There Are No Property Traces

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1. Introduction

This paper argues that movement cannot map onto traces ranging over properties (type $\langle e,t\rangle$) (1).[1]

(1) *[DP_1 $\lambda f_{\langle e,t\rangle}$ … [… [$f_{\langle e,t\rangle}$]$_1$ …]]

The empirical motivation for this claim comes from a detailed investigation of an $\overline{\text{A}}$-movement asymmetry in English discovered by Postal (1994), which has received little systematic attention in the literature. A representative example is given in (2) with an existential construction. While *wh*-movement can target the postverbal position (2b), topicalization cannot (2c). This asymmetry comprises a diverse set of syntactic environments, which I refer to as **Π-positions**. It also extends to other $\overline{\text{A}}$-movement types.

(2) a. There is **a potato** in the pantry. *Baseline*

b. ✓**What**$_1$ is there ___ $_1$ in the pantry? *Wh-movement*

c. *[**A potato**]$_1$, there is ___ $_1$ in the pantry. *Topicalization*

I advance two novel generalizations: (i) DPs in Π-positions denote properties (*property generalization*) and (ii) movement that shifts scope cannot target Π-positions (*scope generalization*). From these two generalizations, an analysis of the Π-position asymmetry in (2) naturally emerges. Movement that shifts scope leaves a trace of type e, which is incompatible with the property-type requirement of Π-positions (3). Movement that does not shift scope instead reconstructs. Thus, if a DP would not ordinarily violate the property-type requirement of Π-positions, then it will not do so under reconstruction either (4).

(3) *[DP_1 λx_e … [… [x_e]$_{\Pi\text{-pos}}$ …]]
type e trace

(4) ✓[___ $_1$ … [… [DP_1]$_{\Pi\text{-pos}}$ …]]
reconstruct

Under this analysis, Π-positions are an instance where movement must reconstruct. Some movement types, e.g. topicalization, are hence unable to target Π-positions because they cannot reconstruct, a property that can crucially be observed independently of Π-positions, as I will show. I will argue that the ungrammaticality of scope-shifting movement targeting Π-positions entails that movement cannot map onto traces ranging over properties (1), because if this were available, it would salvage scope-shifting movement and at the same time be compatible with Π-positions. The paper proceeds as follows: §2 introduces Π-positions and the Π-position asymmetry. I then advance the property and scope generalizations in §3 and §4 respectively. §5 develops the analysis in terms of reconstruction. §6 concludes by discussing the broader ramifications of Π-positions and the constraint in (1).

* University of Massachusetts Amherst. Thanks to Rajesh Bhatt, Kyle Johnson, Barbara Partee, and Ellen Woolford, in addition to Daniel Altshuler, Hsin-Lun Huang, Tim Hunter, Rodica Ivan, Stefan Keine, Angelika Kratzer, Petr Kusliy, Andrew McKenzie, Jon Ander Mendia, David Pesetsky, and audiences at GLOW 40, LSA 2017, WCCFL 35, and UMass for helpful and insightful discussion. This work is supported by the National Science Foundation Graduate Research Fellowship under NSF DGE-1451512.

[1] For simplicity, I treat properties in purely extensional terms, which reduces them to sets of entities.

 Proceedings of the 35th West Coast Conference on Formal Linguistics, ed. Wm. G. Bennett et al., 321-330. Somerville, MA: Cascadilla Proceedings Project.

2. Π-positions

This section introduces Postal's chief observations about the Π-position asymmetry, interleaved with some novel observations of my own. I adopt the following descriptive terminology in (5).[2]

(5) a. **Π-position**: A syntactic position exhibiting Postal's $\overline{\text{A}}$-movement asymmetry.
b. **W-movement:** Movement that can target a Π-position, e.g. *wh*-movement.
c. **T-movement:** Movement that cannot target a Π-position, e.g. topicalization.

§2.1 introduces Postal's central observations about the Π-position asymmetry. §2.2 shows that Quantifier Raising (QR) cannot target a Π-position—a novel observation—and thus is a T-movement.

