On the Distribution of Floating Quantifiers

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1 Asymmetries in Q-Floating

Q-floating shows interesting asymmetries in English. First of all, there is a subject/object asymmetry. As shown in (1-2), the subject permits Q-floating, while the object does not (Sportiche 1988, Bošković 2004, among many others)

(1) a. All the students have read the book.
    b. The students have all read the book.
(2) a. I like all the students.
    b. *I like the students all.

However, if the object is followed by a predicative constituent, Q-floating is permitted.

(3) a. He considered all his friends to be arrogant.
    b. He considered his friends all to be arrogant.

The second asymmetry shows up in this case. In (3a) *arrogant* forms a predicative relation with the object. Interestingly, it bears a predicative relation with the subject in (4a). Mailing (1976) observes that Q-floating is permitted if the predicate bears a predicative relation with the object, but not with the subject. For instance, (4b), is ungrammatical.

(4) a. He impressed all his friends as arrogant.
    b. *He impressed his friends all as arrogant.

This paper attempts to provide a principled account of the distribution of floating quantifiers, including the asymmetries in (1-4). There are two major approaches to quantifier floating. One is the stranding approach, and the other is the adverbial approach. Under the stranding approach, floating quantifiers co-occur with DPs, and are stranded when the associated DPs undergo movement (Sportiche 1988, Déprez 1989, Giusti 1990, Shlonsky 1991, Merchant 1996, Benmamoun 1999, Cinque 1999, McCloskey 2000, Bošković 2004, among others). On the other hand, the adverbial approach assumes that floating quantifiers modify VP (Kayne 1975, Williams 1982, Dowty and Brodie 1984, Miyagawa 1989, Doetjes 1992, Baltin 1995, Bobaljik 2003, Torrego 1996, among many others). This paper assumes that the stranding approach is on the right track in the sense that floating quantifiers are associated with DPs, but departs from the stranding approach in that quantifiers can be stranded even when there is no A-movement. In this paper, I claim that floating quantifiers are subject to the condition that they must not be the complements of predicates, which follows from the condition that the complement of a predicate must be of <e> type, which in turn follows from the anaphoric nature of theta role assignment.

2 A-Movement Approach to Q-floating

This section shows that the A-movement approach can deal with the data introduced in section 1 but leaves many other data unexplained.

2.1 A-movement Approach

Sportiche (1988) claims that quantifier floating is licensed when A-movement takes place. In this approach, (1b) is generated when *the student* raises to SPEC-T, leaving *all* behind, as illustrated in (5a-b).

(5) a. [T [have [all the students read the book]]]: Subject Raising
b. [the students T [have [all ~~the students~~ read the book]]]

Sentence (3a) is generated in the same fashion: it is derived if the object undergoes movement to SPEC-V (Chomsky 2008, 2013, 2015).[1] Let us say that *his friends* moves to SPEC-V, leaving *all* behind. Then, *all* is stranded inside TP.

(6) [$_{vP}$ he [consider v] [$_{VP}$ his friends ~~consider~~ [$_{TP}$ all ~~his friends~~ to be arrogant]]]

If this line of approach is correct, it is predicted that *his friends* cannot undergo raising in (4a). This prediction is borne out. Sentence (4a) does not permit passivization.

(7) a. *All his friends were impressed as arrogant.
b. *His friends were impressed all as arrogant.

This means that *his friends* cannot undergo A-movement, which follows if *all his friends* is assigned inherent Dative Case or it is headed by a null preposition.

(8) He impressed [$_{PP}$ P all his friends] as arrogant.

If (4a) is represented as (8), the ungrammaticality of (4b) can be explained in a straightforward way under the A-movement approach. In (8) *his friends* fails to undergo A-movement. So the A-movement approach correctly predicts that (4b) is not grammatical.

This line of approach can be extended to the phenomenon that the subject control construction does not allow quantifier floating. In (9a) the implicit subject of the *to*-infinitive is controlled by the subject *Frank*. Put differently, the *to*-infinitive bears a predicative relation with the subject. In this case, the object does not permit quantifier floating, as shown in (9b).

