificational DPs, whether

they are inherently strong, as in (95-a), or they are weak NPs under quantificational readings, as in (95-b). I presume the definitions and structures for sentences with strong determiners are as in (96), (97), and (98).[24]:

(95) a. Mary thinks the/every professor is a student.
      b. Mary thinks many/three professors are students.

(96) a. $[\![\mathbf{the}]\!] = \lambda P_{et}$. if there is only one x such that $P(x)$, then this x; otherwise, undefined
      b. $[\![\mathbf{every}]\!] = \lambda P_{et} . \lambda Q_{et} . \forall x . P(x) \rightarrow Q(x)$

(97)

(98)

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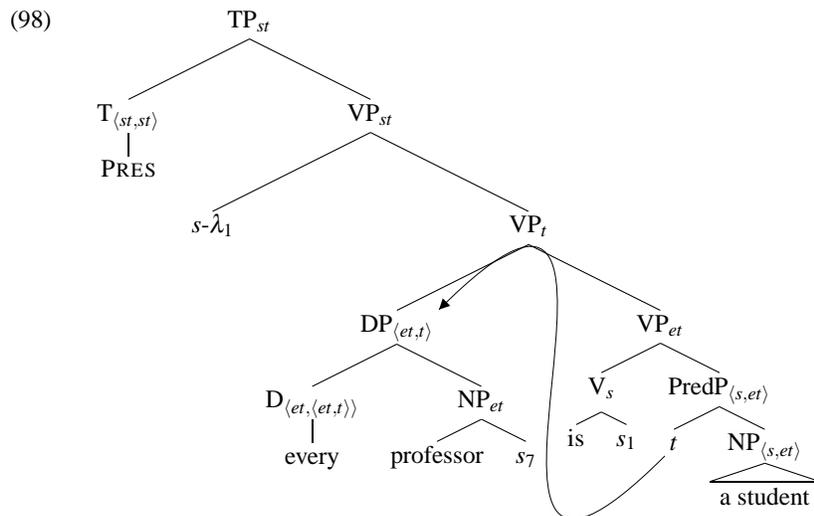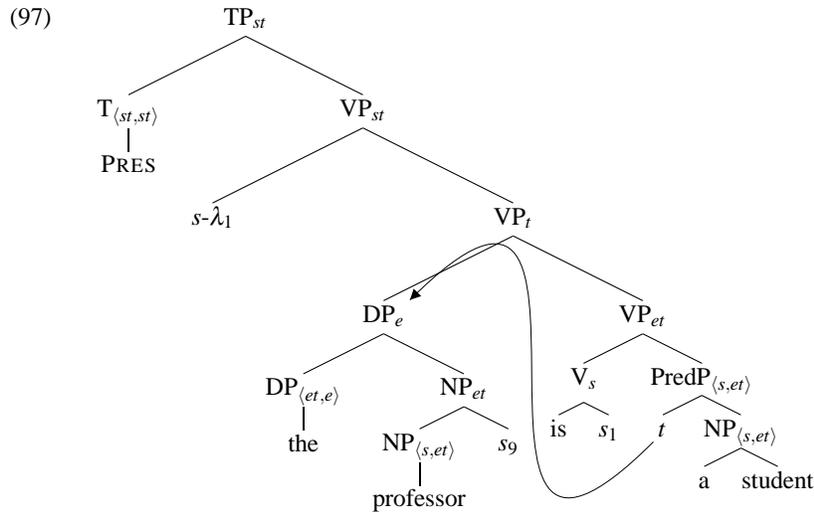
[24]I assume that every DP is generated inside the PredP with its predicate. This means that even a definite such as *the professor* must move to be interpreted, since a node of type *e* cannot combine with one of type *set*.

The only argument of a one-place strong determiner such as *the* is of type *et*, forcing the introduction of a situation pronoun. The restrictive clause of a generalized quantifier such as *every* is also *et*, again forcing a situation pronoun to appear. Situation Economy does not rule these structures out, though, because there is no grammatical alternative where *the* or *every* combines with *professor* without using a situation pronoun. Notice that as shown in (97) and (98), the DPs will receive *de re* readings, since they combine with situation pronouns that are free in the structures. However, if they had combined with bound situation pronouns, they would have received *de dicto* readings.