2.1. Data

The four Π-positions examined in this paper are the pivot of an existential construction (6), the color term of a change-of-color verb (7), the name argument of a naming verb (8), and predicate nominals (9). Two W/T-movement pairings are considered: *wh*-movement compared to topicalization and restrictive relative clauses (RCs) compared to appositive RCs.[3,4] While *wh*-movement and restrictive-RC formation are W-movements, topicalization and appositive-RC formation are T-movements. The pattern shown in (6)–(9) is that W-movements can target these positions, but T-movements cannot.

(6) *Existential constructions*
a. There is **a potato** in the pantry. *Baseline*
b. ✓**What**$_1$ is there ___$_1$ in the pantry? *Wh-movement*
c. *[**A potato**]$_1$, there is ___$_1$ in the pantry. *Topicalization*
d. ✓Gloria saw the **potatoes**$_1$ [$_{\text{RC}}$ that there were ___$_1$ in the pantry]. *Restrictive RC*
e. *Gloria saw the **potatoes**$_1$, [$_{\text{RC}}$ which there were ___$_1$ in the pantry]. *Appositive RC*

(7) *Change-of-color verbs*
a. Megan painted the house **magenta**. *Baseline*
b. ✓[**What color**]$_1$ did Megan paint the house ___$_1$? *Wh-movement*
c. ***Magenta**$_1$, Megan painted the house ___$_1$. *Topicalization*
d. ✓Jyoti liked the **color**$_1$ [$_{\text{RC}}$ that Megan had painted the house ___$_1$]. *Restrictive RC*
e. *Jyoti liked that **color**$_1$, [$_{\text{RC}}$ which Megan had painted the house ___$_1$]. *Appositive RC*

(8) *Naming verbs*
a. Irene called the cat **Snowflake**. *Baseline*
b. ✓[**What name**]$_1$ did Irene call the cat ___$_1$? *Wh-movement*
c. ***Snowflake**$_1$, Irene called the cat ___$_1$. *Topicalization*
d. ✓Helen disliked the **nickname**$_1$ [$_{\text{RC}}$ that Irene always called the cat ___$_1$]. *Restrictive RC*
e. *Helen disliked that **nickname**$_1$, [$_{\text{RC}}$ which Irene always called the cat ___$_1$]. *Appositive RC*

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[2] Postal (1994) refers to the environments as *antipronominal contexts* and the two movement classes as *A-type* and *B-type* extractions. I have elected to use the more neutral term of Π-position, where the "Π" is intended to allude to "property". For the movement classes, I have changed the terminology to avoid confusion between, in his terminology, A-type $\overline{\text{A}}$-extractions and *A-movement*, instead opting for something more mnemonic.

[3] Topicalization presents some challenges because the linear order that it achieves is string-compatible with other information-structure movements; see Poole (forthcoming) for examples that control for these factors.

[4] Note that I reserve *which* for RCs interpreted and pronounced prosodically as appositives.

(9) *Predicate nominals*

a. Erika became **a teacher**. *Baseline*

b. ✓[**What (kind of teacher)**]$_1$ did Erika become ___$_1$? *Wh-movement*

c. *[**A math teacher**]$_1$, Erika became ___$_1$. *Topicalization*

d. ✓Georgia liked the **kind of teacher**$_1$ [$_{RC}$ that Erika had become ___$_1$]. *Restrictive RC*

e. *Georgia liked that **kind of teacher**$_1$, [$_{RC}$ which Erika had become ___$_1$]. *Appositive RC*

As Postal notes, there is no general prohibition against T-movements targeting color terms and names outside of change-of-color verbs (10) and naming verbs (11) respectively. Thus, the prohibition against T-movements targeting color terms and names applies exclusively to their use in Π-positions.

(10) *Change-of-color verbs*

a. {**Green / that color**}$_1$, he never discussed ___$_1$ with me. [Postal 1994:164]

b. He never discussed {**green / that color**}$_1$ with me, [$_{RC}$ which ___$_1$ is his favorite color].

(11) *Naming verbs*

a. **Raphael**$_1$, we never discussed ___$_1$ as a possible name for him. [Postal 1994:164]

b. We didn't discuss **Raphael**$_1$ as a possible name for him, [$_{RC}$ which ___$_1$ is my favorite name].