(9) a. Frank promised all the boys to leave.
b. *Frank promised the boys all to leave

Hornstein (1999, 2001) proposes that the goal argument of the subject control construction is a PP, which is supported by the ungrammaticality of (11)—the passive counterpart of (10).

(10) Frank promised Mary to leave.
(11) *Mary was promised to leave.
(12) a. Frank promised [$_{PP}$ P Mary] to leave.
b. *Mary was promised [$_{PP}$ P ~~Mary~~] to leave

If the goal argument is a PP, it is quite straightforward why (9b) is ungrammatical. As shown

[1] Bowers (2002) proposes that the object moves to SPEC of a transitive head.

in (13), *the boys* cannot undergo A-movement and hence *all* cannot be stranded.

(13) Frank promised [PP P all the boys] to leave.

To recapitulate, the A-movement approach can explain Mailing's (1976) generalization that quantifier floating is permitted if the predicate bears a predicative relation with the object, but not with the subject.[2]

2.2 Remaining Problems

There are many examples that run counter to the A-movement approach. For instance, movement does not produce a floating quantifier in many cases. Sentence (2b), repeated here as (14), is a case in point. According to Chomsky (2013, 2015), object shift takes place even in simple transitive constructions. However, (14) is ill-formed.

(14) *I like the boys all.

Furthermore, (15a-b) are ill-formed although A-movement takes place (Sportiche 1988, Bobaljik 2003, Bošković 2004).

(15) a. *The students arrived all.
b. *They were arrested all.

This suggests that A-movement does not necessarily trigger quantifier floating.

In an attempt to resolve this problem, Bošković (2004) proposes that quantifiers cannot be floated in theta positions. In (15a-b), *all* occurs in theta positions, so that we can rule them out. However, it is unclear whether this proposal can deal with sentences like (16a-c). In (16a-c) the floating quantifiers seem to be in theta positions, but they are grammatical.

(16) a. I met the boys all during the party.
b. We arrived *all* in one piece.
c. There were arrested all for breaking lockdown rules.

As observed by many linguists (Mailing 1976, Sportiche 1988, Janke and Neeleman 2005), quantifiers can be floated if the object is followed by a constituent like a PP. This point is clearly shown by (17a-b). Sentence (17a) is ungrammatical, but it turns into a grammatical sentence if the direct object is followed by the PP *under the sheet*, as illustrated in (17b).

(17) a. *You could see the mattresses all.
b. You could see the mattresses all under the sheet.

It seems that the floated quantifier *all* is in a theta position in both (17a) and (17b), but the former does not permit quantifier floating, while the latter does. This suggests that the

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[2] Sentences (8) and (9a) lead us to the following generalization:

(i) If YP bears a predicative relation with S in a configuration [S V XP YP], XP is not a DP but a PP.

According to this generalization, if YP is a predicate, it bears a relation with the closest DP, which is reminiscent of Rosenbaum's (1967) Minimal Distance Principle. Hornstein (1999, 2001) and Boeckx, Hornstein, and Nunes (2010) propose that the Minimal Distance Principle follows from the movement theory of control.

distribution of floating quantifiers cannot be captured under the proposal that (i) A-movement produces floating quantifiers and (ii) floating quantifiers cannot occur in theta positions.

3 The Anaphoric Nature of Theta Roles and Distribution of Quantifiers

This section assumes that an argument and its thematic role form an anaphoric relation, as Williams (1994) proposes. Taking it one step further, I claim that there are two types of anaphoric relations: an argument forms a symmetric relation with its predicate if they c-command each other, and it forms an asymmetric relation with its predicate when there is an asymmetric c-command relation. Furthermore, I claim that the symmetric relation requires the argument to be of <e> type, while the asymmetric relation does not. This section shows that this approach enables us to capture the distribution of floating quantifiers.