As for the weak NPs with quantificational readings, I presume that there is a silent generalized quantifier-determiner SOME that turns weak DPs into strong ones (again, see Landman (2004) for discussion). The definition of this determiner and the structure for the sentence containing it are as follows:

(99) $[\![\text{SOME}]\!] = \lambda P_{et} . \lambda Q_{et} . \exists x . P(x) \,\&\, Q(x)$

(100)
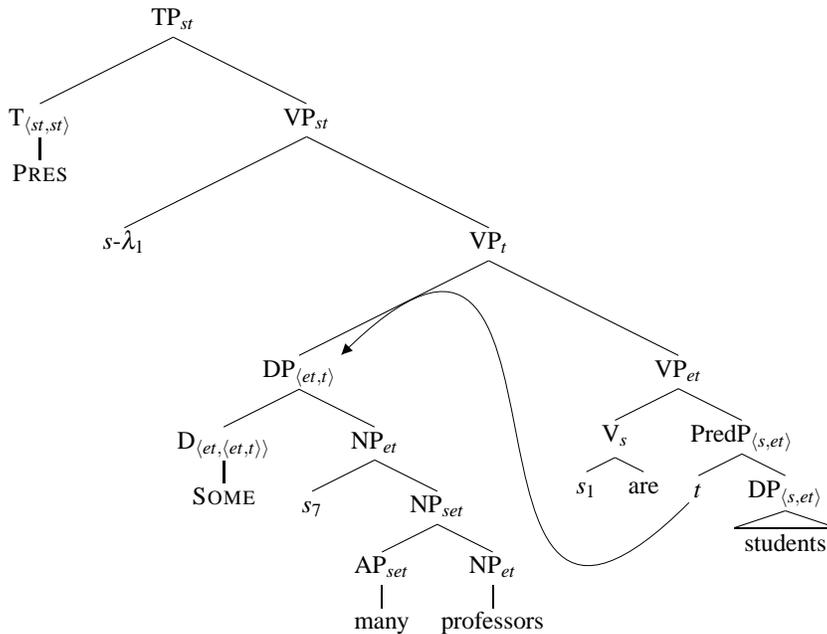
Since these structures are entirely parallel to the ones with overt generalized quantifiers, they have the exact same range of meanings: if the situation pronoun below SOME is bound, the DP receives a *de dicto* reading; otherwise it receives a *de re* reading.[25]

2.8.2 Extensional Type Hypothesis

This analysis of *de re* phrases depends crucially on the the semantic types stipulated above. The aim of this subsection is to provide a conceptual motivation for the fact that strong determiners have extensional types. I will propose a constraint like the following:

---

[25]This analysis runs into the same problem with non-monotone-increasing articles that my analysis of the ETC does; see Landman (2004) for the discussion of this problem. Also, this silent SOME determiner must have some further component to its meaning to account for the presuppositionality of quantificational readings of weak NPs.

(101)   **Extensional Type Hypothesis** (informal)[26]: If a lexical item is definable without reference to worlds or times, it cannot take a situation argument.

The intuition behind (101) is that, unlike most lexical items, those that we stipulated must take extensional arguments could actually be defined without any reference to worlds or times at all. Lexical predicates like *sleep*, *boy*, and *married* intrinsically must be evaluated at a world or a time. An individual may be a boy at one world or time and not a boy at another. Once situation arguments become a part of the type system, though, you could define a word such as *every* to take one or more situation pronouns and merely pass them onto its other arguments:

(102) $[\![\mathbf{every}]\!] = \lambda P_{set} \, . \, \lambda Q_{set} \, . \, \lambda s' \, . \, \lambda s \, . \, \forall x \, . \, P(s')(x) \rightarrow Q(s)(x).$

However, most traditional meanings for *every* simply define it as a subset relation between two sets of individuals. Thus, the definition in (102) could also be rewritten without situation arguments[27]:

(103) $[\![\mathbf{every}]\!] = \lambda P_{et} \, . \, \lambda Q_{et} \, . \, \forall x \, . \, P(x) \rightarrow Q(x).$

Under this definition, if two predicates A and B are of type $\langle s, et \rangle$, they will each have to combine with a situation pronoun prior to the application of *every*.