2.2. QR is a T-movement

It is well-known that QR cannot target the pivot of an existential construction (Williams, 1984). The pivot always takes lowest scope with respect to other scope-bearing elements (12a), *cf.* (12b).

(12) a. There *must* be **someone** in his house. ✓must ≫ someone; *someone ≫ must

b. **Someone** *must* be in his house. ✓must ≫ someone; ✓someone ≫ must
[Williams 1984:152]

I make the novel observation that QR cannot target any Π-positions. Thus, the examples in (13) all lack an inverse-scope reading, hence the infelicity of *different*. For example, (13a) is true iff there is a single contractor, who incidentally did lots of painting, but not if there is a different contractor for every color.

(13) a. *Change-of-color verbs*
A (#different) contractor painted the house **every color**. ✓a ≫ every; *every ≫ a

b. *Naming verbs*
A (#different) child called the cat **every nickname**. ✓a ≫ every; *every ≫ a

c. *Predicate nominals*
A (#different) student became **every kind of teacher**. ✓a ≫ every; *every ≫ a

With change-of-color and naming verbs, QR of the DP in the Π-position can be contrasted with QR of the object, which is indeed possible, as shown in (14).

(14) a. *Change-of-color verbs*
A (different) contractor painted **every house** that ugly green. ✓a ≫ every; ✓every ≫ a

b. *Naming verbs*
A (different) child called **every cat** Garfield. ✓a ≫ every; ✓every ≫ a

Thus, QR is a T-movement, like topicalization and appositive RCs.[5]

[5] This generalization only applies to the *scope-shifting functionality* of QR. This functionality ordinarily coalesces with QR for interpreting quantifiers (at least in English), but (13) shows that even though quantificational DPs can occur in Π-positions, they do not enjoy the scopal mobility that QR would afford. I assume that some non-QR mechanism is available to Π-positions for interpreting quantifiers in situ; see Poole (forthcoming).

3. Property generalization

(15) ***Property generalization***
DPs in Π-positions denote properties (semantic type $\langle e, t \rangle$).

The arguments for this generalization come from the respective literatures on each of the Π-positions introduced above. Therefore, the arguments are *independent* from the Π-position asymmetry. In the interest of space, I will take it for granted that (i) the color term of a change-of-color verb denotes a property because these verbs are textbook examples of resultatives (e.g. Kratzer, 2005) and (ii) predicate nominals denote properties, as this is the standard analysis (e.g. Williams, 1983; Partee, 1986).

3.1. Existential constructions

The pivot of an existential is famously subject to the Definiteness Restriction (DR) (Milsark, 1974). DPs that can occur as the pivot are called *weak* (16a), while DPs that cannot are called *strong* (16b, c).

(16) a. There is/are {**a / two / many / no**} **potato(es)** in the pantry. *Acceptable pivots*
b. *There is/are {**every / most / both**} **potato(es)** in the pantry. *No quantificational DPs*
c. *There is { **the potato / it / Mr. Potato Head**} in the pantry. *No definite descriptions*

The standard approach to the DR is to attribute the weak–strong distinction to some semantic property of determiners (e.g. Barwise & Cooper, 1981; Keenan, 1987). However, there are well-documented counterexamples to an analysis of the DR exclusively in terms of determiner semantics from McNally (1997, 1998). Here, I briefly review two of her arguments.

First, a necessarily quantificational DP headed by a strong determiner can be the pivot if it quantifies over *nonparticulars*; compare the ungrammatical (17a) with the grammatical (17b).

(17) a. *There was **every doctor** at the convention.
b. ✓There was **every kind of doctor** at the convention. [McNally 1998:358]

Second, a definite description can occur as the pivot if the sentence is a so-called *list existential* (18).

(18) A: What shall we dig up this year?
B: Well, there are **the peonies**. [McNally 1998:366]

Any analysis that outright bans certain determiners like *every* and *the* will undergenerate in (17)–(18).