3.1 Symmetric vs. Asymmetric Anaphoric Relations

Traditionally, an argument has been assumed to be associated with its theta role via a λ-operator: that is, they form a bound variable relation, as shown in (18-19).

(18) John arrived
(19) John λx [T [$_{VP}$ arrive(x)]]

On the other hand, Larson and Segal (1995) propose that they form a specificational relation.

(20) x arrived and x = John

With these two approaches in mind, let us consider how arguments are associated with the theta roles. Following Williams (1994), I assume that a theta role is indicated by a variable, and when it is assigned to an argument, they form an anaphoric relation. Furthermore, I assume that theta roles are assigned at LF, which means that either the higher copy or the lower copy of *John* is assigned a theta role in (21).

(21) [John T [$_{VP}$ arrive$_{(Theta\ x)}$ John]]
(22) a. [~~John~~ T [$_{VP}$ arrive$_{(Theta\ x)}$ John]]
b. [John T [$_{VP}$ arrive$_{(Theta\ x)}$ ~~John~~]]

Let us consider the LF in (22a), where the lower copy is interpreted. Theta roles are assigned via the sisterhood relation. In (22a)—in (23a), the theta variable *x* can be assigned to *John*, because *John* is the sister of *arrive*. If *John* is assigned the variable *x*, the resulting constituent *John$_x$* is interpreted as 'x is John', as shown in (24).

(23) a. [$_{VP}$ arrive$_{(Theta\ x)}$ John]: Theta Role Assignment
b. [$_{VP}$ arrive$_{(Theta\ x)}$ John $_x$]
(24) Interpretation of (23b): [x arrives] & [x = John]

Williams (1994) proposes that if a theta role cannot be assigned to its sister, it is vertically bound by the percolated index. In (22b), that is, in (25a), the theta role *x* cannot be assigned to its sister and so it is percolated into T'. The percolated index *x* vertically binds the theta role *x*. If we assume that the vertical binder functions as a λ-operator, *John* can be the binder of the theta variable *x*.

(25) a. [John [T [$_{VP}$ arrive$_{(Theme\ x)}$]]: Theta Role Percolation
b. [John [$_{x}$ T [$_{VP}$ arrive$_{(Theme\ x)}$]]
(26) Interpretation of (25b): John λx [T [$_{VP}$ arrive$_{(x)}$]]

Let us now consider the condition on the semantic type of arguments. The theta variable is of type <e>. So, if an argument is to bear a symmetric relation with its theta variable, it must be of <e> type. An argument is forced to have a symmetric relation with its theta variable if it is the sister of the predicate. This amounts to saying that the sister of a predicate must be of <e> type. Put differently, if an argument is not of <e> type, it cannot be the sister of its theta role assignor.

(27) If a DP argument is the sister of a predicate, it must be of <e> type.

On the other hand, the binder can be either of <e> type or <<e,t> t> type.

3.2 V'-Modifiers or V-Complements

We are now in a position to explain why (15a-b), repeated as (28a-b), are ill-formed.

(28) a. *The students arrived all.
b. *They were arrested all.

In (29a-b) *[all t_i]* is forced to form a symmetric relation with the theta variable *x*; they mutually c-command each other, as shown in (29a-b).

(29) a. arrive$_{(Theme\ x)}$ [all t_i]
b. arrested$_{(Theme\ x)}$ [all t_i]

Thus, *[all t_i]* is required to be of <e> type, but it is of <<e,t> t>. The mismatch problem is usually resolved by QR, but floating quantifiers cannot undergo QR (Williams 1982, Dowty and Brody 1984, Déprez 1994, McCawley 1998). In (30a), for instance, *all* must be inside the scope of *n't*, although it can be outside the scope of negation in (30b).

(30) a. The students didn't all leave. (not>all, *all<not) (Dowty& Brodie 1984:77).
b. They didn't meet all the students. (not>all, all<not)

This lends support to the claim that floating quantifiers do not move at LF. Sentences (31-32) show the same point. Sentence (31) is ambiguous with regard to the relative scope of *all* and *appear*. In (32), however, *all* must be inside the scope of *appear*.