Taking this intuition to its logical conclusion, the Extensional Type Hypothesis claims that no word definable without a situation argument is allowed to take such an argument. More formally, this hypothesis is a constraint on the arguments of functions representing the meanings of lexical items[28]:

(104)   **Extensional Type Hypothesis** (formal): A n-place function f representing the meaning of a lexical item whose arguments include a type-s argument s and m type-$\langle s, \alpha \rangle$ predicates $P^1 \ldots P^m$ is disallowed if there is an $(n-1)$-place function g such that $\forall s_s \, . \, \forall P^1 \ldots P^m \in D_{\langle s, \alpha \rangle} \, . \, f(s, P^1, \ldots, P^m) \leftrightarrow g(P^1(s), \ldots, P^m(s)).$

Essentially, (104) says that since *every* **could** be defined as in (103), it **must** be defined this way, rather than as in (102). Under this hypothesis, then, the lexical items that must take extensional types include those that can head *de re* phrases: definite determiners and generalized quantifiers. The restrictive clause and the nuclear scope of a generalized quantifier both must be of type *et*. However, the nuclear scope cannot be *de re* due to Percus's (2000) Generalization X.

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[26]A version of this was first suggested to me by Danny Fox.

[27]Sometimes one gets the feeling that a mistake in someone's belief might be due to the word *every* varying in different world:

(i)   Mary thought that every boy was late, but really only most of them were.

However, (i) could just as easily be analyzed as the predicate *be late* or *boy* varying from world to world. In Mary's thought worlds, the set of individuals who were late includes every boy; whereas in the real world, this set only includes most of the boys.

[28]This restriction bears a similarity to a more general constraint on superfluous arguments of any kind proposed by von Fintel and Heim (2002).

2.8.3 Prediction: Adjectival Determiners

The Existential Type Hypothesis also makes predictions about the types of many other lexical items. For instance, the cardinal determiners, as defined in section 2.6, all have superfluous type-*s* arguments. According to the Extensional Type Hypothesis, the definitions of these words should be as in (105)– i.e., they should have extensional types.

(105) a. $[\![\mathbf{a}]\!] = \lambda x_e \,.\, |x| = 1$
       b. $[\![\mathbf{two}]\!] = \lambda x_e \,.\, |x| = 2$
       c. $[\![\mathbf{three}]\!] = \lambda x_e \,.\, |x| = 3$
       d. $[\![\mathbf{few}]\!] = \lambda x_e \,.\, |x| = n$, for some contextually determined small n
       e. $[\![\mathbf{many}]\!] = \lambda x_e \,.\, |x| = n$, for some contextually determined large n

On the face of it, this poses a problem for the Situation Economy theory. For instance, in the analysis of ETC given above, a numeral like *three* is presumed to be of type *set*, so it may combine with other predicates of type *set* directly via Predicate Modification.

Perhaps one way to solve this problem would be to assume that the internal structure of an NP mirrors that of a VP. Perhaps, just like a verb, a noun combines with a situation pronoun which is obligatorily bound by a λ operator higher in the phrase. I will not make a complete proposal for this idea, but the main idea can be seen in (106):

(106)
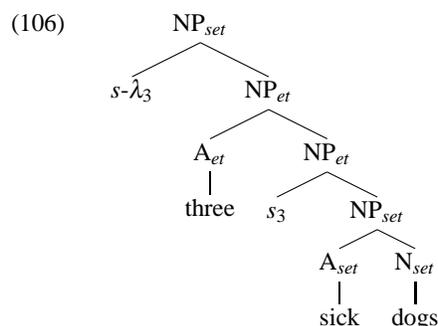
In (106), the noun *dog* combines with a type-*set* adjective *brown*. Then the NP *brown dog* takes a situation pronoun argument before combining with the type-*et* adjective *three*.[29]

Having an obligatory situation pronoun inside the NP could also help explain the distribution of cardinal determiners. If these words are actually adjectives, as assumed above, why are the following (b) sentences unacceptable?

(107) a. Three sick dogs followed me home.
       b. *Sick three dogs followed me home.

(108) a. There are three dogs sick.
       b. *There are sick dogs three.