McNally (1997, 1998) develops an analysis that takes into account these cases. For her, the DR is about the meaning of the DP as a whole, not just the determiner. She proposes that the DR is part semantic and part pragmatic. The semantic part is that the pivot denotes a *property* and hence must have a licit property denotation. An existential then means that the property denoted by the pivot is instantiated (19).

(19) For all models $\mathcal{M}$, $[\![\text{NP}]\!]^{\mathcal{M},g} \in [\![\text{There be}]\!]^{\mathcal{M},g}$ iff $[\![\text{NP}]\!]^{\mathcal{M},g}$ is nonempty. [McNally 1998:376]

The pragmatic part is that the pivot must introduce a new discourse referent, which is what prohibits definite descriptions. McNally argues that this pragmatic requirement is relaxed under special circumstances, e.g. list existentials. Crucial for our purposes is that the semantics of existentials requires that the pivot denote a property. This property denotation is achieved via nominal type shifting of the pivot. Because not every DP has a licit property denotation under type shifting, this in turn restricts the kinds of quantificational DPs that can occur in existentials. For reasons of space, I cannot discuss the precise mechanics of type shifting here, only its ramifications for the DR, which are summarized in (20).[6]

[6] The relevant type shifter is Partee's (1986) $\mathcal{BE}$: $\lambda\mathcal{P}_{\langle et,t\rangle}\,\lambda x_e\,.\,\mathcal{P}([\lambda y\,.\,y = x])$. $\mathcal{BE}$ applies to a generalized quantifier, finds all of the singleton sets therein, and collects the elements of these singleton sets into a set—thereby returning a property. Because not every generalized quantifier has singleton sets in its domain, they do not all have valid property denotations.

(20) a. *some NP* $\Rightarrow_{\text{shift}}$ ✓property denotation $\Rightarrow_{(19)}$ ✓pivot
b. *every NP* $\not\Rightarrow_{\text{shift}}$ ✗property denotation $\not\Rightarrow_{(19)}$ ✗pivot
c. *the NP* $\Rightarrow_{\text{shift}}$ ✓property denotation $\Rightarrow_{(19)}$ ✓pivot

Under type shifting, weak determiners like *some* can head the pivot and strong determiners like *every* cannot, because *some NP* has a valid property denotation (20a), but *every NP* does not (20b). Note that the property-type requirement does *not* ban definite descriptions, which also have licit property denotations under type shifting (20c); this is the job of the pragmatic restriction.

3.2. Naming verbs

Proper names behave differently with *naming verbs* than they do in *argument positions*. The italicized proper names in (21) do not refer to individuals with those names, but rather to the names themselves.

(21) a. Irene **called** the cat *Snowball*.
b. Helen **nicknamed** the dog *Odie*.
c. The priest **baptized** the child *Brigid*.
d. I am **named** *Ethan*.

Matushansky (2008) argues that the name argument of a naming verb denotes a *property*. I briefly review two of her arguments. First, in languages where proper names can appear with a definite article, they cannot do so with naming verbs, as shown in (22) for German (for many dialects).

(22) *German (dialectal)* [Matushansky 2008:580]
a. Ich habe **den Karl** gesehen.
I have the Karl seen
'I have seen Karl'
b. Ich habe ihn **(*den)** Karl genannt.
I have him the Karl called
'I called him Karl'

Second, in some languages, the name argument is overtly marked as a predicate, either with special predicate marking or with a dedicated case, as shown in (23) for Finnish.

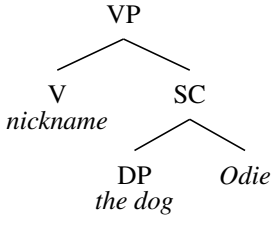
(23) a. Me maalasi-mme seinä-n **keltaise-ksi** *Finnish*
we painted-1PL wall-ACC yellow-TRANS
'We painted a/the wall yellow'
b. Me kutsu-mme William Gatesi-a **Billi-ksi**
we call-1PL William Gates-PTV Billy-TRANS
'We call William Gates Billy' [Matushansky 2008:584]

Based on this evidence, Matushansky (2008) concludes that the name argument of a naming verb denotes a *property*. She proposes that proper names are two-place functions that take an individual x and a *naming convention* R as its arguments (24). Thus, a proper name denotes the set of individuals who bear that name according to some naming convention.