(31) John appears to understand all her conclusions.
(32) His conclusions appear to all be incorrect. (McCawley 1998: 631)

With this in mind, let us return to (28a-b). In these sentences, the theta role and *[all t_i]* c-command each other, forming a symmetric relation, and the symmetric relation requires *[all t_i]* to be of <e> type. But it cannot be of <e> type. Therefore, both sentences are ill-formed.[3]

[3] Fox (1999) proposes that type mismatch triggers QR. In (i), for instance, there is a type mismatch between *met* and *every student*. So QR is required to take place.

This line of approach appears to be incongruous with the grammaticality of (1b), rewritten here as (33). However, the grammaticality of (33) is correctly predicted, because the external theta variable *x* and *[all t_i]* do not c-command each other. As shown in (34a-b), the theta variable x undergoes percolation because it cannot be assigned to its sister.

(33) The students have all read the book.
(34) a. [[all t_i] [$_{v'}$ $V_{(Agent\ x)}$ [$_{VP}$ read the book]]]: Theta Role Percolation
b. [[all t_i] [$_{v'x}$ $V_{(Agent\ x)}$ [$_{VP}$ read the book]]]

In (34b), *[all t_i]* forms an asymmetric relation with the theta variable *x*, and does not run into the type mismatch problem. Therefore, (33) is well-formed. Generally speaking, floated quantifiers are permitted unless they are the complements of predicates. This means that floating quantifiers can be permitted although they occur in theta positions, as long as they are not the complements of predicates.

Sentences (16a-c), repeated as (35a-c), can be explained in a similar way.

(35) a. I met the boys all during the party.
b. We arrived *all* in one piece.
c. There were arrested all for breaking lockdown rules.

Before attempting to explain the well-formedness of (35a-c), let us first consider why *Mary* can be involved in the anaphoric relation with the constituent inside the PP in (36a-b).[4]

(36) a. John met Mary in each other's house.
b. John met Mary in her own house.

The anaphoric relation can be explained if the PP is the sister of V and V raises to v, as in (37a-b).

(37) a. [$_{vP}$ John v [$_{VP}$ Mary meet in her own house]]: V-to-v Movement
b. [$_{vP}$ John meet v [$_{VP}$ Mary ~~meet~~ in her own house]]

The representation in (37) lends support to the view that (i) the locative PP can be the complement of an intransitive verb or adjoined to V', and (ii) the Theme argument is base-generated in SPEC-V. In fact, Larson (1988), Kratzer (1996) and Green (2018) propose that direct objects are base-generated as the specifier of V, if there is a constituent following them.

(i) John met<e <e,t>> every student<<e,t> t>

This proposal predicts that the lower copy of *all students* can be interpreted in (iia). It is because there is no type mismatch when the lower copy is interpreted: that is, the lower copy of *all students* can take *arrive* as its argument.

(ii) a. All students T [arrive ~~all students~~]
b. [~~all students~~ [arrive all students]
<e, t> <<e,t> t>

On the other hand, the proposal advocated here requires that the lower copy of *all students* must not be interpreted, because the sister of a predicate must be of <e> type.

[4] In an attempt to explain the anaphoric relations in (36a-b), Pesetsky (1995) proposes a so-called cascade structure, according to which *Mary* is generated in SPEC-*in*, as show in (i).

(i) [$_{vP}$ John v [$_{VP}$ meet [$_{PP}$ Mary in her own house]]]

Under this view, the VP of (35b) is represented as (38a), where *[all ti]* asymmetrically c-commands the theta variable *x* and it is associated with the theta variable via the percolated theta role.

(38) a. [VP [all t_i] [$_{V'}$ arrive(x) in one piece]]: Theta Role Percolation
b. [$_{VP}$ [all t_i] [$_{V'x}$ arrive$_{(x)}$ in one piece]]

Hence, there is no type mismatch problem although *all* is left in situ.[5] Sentences (35a) and (35c) can be dealt with in the same way.