Although the details remain to be worked out, an explanation for (107) might be that a type-*set* adjective such as *sick* must appear beneath the situation pronoun inside the NP, and a type-*et* adjective such as *three* must appear above the situation pronoun, as (106). Therefore, the extensional adjective must precede the intensional one. (107-b) is out because this order

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[29]This is an example of Predicate Modification applying to nodes of type $\langle e,t \rangle$, as mentioned above.

has been reversed. (108-b) could be out because inside the PredP, the NP is of type *set* and cannot combine with an AP of type *et* like *three*.
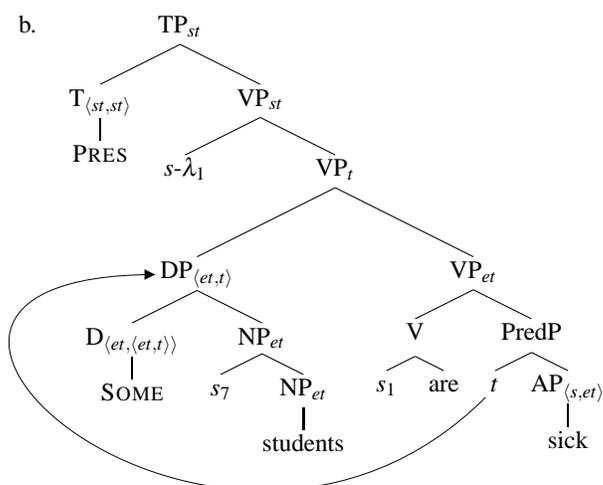
3 Bare Plurals

As mentioned above, another way to capture the Intersective Predicate Generalization might be to restrict Predicate Modification to apply only to intensional items, so for instance it would apply to items of type $\langle s, \langle e,t \rangle \rangle$ but not of type $\langle e,t \rangle$. One argument in favor of the Situation Economy account above an account restricting Predicate Modification is that Situation Economy makes predictions beyond just capturing the Intersective Predicate Generalization. To show that such a prediction is made, and in fact correct, I turn in this section to bare plurals.

Without any further assumptions, the system above predicts that a bare plural will have the same meaning as a plural DP headed by *some*, since the only mechanism available to interpret a bare plural is the silent version of the word *some*, SOME:

(109) a. Some students are sick.
       b. Students are sick.

(110) a.

b.
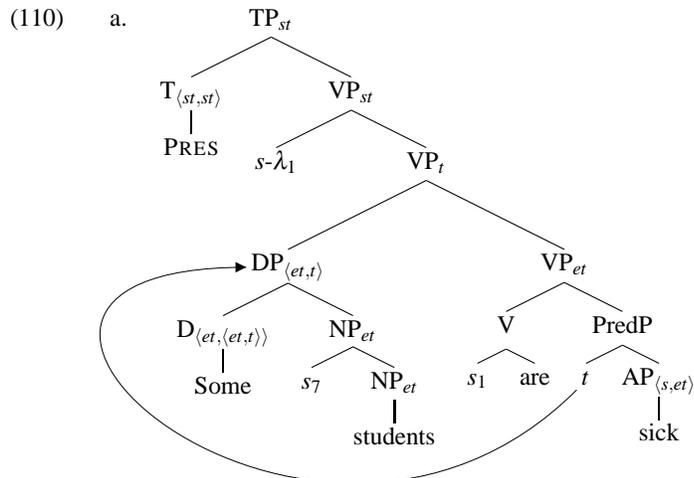
However, most bare plurals actually have a different range of meanings from DPs with determiners.[30] Most significantly for this analysis, simple bare plurals cannot receive a *de re* interpretation:

(111)   Mary is confused about whether my friends are married.
    a.   She thinks some bachelors are married.
    b. #She thinks bachelors are married.

Although (111-a) describes a coherent scenario where Mary mistakenly believes that a few of my friends who happen to be bachelors are married, (111-b) can only perhaps mean that Mary is mistaken about the definition of what a *bachelor* is.[31]

To solve this problem, I turn to a proposal by Chierchia (1998), who assumes that bare plurals in English that can denote kinds can be reconstrued as kind individuals. Chierchia assumes an ontology where kinds are individuals (type e)[32], each of which is in a one-to-one correspondence with a property (type set). He defines two meta-language operators $\cap$ and $\cup$ which convert to and from kinds, respectively:

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[30]Although this may not be the case for non-kind-denoting NPs like *parts of that machine*. See Carlson (1977) for details on both these claims.

[31]Interestingly, this sentence improves in the following scenario:

(i)   a.   Person A: Mary is confused about which of my friends are married and which are not.
        b.   Person B: Does she think that some of your married friends are bachelors?
        c.   Person A: No, she thinks BACHELORS are MARRIED.

The sentence is still odd, but I am not sure why it improves with contrastive focus.