(24) $[\![\text{Odie}]\!] = \lambda x_e\, \lambda \mathrm{R}_{\langle e,\langle n,t\rangle\rangle}\, .\, \mathrm{R}(x)([\text{owdij}])$ (where n is a sort of semantic type e; a phonological string)

Ordinarily, the naming convention is supplied contextually. However, with a naming verb, the naming convention is supplied by the verb itself. A simplified derivation is given in (25) for the sentence in (21b).

(25) Helen nicknamed the dog Odie.



$[\![\text{nickname}]\!] =$
$\lambda f_{\langle\langle e,\langle n,t\rangle\rangle,t\rangle}\, \lambda w\, .\, \exists \mathrm{R}[\textsc{nickname}(w)(\mathrm{R}) \wedge f(\mathrm{R})]$

$[\![\text{SC}]\!] = \lambda \mathrm{R}_{\langle e,\langle n,t\rangle\rangle}\, .\, \mathrm{R}(\text{the dog})([\text{owdij}])$

$[\![\text{VP}]\!] = [\![\text{nickname}]\!]([\![\text{SC}]\!])$
$= \lambda w\, .\, \exists \mathrm{R}[\textsc{nickname}(w)(\mathrm{R}) \wedge \mathrm{R}(\text{the dog})([\text{owdij}])]$

Paraphrase: There exists a relation R such that R is a nicknaming convention and R holds between the dog and the phonological string [owdij].

4. Scope generalization

(26) ***Scope generalization***
Movement that shifts scope cannot target Π-positions.
⇝ Movement targeting a Π-position must reconstruct.

For movement to shift scope means that, at LF, the moved DP takes scope in the position achieved by movement, which, for all overt forms of movement, will be the DP's surface syntactic position. If movement does not shift scope, the scope of the moved DP at LF mismatches its surface position in that it takes scope in its position prior to movement, viz. its base-generated position. This dichotomy is schematized in (27) where the check mark represents the moved DP's position at LF.

(27) a. *Movement that shifts scope*
[✓$_1$ … [… ___$_1$ …]] ⇝ Cannot target Π-positions

b. *Movement that does **not** shift scope*
[___$_1$ … [… ✓$_1$ …]] ⇝ Can target Π-positions

According to (26), the W/T-movement distinction reduces to scope: T-movements obligatorily shift scope, but W-movements do so only optionally. I will crucially show that W-movements can only target Π-positions when they do not shift scope. This observation entails that the Π-position asymmetry cannot be based on a categorical distinction between W- and T-movements because such an analysis cannot draw a distinction *within* W-movements.[7] Due to space, I limit the discussion moving forward to topicalization and *wh*-movement. The relevant facts and the analysis also hold for RCs; see Poole (forthcoming).

4.1. Topicalization

Topicalization in English obligatorily shifts the scope of the moved DP. This behavior is notably distinct from other movement types called "topicalization" in other languages, e.g. German V2-fronting, which are indeed able to reconstruct. To illustrate the crucial behavior in English, consider the possible interpretations of the baseline sentence in (28), which has narrow-scope and wide-scope readings of *a student* with respect to *every teacher*.

(28) *Every teacher* likes **a (different) student** in the first week.

a. *Narrow-scope reading* every ≫ a
For every teacher x, there is a student y such that x likes y.

b. *Wide-scope reading* a ≫ every
There is a single student y such that for every teacher x, x likes y.

Crucially, in a scenario where the student is a different student for each teacher, only the narrow-scope reading in (28a) is true. Topicalizing *a student*, as in (29), bleeds the narrow-scope reading in (28a).

(29) [**A (#different) student**]$_1$, *every teacher* likes ___$_1$ in the first week. *every ≫ a; ✓a ≫ every

The only interpretation of (29) is the wide-scope reading. Consequently, (29) is true iff there is a single student that every teacher likes. It is false if the student is a different student for each teacher. In sum, topicalization obligatorily shifts scope; according to the scope generalization, this is the reason why it cannot target a Π-position (30).