3.3 QP-Internal Movement

The contrast between (17a-b), rewritten as (39a-b), can be explained in the same fashion.

(39) a. *You could see the mattresses all.
b. You could see the mattresses all under the sheet.

In (40a) *[all t_i]* is forced to bear a symmetric relation with *x*, which is not possible. By contrast, in (40b) *[all t_i]* asymmetrically c-commands the theta role, and is associated with the theta role via the percolated variable. Hence, there is no semantic conflict.

(40) a. [$_{VP}$ see$_{(Theme\ x)}$ all t_i]
b. [$_{VP}$ all t_i [$_{V'x}$ see$_{(Theme\ x)}$ under the sheet]]

However, there is a remaining question with this approach: there is no motivation of raising *the mattresses* if we adopt Chomsky's (2008, 2013, 2015) theory of object shift. Chomsky proposes that SPEC-V must be filled, which is satisfied in (41) without object raising.

(41) [$_{vP}$ you v [$_{VP}$ all the mattresses [$_{V'}$ see$_{(x)}$ under the sheet]]]

The question is now how a quantifier is stranded without movement. Shlonsky's (1991) QP-internal movement provides a clue to this question. According to Shlonsky, Q takes DP as its complement and DP moves to SPEC-Q.

(42) a. [$_{QP}$ all [$_{DP}$ the mattresses]]: Raising of *the mattresses* to SPEC-*all*
b. [$_{QP}$ the mattresses all [$_{DP}$ ~~the mattresses~~]]

In this approach, *all* is stranded regardless of whether or not the object *the mattresses* further undergoes A-movement, as shown in (43).

(43) [$_{vP}$ you v [$_{VP}$ [the mattresses [all ~~the mattresses~~]] [$_{V'}$ see$_{(x)}$ under the sheet]]]

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[5] It is not the case that every clause-final adverbial can license quantifier floating (Mailing 1976).

(i) a. I met the boys both during the party.
b. *I met the boys both yesterday.

This contrast follows if *during the party* is a V'-internal constituent, while *yesterday* is a VP-external constituent.

(ii) a. [$_{vP}$ I meet v [$_{VP}$ the boys [$_{V'}$ ~~meet~~ during the party]]]
b. [$_{vP}$ [$_{vP}$ I meet v [$_{VP}$ ~~meet~~ the boys]] yesterday]

This amounts to saying that floating quantifiers can be generated without recourse to A-movement of the whole QP.

This line of approach also sheds light on many other puzzling phenomena. First of all, the QP-internal movement approach enables us to generate (44), where *the students all* seem to be in SPEC-T and there is no position to which *the students* undergo further movement.[6] There is no problem with deriving the sentence if *students* raises to SPEC-*all*, and the resulting structure undergoes A-movement to SPEC-T, as shown in (45).

(44) The students all are happy.
(45) a. [[all the students] happy]: Raising of *the students* to SPEC-*all*
b. [[the students all ~~the students~~] happy]: Merge with *be* and T
c. [T be [[the students all ~~the students~~] happy]]: Raising of *the students all*
d. [[the students all ~~the students~~] T be [~~[the students all the students]~~ happy]]

Second, the QP-internal movement approach explains how *all* can be licensed in conjoined phrases. Bobaljik (2003) notes that (46a) is not ambiguous, producing the reading in (47a) only, while (46b) is ambiguous between (47a) and (47b).

(46) a. **All** lions, tigers and bears are scary.
b. Lions, tigers and bears are **all** scary.
(47) a. Every lion is scary, every tiger is scary, and every bear is scary,
b. Lions are generally scary, and tigers are generally scary, and bears are generally scary.

This contrast can be explained as follows. There are two separate representations for (46b). First, it is represented as (48a), where *all* quantifies over *[lions, tigers and bears]*, and regardless of whether or not the conjoined DP undergoes raising, we get the same interpretation.