[32]Chierchia's kinds are actually of type $\langle s, e \rangle$; he defines a kind k as a function from a world w to to the totality of instances of k in w. This allows him to define $\cap P_{set}$ as $\lambda w_s.\iota P(w)$. From this, he derives the fact that $\cap$ may only apply to plural nouns, since if it applied to a singular noun denoting P_{set}, $P(w)$ would have to be a singleton in every world w in order for $\iota P(w)$ to avoid presupposition failure. And, by stipulation, no kind may have a single manifestation in every world. In my system, I will have to merely stipulate that $\cap$ requires a plural argument.

(112) PROPERTIES $\overset{\text{'down'}}{\underset{\cup}{\overset{\cap}{\rightleftarrows}}}$ KINDS $(\approx \text{Chierchia's (13))}$
   (type e) $\underset{\text{'up'}}{}$ (type set)

For the purposes of this analysis, I will not define these meta-language operators any further than to say that they are functions which map between corresponding properties and kinds. I will define an object language operator $\cap$, though, which is freely insertable into English sentences, as given in (113).

(113) $[\![\cap]\!] = \lambda P_{set} \cdot \cap P$, if $P \in dom(\cap)$; otherwise undefined.

Chierchia assumes that individuals are sorted corresponding to whether they denote kinds, pluralities, or atoms; and predicates may select (semantically) for some subset of individuals. For instance, as defined in (113), $\cap$ is undefined when it takes a non-kind argument. (114) shows an example of $\cap$ used with a predicate which selects for kinds, *widespread in Cambridge*. I will indicate variables over kinds with the subscript k and variables over atoms or pluralities with the subscript o for object. This does not mean that this is a syntactic distinction; a predicate selecting for a kind is simply undefined for objects and vice versa.

(114)
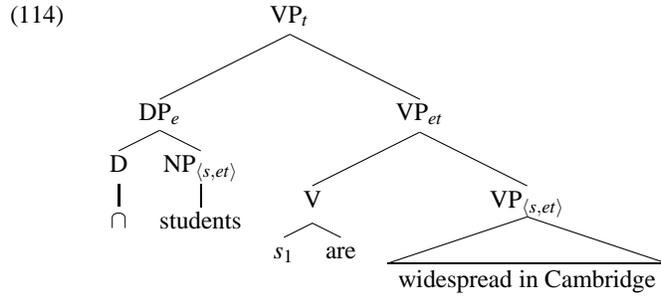
(115) $[\![\textbf{widespread in Cambridge}]\!] = \lambda s_s \cdot \lambda x_k \in D_e$. the distribution of the x_o such that $[\cup x_k](s)(x_o)=1$ is equal over all of Cambridge

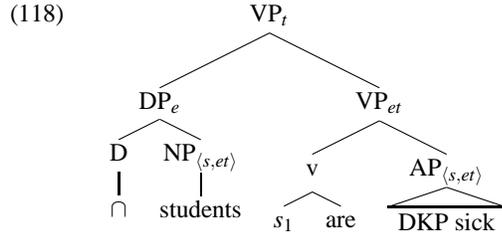(116)   a. $[\![s_1 \textbf{ widespread in Cambridge}]\!]([\![\cap \textbf{students}]\!]) = 1$ iff
   b. $[\![s_1 \textbf{ widespread in Cambridge}]\!](\cap[\![\textbf{students}]\!]) = 1$ iff
   c.   The distribution of the x_o such that $[\cup[\cap[\![\textbf{students}]\!]]](s_1)(x_o)=1$ is equal over all of Cambridge iff
   d.   The distribution of the x_o such that $[\![\textbf{students}]\!](s_1)(x_o)=1$ is equal over all of Cambridge iff
   e.   The distribution of the x_o such that x_o comprises students in s_1 is equal over all of Cambridge

Notice that, as employed in (116-d), $\cup \cap P = P$. The predicate *to be widespread in Cambridge* takes a kind for an argument, and therefore the structure in (115) is easily interpreted, as shown. One way to paraphrase (115) is that the kind **students** has the property of being widespread in Cambridge. However, some predicates select for object (non-kind) individuals. In order for a kind-denoting bare plural to be the argument of a predicate over simple

individuals, I assume that there is an operator called DKP (for Derived Kind Predication) that turns a predicate over simple individuals into a predicate over kind individuals[33]:

(117) $[\![\mathbf{DKP}]\!] = \lambda P_{\langle s,et\rangle} . \lambda s_s . \lambda x_k . \exists x_o . [\cup x_k](s)(x_o) = 1$ and $P(s)(x_o) = 1$