(30) *Topicalization*
[$_{\text{TopicP}}$ ✓$_1$ Topic^0 [… [… *$_1$ …]]] ⇝ Cannot target Π-positions
topic

[7] This is a problem in Postal's (1994) analysis of the Π-position asymmetry and Stanton's (2016) analysis of a similar set of $\overline{\text{A}}$-movement contrasts. For reasons of space, I cannot discuss their analyses here; see Poole (forthcoming).

4.2. Wh-movement

Wh-movement optionally shifts the scope of the moved DP. In order to probe scope in constituent questions, we will use *how many*-questions. In addition to the *wh*-meaning component, *how many* independently carries its own existential quantification that can vary in scope (Kroch, 1989; Cresti, 1995; Rullmann, 1995). Consider the *how many*-question in (31). Under the wide-scope, *de re* reading (31a), it is assumed that there is a certain set of books that Nina should read. Under the narrow-scope, *de dicto* reading (31b), there is no assumption that there are any specific books that Nina should read. Rather, it is assumed that she should read a certain number of books, without having any particular books in mind.

(31) [**How many books**]$_1$ should Nina read ___ $_1$ this summer?

a. *Wide-scope reading* how many ≫ should
   i. For what number *n*: There are *n*-many particular books *x* such that Nina should read *x* this summer.
   ii. Possible answer: 'Three books, namely The Prisoner of Azkaban, Slaughterhouse Five, and The Eye of the World.'

b. *Narrow-scope reading* should ≫ how many
   i. For what number *n*: It is necessary for there to be *n*-many books *x* such that Nina reads *x* this summer.
   ii. Possible answer: 'Three books, any three.'

This scope ambiguity in (31) is the result of the fact that *wh*-movement only optionally shifts scope. Crucially, even though *wh*-movement can ordinarily shift scope, when it targets a Π-position, scope shifting is rendered impossible, as shown in (32).

(32) a. *Existential constructions* *how many ≫ should; ✓should ≫ how many
[**How many books**]$_1$ *should* there be ___ $_1$ on the table?

b. *Change-of-color verbs* *how many ≫ should; ✓should ≫ how many
[**How many colors**]$_1$ *should* Nina paint the house ___ $_1$?

c. *Naming verbs* *how many ≫ should; ✓should ≫ how many
[**How many nicknames**]$_1$ *should* Nina call the cat ___ $_1$?

d. *Predicate nominals* *how many ≫ should; ✓should ≫ how many
[**How many kinds of teacher**]$_1$ *should* Nina become ___ $_1$?

To appreciate this fact, let us take a closer look at existential constructions, which we can contrast with a corresponding copula construction. The difference in the available scopes for *how many* between (32a) and (33) is reflected in the felicitous answers to the respective questions. As expected, a narrow-scope answer like in (31b.ii) is a felicitous response to both the existential question and the copula question. However, a wide-scope answer like in (31a.ii) is a felicitous response only to the copula question, crucially not to the existential question.

(33) [**How many books**]$_1$ should ___ $_1$ be on the table? ✓h.m. ≫ should; ✓should ≫ h.m.

In sum, *wh*-movement can successfully target a Π-position only when it does not shift the scope of the moved DP (34a). When *wh*-movement does shift scope, it patterns as a T-movement in that such extraction from a Π-position is ungrammatical (34b).

(34) *Wh-movement*

a. *Reconstructed derivation*
[Q ___ $_1$ . . . [. . . ✓ $_1$ . . .]] ⇝ Can target Π-positions
wh

b. *Scope-shifted derivation*
[Q ✓ $_1$ . . . [. . . ___ $_1$ . . .]] ⇝ Cannot target Π-positions
wh

5. Analysis

Against the backdrop of these two novel generalizations, repeated below in (35), we are now in a position to account for the Π-position asymmetry.

(35) a. ***Property generalization***: DPs in Π-positions denote properties (semantic type $\langle e,t\rangle$).

b. ***Scope generalization***: Movement that shifts scope cannot target Π-positions.