(48) a. all [$_{DP}$ lions, tigers, and bears]
b. lions, tigers, and bears all ~~lions, tigers, and bears~~

Second, there is another representation for (46b): *all* can take a PRO as its complement, and the PRO is controlled by *lions, tigers, and bears*.

(49) [[lions, tigers, and bears]$_i$ all [PRO$_i$]]

This analysis provides a principled account of why (46b) gives the reading in (47b). In (50) the pronoun *they* can denote the three different types of animals.

(50) Lions, tigers, and bears are three major animals in the zoo, and they are all scary.

Likewise, the PRO in (49), being controlled by the nominal with three conjuncts, can be interpreted as three different types of animals. That is why (46b) is ambiguous between (47a) and (47b).

This approach also provides a principled account of the following puzzle: why is (51a) grammatical, while (51b) is not?

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[6] In order to fix this problem, Bošković (2004) splits TP into multiple projections.

(51) a. John, Mary, and Tom are all smart.
b. *All John, Mary, and Tom are smart.

The contrast between (51a-b) appears to support the adverbial approach; if we simply assume that *all* is an adverb, it can be generated in a straightforward way. However, (51a) can be generated without resort to the adverbial approach; the subject in the sentence is represented as (52), where *John, Mary, and Tom* is a controller for the PRO. The PRO refers to the three different members of the controller, so that *all* can quantify over them, just as *all* can quantify over *them* in (53).

(52) [$_{QP}$ John, Mary, and Tom [$_{Q'}$ all [$_{DP}$ PRO]]]
(53) John, Mary, and Tom arrived late, and they all looked quite tired.

3.4 Object Shift in Simple Transitive Constructions?

Now there arises a new problem: if QP-internal Movement is possible and if object shift takes place, there is no reason that (54b) is ill-formed. As shown in (55a-c), the floated Q is not c-commanded by the predicate *love$_{(x)}$* if *the students* moves to SPEC-*all* and the object moves to SPEC-V.

(54) a. I love all the students.
b. *I love the students all.
(55) a. [love$_{(x)}$ [$_{QP}$ all [$_{DP}$ the students]]]: QP-internal Movement
b. [love$_{(x)}$ [$_{QP}$ the students all ~~[$_{DP}$ the students]~~]]: Object Shift
c. [$_{VP}$ [$_{QP}$ the students [$_{Q'}$ all [$_{DP}$ ~~the students~~]]] [$_{V'}$ love$_{(x)}$ [$_{QP}$ the students [$_{Q'}$ all [$_{DP}$ ~~the students~~]]]]

Chomsky (2015) proposes that object shift takes place because V is a root, which fails to project its label. In (56), for instance, *Mary* precedes the adverb *seriously* because it raises to SPEC-V; otherwise, labeling failure takes place.

(56) John considered Mary seriously to be the right person for the job.
(57) a. [seriously consider [$_{TP}$ Mary to be the right person for the job]]: Object Shift and Labeling
b. [$_{<j><j>}$ Mary seriously consider [$_{TP}$ Mary to be the right person for the job]]: Merger with v and V-to-v Raising
c. [consider v [$_{<j><j>}$ Mary seriously ~~consider~~ [$_{TP}$ Mary to be the right person for the job]]]

He goes on to argue that object shift also takes place in (58) for the same reason. In (59a) *love* cannot project, and so *Mary* moves to SPEC-*love*.

(58) John loves Mary.
(59) a. [love Mary]: Object Shift
b. [$_{<j><j>}$ Mary [love Mary]]

Chomsky (2015) proposes that labeling takes place via feature sharing only after *Mary* moves to SPEC-*love*. This proposal is strange in at least three respects. First, there is no SPEC-head agreement in Chomsky's (2013, 2015) approach, but *Mary* is required to move to SPEC-*love*. Second, *love* and *Mary* share the feature <j> and they are sisters in (59a), but labeling via

feature sharing cannot take place in (59a). Third, it is a violation of anti-locality condition to raise *Mary* to SPEC-*love* in (59b) (Abels 2003, Grohmann 2003). These considerations lead us to the conclusion that labeling via feature sharing is possible in (59a) and that object shift does not take place in simple transitive constructions.[7]

(60) a. [love Mary]: Labeling via Feature Sharing
b. [$_{<j><j>}$ love Mary]

We are now in a position to explain why (54b) is not grammatical. If *the students* moves to SPEC-all, the quantifier *all* can be floated. However, (54b) is ill-formed, because the floated QP is the sister of the theta role assignor and so it is required to be of <e> type.