This operator allows a kind-denoting NP to combine with a predicate over object individuals:

(118)

(119)   a. $[\![s_1 \ \mathbf{DKP} \ \mathbf{sick}]\!]([\![\cap \ \mathbf{students}]\!]) = 1$ iff
       b. $[\![s_1 \ \mathbf{DKP} \ \mathbf{sick}]\!](\cap \ [\![\mathbf{students}]\!]) = 1$ iff
       c. $[\lambda x_k . \exists x_o . [\cup x_k](s_1)(x_o)$ and $[\![\mathbf{sick}]\!](s_1)(x_o)](\cap \ [\![\mathbf{students}]\!]) = 1$ iff
       d. $\exists x_o . [\cup[\cap[\![\mathbf{students}]\!]]](s_1)(x_o)$ and $[\![\mathbf{sick}]\!](s_1)(x_o)]$ iff
       e. $\exists x_o . [\![\mathbf{students}]\!](s_1)(x_o)$ and $[\![\mathbf{sick}]\!](s_1)(x_o)]$ iff
       f. $\exists x_o . x_o$ comprises students in s_1 and x_o is sick in s_1

One way to paraphrase (118) is that the kind **student** has a manifestation in s comprising sick people in s.

     In order to fully derive the facts in (111), namely that a bare plural may not be *de re*, Chierchia must find a way to force the bare plural to take the $\cap$ operator and denote a kind rather than taking SOME and being existentially quantified over. Otherwise, (111-b) could have a reading identical to (111-a), which it does not. Chierchia makes the following suggestion for why $\cap$ is obligatory when the bare plural can be kind-denoting:

(120)   There is a clear sense in which $\cap$ is more meaning preserving than $\exists$. $\cap$ merely changes the type of its argument, leaving the information associated with it otherwise unchanged. [...] Not so for $\exists$, which adds existential import. Since of the available options, $\cap$ is the more meaning preserving one, it gets picked over $\exists$ whenever possible. (Chierchia (1998), p. 374)

I would like to suggest an alternative solution to the problem, or perhaps merely an alternative cashing out of what it means to be "more meaning preserving." Notice that the structure proposed for a sentence involving DKP such as (118) only has one situation pronoun, the pronoun required by the verb. Next, notice that (118) is in fact an alternative to the structure in (110), according to the definitions in (37). Since (120) has fewer situation pronouns, how-
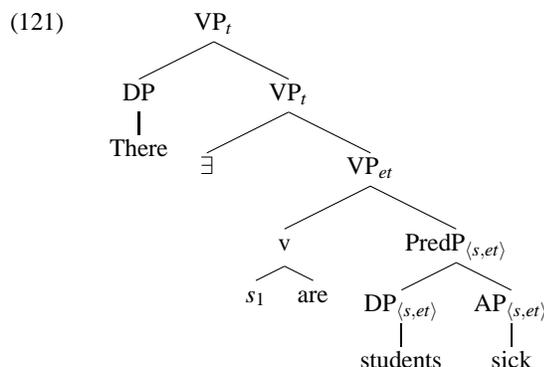
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[33]Chierchia (1998) assumes that this effect is achieved by a special interpretation rule, triggered by a sortal type mismatch between a predicate which takes an object individual and an argument which is a kind individual. In my system, though, object and kind individuals are not distinguished syntactically. Instead, the DKP operator may be freely inserted, and structures with sortal type mismatches are discarded via a general rule against uninterpretable structures.

     Also, Chierchia, p.c., notes that the eventual meaning of an operator version of DKP might have to be able to bind a variable to deal with cases such as (i), where the object individuals quantified over by DKP can bind a pronoun:

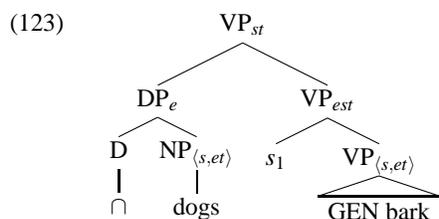(i)   Dogs were biting themselves.

ever, (110) is ruled out by Situation Economy. So, with a few standard assumptions about bare plurals and kinds, Situation Economy is able to explain why bare plural subjects must be *de dicto*: when bare plurals are interpreted as kinds, the resulting structures have fewer situation pronouns.[34]