Let us first consider the interpretation of movement. The standard semantic mechanism for interpreting movement is to replace the launching site with a variable and insert a λ-abstraction binding this variable immediately below the landing site, as schematized in (36) (Beck, 1996; Heim & Kratzer, 1998).

(36) [**every book** [λx_e [some student read x_e]]] every ≫ some

The λ-abstraction will force the moving element to take scope in the landing site, e.g., for variable binding. Moreover, because the variable left behind by movement is semantic type *e*, if the moving element is a generalized quantifier, the λ-abstraction binding the type-*e* variable will force the quantification to have scope in the landing site of movement. Thus, for example, in (36), *every book* takes scope above *some student* because movement lands above *some student*.

What about movement that does not shift scope? Movement that does not shift scope instead *reconstructs*. Reconstruction means that the moved element behaves as if that movement has been undone at LF. I will assume the copy-theoretic approach to reconstruction wherein reconstruction means that the lower copy but not the higher copy is interpreted at LF (Chomsky, 1993, 1995). Under the Copy Theory of Movement, movement creates copies in both the launching and landing sites of movement. The scope-shifted meaning comes about by interpreting the higher copy using the λ-abstraction–variable relation discussed above (37a), while the reconstructed meaning comes about by interpreting only the lower copy and ignoring the higher copy (37b).[8]

(37) [[**every book**] [some student read [**every book**]]]

a. *Interpret higher copy ⇒ Scope-shifted meaning*
[**every book** [λx_e [some student read x_e]]] every ≫ some

b. *Interpret lower copy ⇒ Reconstructed meaning*
[~~every book~~ [some student read **every book**]] some ≫ every

Turning to Π-positions, the type-*e* trace required for scope-shifting movement is incompatible with Π-positions because it does not provide the property meaning ($\langle e,t\rangle$) that is expected by a Π-position. This semantic-type mismatch in turn yields ungrammaticality, thereby preventing scope-shifting movement from targeting a Π-position (38). On the other hand, because movement that does not shift scope reconstructs, if a DP would not ordinarily violate the property-requirement of a Π-position, then it will not do so under reconstruction either (39).

(38) *[DP_1 λx_e … [… [x_e]$_{\Pi\text{-pos}}$ …]] (type *e* trace)

(39) ✓[___$_1$ … [… [DP_1]$_{\Pi\text{-pos}}$ …]] (*reconstruct*)

According to this analysis, Π-positions are an instance where movement must reconstruct in order to avoid a semantic-type mismatch that would occur if the moved DP were not interpreted in its base-generated position. T-movements are unable to target a Π-position at all because they cannot reconstruct, as was

[8] (37) is overly simplistic. More needs said about replacing the lower copy with a variable (i.e. Trace Conversion) and about interpreting quantificational DPs that reconstruct; see Poole (forthcoming).

shown in §4. W-movements, on the other hand, can target a Π-position, but to do so, they must reconstruct into that Π-position.

Moreover, the property and scope generalizations are in fact interconnected: It is precisely because Π-positions host property-type DPs that they cannot be targeted by scope-shifting movement. That is, the property generalization *implies* the scope generalization. Therefore, the restriction on Π-positions can now be stated more generally as the constraint in (40).

(40) ***Π-position Restriction***
*$[\ x\ ]_{\Pi\text{-pos}}$, where x is an element of type e

(40) has the advantage of being more general than a constraint on movement itself, and it derives other facts about Π-positions not discussed here; see Poole (forthcoming).[9]

An important advantage of this analysis is that it does not appeal to separate primitive movement operations, unlike Postal's (1994) analysis. Rather, the complex set of facts comprising the Π-position asymmetry follows from the tools that are already independently needed for interpreting movement and reconstruction. Of course, whether a given movement type can reconstruct is still somewhat arbitrary. Though any analysis of movement types will have to stipulate this fact irrespective of Π-positions, more importantly, as was shown in §4, *reconstruction crosscuts movement types*. Assigning separate primitive operations to T-movements and W-movements cannot capture this pattern, in particular that W-movements cannot target Π-positions when they do not reconstruct.