(61) a. [love$_{(x)}$ [$_{QP}$ all [$_{DP}$ the students]]]: QP-internal Movement
b. [love$_{(x)}$ [$_{QP}$ the students [$_{Q'}$ all [$_{DP}$ ~~the students~~]]]]

In short, quantifier floating is only permitted if the object is not the complement of V, and therefore, quantifier floating is not possible in (54b).[8]

(62) Quantifiers can be floated in the object position if the object is followed by a constituent that can be the complement of V or adjoined to V'.

The generalization in (62) follows from the fact that if a nominal argument is the complement of a predicate, it must be of <e> type and if not, it may be either <e> or <<e,t> t> type.

3.5 Scope Rigidity

The type mismatch approach heavily hinges on the assumption that floated quantifiers do not undergo QR. We have seen that the assumption is empirically supported. For instance, McCawley observes that although (63) displays scope ambiguity, (64a) ad (64b) do not: the former permits the 'appear>all' reading only, and the latter permits the 'all>appear' reading only.

(63) All his conclusions appear to be incorrect.
(64) a. His conclusions appear to all be incorrect.
b. His conclusions all appear to be incorrect. (McCawley 1998:631).

Let us consider the nature of pied-piping of quantifiers. It is an optional free operation. Let us

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[7] According to Chomsky (2015), there is another motivation for object shift. Chomsky proposes that v has an edge feature and it is inherited down to V. I assume that object shift is only driven by labeling failure.

[8] If the host nominal is a pronoun, quantifier floating is allowed in the object position.

(i) I like them all.

Bošković (2004) proposes that object pronouns are clitics and undergo head movement to V

(ii) a. [I v [like [them$_{(Theme\ x)}$ all]]]: *Them*-to-*like* movement
b. [I v [$_{VP}$ [$_{V}$ like$_{(Theme\ x)}$ them] [~~them~~ all]]]

If *them*-to-*like* movement takes place in the narrow syntax, the Theme role of *like* is assigned to *them*, not to *them all* in (iib). Being of <e> type, *them* can form a symmetric relation with the theta variable. Therefore, (i) is well-formed.

first generate (64b). If *his conclusions* moves to SPEC-*all*, SPEC-*to*, and then to the matrix clause, (64b) is generated.

(65) a. [$_{VP}$ all his conclusions be incorrect]: QP-internal movement
b. [$_{VP}$ [his conclusions all ~~his conclusions~~] be incorrect]: Merge with *to* and Raising of *his conclusions*
c. [his conclusions to [$_{VP}$ [~~his conclusions~~ all ~~his conclusions~~] be incorrect]]: Merge with *appear* and T
c. [T [appear [his conclusions to [$_{VP}$ [~~his conclusions~~ all ~~his conclusions~~] be incorrect]]]]: Raising of *his conclusions*
d. [his conclusions T [appear [~~his conclusions~~ to [$_{VP}$ [~~his conclusions~~ all ~~his conclusions~~] be incorrect]]]]

In (65a) *all his conclusions* could have undergone raising. Put differently, there was a chance for *all* to have scope over *appear*. However, the option was not taken. In this case, there is no chance to raise it at LF.

(66) If an operation could have taken place in the narrow syntax but it did not, it is not permitted at LF.

This follows from Gricean Maxim, as shown in (67).

(67) a. The speaker S could have raised the quantifier *all* in the narrow syntax.
b. But S did not raise it in the narrow syntax.
c. This implies that S intended not to raise it at all.