Additionally, since for Chierchia $\cap$ is always preferred to SOME, he must assume that DKP applies inside the ETC. However, under this proposal, nothing special need be said about bare plurals in the ETC. Here, since they can receive an interpretation without the kind-forming operator (and in fact could not receive an interpretation with the $\cap$), there is no kind reading in such contexts:

(121)

$$\begin{array}{c}\text{VP}_t\\ \diagup\diagdown\\ \text{DP}\quad\text{VP}_t\\ |\\ \text{There}\quad\exists\quad\text{VP}_{et}\\ \diagup\diagdown\\ \text{v}\quad\text{PredP}_{\langle s,et\rangle}\\ \diagup\diagdown\quad\diagup\diagdown\\ s_1\quad\text{are}\quad\text{DP}_{\langle s,et\rangle}\quad\text{AP}_{\langle s,et\rangle}\\ |\qquad\quad|\\ \text{students}\quad\text{sick}\end{array}$$

To finish off the analysis of bare plurals, I will assume a GEN operator, analogous to the DKP operator, only having generic, rather than existential quantification:

(122) $[\![\textbf{GEN}]\!] = \lambda P_{\langle s,et\rangle} \,.\, \lambda s_s \,.\, \lambda x_k \,.\, \forall x_o$ (given the property opportunity) $\,.\, [\cup x_k](s)(x_o)$ $\rightarrow P(s)(x_o)$

(123)

$$\begin{array}{c}\text{VP}_{st}\\ \diagup\diagdown\\ \text{DP}_e\qquad\text{VP}_{est}\\ \diagup\diagdown\qquad\diagup\diagdown\\ \text{D}\quad\text{NP}_{\langle s,et\rangle}\quad s_1\quad\text{VP}_{\langle s,et\rangle}\\ |\qquad|\\ \cap\quad\text{dogs}\qquad\text{GEN bark}\end{array}$$

(123) means that the kind **dog** has the property that its manifestations in s_1, given the proper opportunity, bark in s_1.

4 Conclusion

This paper has proposed a new generalization describing cases where a theory with situation pronouns overgenerates: The Intersective Predicate Generalization. While the null Free Situation Pronoun Hypothesis would allow two predicates interpreted intersectively in theory to

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[34]Irene Heim, p.c., notes that a bare plural in object position would remain *in situ* if interpreted via a DKP operator, but raise to a higher position if interpreted with the silent SOME determiner. Therefore, these two methods of interpretation would lead to structures which are not alternatives under the definition in (37). There are several ways to patch this problem, one of which is simply to redefine the alternatives to allow the base structures of quantifier movement to count as alternatives.

be evaluated at different times or worlds, the Intersective Predicate Generalization states that this cannot happen. The paper then explored an explanation for the Intersective Predicate Generalization based on a syntactic economy principle, which disallows certain structures for sentences and hence certain readings. In particular, the rule of Situation Economy was proposed to rule out structures that have more situation pronouns than relevant alternative structures. We have seen how such a rule explains the Intersective Predicate Generalization for nouns and intersective modifiers, the Existential There Construction and Have Construction, and subject and object depictives. The Extensional Type Hypothesis was next proposed to explain why strong determiners must have extensional types and therefore must take arguments which have already combined with situation pronouns. This obviated the Situation Economy rule and allowed *de re* readings for strong DPs and weak NPs with quantificational readings. Last, it was shown that the Situation Economy approach may explain why bare plurals must have kind readings: namely, since such readings involve fewer situation pronouns.

Some interesting questions remain for this analysis. For instance, where exactly does the economy principle apply? And why is it situation pronouns which are economized? As for the first question, it seems that Situation Economy could easily be classified as a parsing constraint. Notice that the process of generating alternatives, as defined in (37), never involves adding or removing a word that was actually spoken or heard. At a certain point during the process of understanding an utterance, a hearer must generate possible structures for what she has heard. Part of generating these structures is determining which covert words are in these structures. Situation Economy is a way of ruling out a good number of such structures – namely those with more than the necessary number of situation pronouns – and hence making the hearer's job that much easier. As for why situation pronouns are economized, this, too, has a practical explanation. As we have seen, situation pronouns add a great deal of power to the semantic system. As such, the fewer of these items there are, the fewer possible binding ambiguities there will be involving the pronouns. Other remaining questions include how the situation economy account interacts with the copy theory of movement, and whether unpronounced individual variables, such as pro, PRO, and traces, could come under a similar economy principle.

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