Finally, the ungrammaticality of scope-shifting movement targeting a Π-position indicates that movement cannot map onto a λ-abstraction–variable relation ranging over properties, where the moved DP denotes either a property (41a) or a generalized quantifier over properties (41b). In other words, there are no traces that range over properties.

(41) *Property traces are ungrammatical*
a. *$[\ \mathrm{DP}_{\langle e,t\rangle}\quad \lambda f_{\langle e,t\rangle}\ [\ \ldots f \ldots\ ]\ ]$
b. *$[\ \mathrm{DP}_{\langle\langle et,t\rangle,t\rangle}\ \lambda f_{\langle e,t\rangle}\ [\ \ldots f \ldots\ ]\ ]$

Empirically, (41) would derive the wrong scope facts; see §4. Namely, even in instances that appear to involve quantification over properties, these quantifiers over properties cannot take scope over other scope-bearing elements in the sentence, as shown in (42) for existential constructions.

(42) a. There was*n't* **every kind of doctor** at the convention. ✓not ≫ every; *every ≫ not
b. There was*n't* **only one kind of doctor** at the convention. ✓not ≫ only one; *only one ≫ not

This unavailability of wide-scope is expected if (41b), where a generalized quantifier over properties has undergone QR, is an unavailable representation (43).

(43) *[**every kind of doctor** $]_{\langle\langle et,t\rangle,t\rangle}$ $\lambda f_{\langle e,t\rangle}$ [there wasn't $f_{\langle e,t\rangle}$ at the convention]
(QR: **every kind of doctor** → $\lambda f_{\langle e,t\rangle}$; $f_{\langle e,t\rangle}$ → at the convention)

If a property trace is unavailable in (41b), then we can generalize that it is also unavailable in (41a). Therefore, what the ungrammaticality of scope-shifting movement targeting a Π-position ultimately reveals is that ***the syntax–semantics mapping does not permit movement to map onto a trace ranging over properties***.

[9] In particular, the Π-position Restriction accounts for Postal's (1994) observation that Π-positions prohibit weak pronouns like *it* (what he terms *antipronominality*): they lack property meanings. Weak pronouns cannot occur in other property positions either: *Donald Trump thinks that he is a success, but no one else considers him that/*it*.

6. Conclusion

This paper has shown that a given step of movement cannot target a property-type DP if that movement shifts the scope of the moved DP. Thus, movement that targets a property-type DP must reconstruct. The consequence of this restriction is that some movement types are precluded from targeting property-type DPs because they can never reconstruct—this is what gives rise to the Π-position asymmetry. I argued that we can account for this reconstruction asymmetry using only the tools that are already independently needed for interpreting movement and reconstruction.

This investigation of movement targeting property-type DPs revealed that the syntax–semantics mapping lacks a way of interpreting moved properties as "semantically displaced" because traces cannot range over properties. This restriction mirrors another restriction discovered by Romero (1998) and Fox (1999) that movement cannot map onto generalized-quantifier traces (*cf.* Lechner, 1998). Taken together, these restrictions show that natural language only permits movement to map onto traces over individual types and never over higher types (Chierchia, 1984; Landman, 2006; Poole, forthcoming). Fox (1999) suggests that such a restriction might originate from the semantic type of a trace being determined to be the lowest type compatible with the syntactic environment. However, such an explanation would not account for Π-positions because the lowest type compatible with a Π-position is a property, but, as this paper has argued, such traces are nevertheless unavailable. Consequently, the constraint on possible traces still needs to be explained—see Poole (forthcoming).

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Proceedings of the 35th West Coast Conference on Formal Linguistics

edited by Wm. G. Bennett, Lindsay Hracs, and Dennis Ryan Storoshenko

Cascadilla Proceedings Project Somerville, MA 2018

ISBN 978-1-57473-472-0 library binding

Ordering information

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This paper can be cited as:

Poole, Ethan. 2018. There Are No Property Traces. In *Proceedings of the 35th West Coast Conference on Formal Linguistics*, ed. Wm. G. Bennett et al., 321-330. Somerville, MA: Cascadilla Proceedings Project. www.lingref.com, document #3404.