If the speaker S intended the 'all>appear' reading, S must have raised *all* in the narrow syntax. But S did not. This implies that S didn't intend the 'all>appear' reading. The gist of the claim is that if movement of a quantifier is an optional free operation, the surface structure determines the scope of the quantifier. This generalization is also supported by (64a). Let us first assume that QP-internal movement takes place as soon as it enters into a syntactic derivation, as shown in (68a-b).

(68) a. [all his conclusions] incorrect: QP-internal movement
b. [his conclusions all ~~his conclusions~~] incorrect: Merge with *to* and raising
c. [his conclusions all ~~his conclusions~~] to his conclusion all ~~his conclusion~~ incorrect: Merge with *appear* and T
d. T appear [his conclusions all ~~his conclusions~~] to [his conclusion all ~~his conclusions~~]incorrect: Raising
e. [his conclusions all ~~his conclusions~~] T appear [his conclusion all ~~his conclusions~~] to [his conclusions all ~~his conclusions~~] incorrect

The speaker S could have left *all* behind in (68d). However, the speaker S did not, which implies that S intended not to interpret *all* in situ. Therefore, *all* must have scope over *appear* in (68e).

(69) a. The speaker S could have left the quantifier *all* in situ in the narrow syntax.
b. But S did not leave it behind in the narrow syntax.
c. This implies that S intended not to interpret it in situ at LF.

Kim (2020) claims that scrambling languages display the scope rigidity, because scrambling is an optional free merge and if a scope-determining operation is optional, the scope relation is determined by the surface structure. English is not a scrambling language, but it exhibits the scope rigidity with regard to floating quantifiers, because quantifier floating is optional.

4 Conclusion

In this paper I claimed that the stranding approach is correct in that floating quantifiers are associated with DPs, but it is not correct in that A-movement is not a necessary nor a sufficient condition on quantifier floating: that is, quantifier floating may not be possible although A-movement takes place, and it is possible although there is no A-movement. While maintaining the view that quantifier floating is produced if the complement of Q undergoes QP-internal movement, I proposed that a floated Q must not be the sister of a theta role-bearing predicate, which is required to be of <e> type. The type-match condition can be met in two different ways. First, it can be satisfied if a quantifier is dislocated via A-movement. For instance, if *the students all* undergoes movement to SPEC-T, the type-match condition can be met.

(70) a. The students all are happy
b. [the students all T [be [~~the students all~~ [happy$_{(\text{Theme x})}$]]]

Second, it can be met if a theta role bearer cannot directly assign its theta role. In (71a) *all* occurs in a theta position, but it is not the sister of the theta role bearer $v_{(\textit{Theme x})}$. Accordingly, *all* can be stranded in the theta position.

(71) a. The students have all met him.
b. [the students have [~~the students~~ all [V$_{(\text{Theme x})}$ [ ]]]]

Sentence (72a) is another instance that satisfies the type match condition without movement. The VP-internal constituent *during the conference* is the complement of V, and so *the students* cannot be directly assigned the Theme role. Therefore, *all* can be stranded in SPEC-V although there is no A-movement.

(72) a. I have met the students all during the conference.
b. [$_{\text{vP}}$ I meet$_{(\text{Theme x})}$ v [$_{\text{VP}}$ the students all [~~meet~~$_{(\text{Theme x})}$ PP]]

Generally speaking, quantifiers can be floated without recourse to A-movement if their projection is not the complement of a predicate.

(73) a. *[V$_{(\text{Thematic Role x})}$ [DP Q]$_{\text{x}}$]
b. [DP Q]$_{\text{x}}$ [V$_{(\text{Thematic Role x})}$ YP]]

I claimed that this generalization follows if (i) an argument and its theta variable form an anaphoric relation, (ii) there are two types of anaphoric relation: symmetric and asymmetric, (iii) the symmetric relation, which is a mutually c-commanding relation, requires the argument to be of <e> type.

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