Distributive Operators in Distributive Numerals: Zimmermann 2002

1. The Basic Empirical and Analytic Claims and Questions

(1) Key Proposals of Zimmermann (2002a,b)

a. Distributivity From Distributive Numerals

- Distributive numerals (aka ‘Anti-Quantifiers’, ‘Distance Distributives’) – specifically, the ‘binominal each’ construction of English and the Jeweils constructions of German – actually syntactically contain the distributive operators they are understood to contribute.

- Nevertheless, (with the help of a few special composition rules), we can derive the semantics of these constructions from something very close to their surface syntax.

b. Cross-Linguistic Variation w.r.t. ‘Pluractional Readings’

- Pluractional readings (aka ‘event-distributive readings’, ‘event-related readings’) of sentences containing distributive numerals are derived by allowing the understood restrictor of the distributive operator go unbound
  - This allows the restrictor to be construed as a contextually salient plural event.

- The absence of such pluractional readings for binominal each in English (and related constructions) is due to certain formal properties of the distributive numerals in those languages
  - These properties conspire to prevent the distributive restrictor from being unbound, and thus from being construed as a plural event…

(2) The Phenomena of Central Interest: English ‘Binominal Each’; German Jeweils

- The sentences below are more-or-less synonymous.

- Their chief difference rests in the ability for (adnominal) ‘jeweils drei’ to in some sentences allow a pluractional reading akin to ‘three at a time’ or ‘in threes’.
  - Note: such a pluractional reading may actually be absent from (2b).

a. The boys bought [ three sausages each ]

b. Die Jungen kauften [ jeweils drei Würstchen ].
the boys bought DIST three sausages
(3) **Characteristic Properties of the Constructions in (2) [According to Zimmermann]**

a. The expression bearing the special marker (each, jeweils) must be indefinite.

(i) * The boys tried [ those sausages each ]
   (cf. The bought each tried those sausages.)

   **Note:** Actually, the generalization that the marked expression must be indefinite is too weak. Rather, as we’ve seen before, it’s usually the case that only a restricted set of cardinality predicates can be so-marked.

(ii) * The boys bought [ a sausage each ]
(iii) The boys bought [ one sausage each ]

(iv) ? The boys bought [ a few sausages each ]
(v) * The boys bought [ many sausages each ]

b. The expression bearing the marker must be a clausalmate with the understood restrictor of the distributive operator (the so-called ‘Distributive Key’)

(i) * The store clerks said that Peter bought [ one balloon each ]
   (cf. The store clerks each said that Peter bought one balloon.)

(4) **Terminology: ‘Anti-Quantifier’** Construction bearing properties above.

(5) **Anti-Quantifiers in Other Languages**
Zimmermann (2002a,b) lists a great many; I’ve excerpted a few below.

a. **Icelandic:** Strakarnir keyptu [ tvaer pylsur hvor ].
   boys.the bought two sausages each.DUAL

b. **Italian:** I ragazzi comprarano [ un libro ciascuno ]
   the.boys bought one book each

c. **Russian:** Mal’chiki kupili [ po dve sosiski kazhdyj ]
   boys bought P two sausages each

d. **Korean:** Aituli phwungsen-hana-ssik-ul saessta
   kids balloon-one-DIST-ACC bought

e. **Japanese:** Otokotatiga sorezore huta-ri-no zyosei-o aisi teiru koto
   men each two-CL-GEN women-ACC love

**Notes:**
- The dual number on the distributive particle in (4a) seems significant!
- According to Gil (1982), the particle kazhdyj isn’t really necessary in (4c).
- Unlike Gil (1982), Zimmermann seeks a unified analysis of (2) and (4)
First Key Analytic Puzzle: ‘The Compositionality Problem’

- In many of the Anti-Quantifier (AQ) constructions, the marker of the AQ appears independently to be a distributive operator in the language (e.g. English ‘each’)
- It’s not implausible, then, to suppose that the AQ marker is itself the distributive operator that these constructions are interpreted as contributing to the sentence.
  - In languages where the AQ marker is not homophonous with an independent DIST operator, there is simply some kind of contextual allomorphy going on.
- However, if the AQ marker is a distributive operator, it seems to be surfacing in a different position from where it’s interpreted in.
  - Rather than being sister to its restrictor as it usually is (6a), it seems to be sister to a subpart of its scope (6b).

a. *Each* as a Distributive Operator:
   (i) *Sentence:* [ Each of [ the boys ] ] brought one dish to the party
   (ii) *Meaning:* ∀z. z < the.boys & AT(z) → z brought one dish to the party

b. *Each* as an Anti-Quantifier
   (i) *Sentence:* [ the boys ] brought [ one dish each ] to the party
   (ii) *Meaning:* ∀z. z < the.boys & AT(z) → z brought one dish to the party

c. **Key Question:** Can we derive the T-conditions in (6bii) without distorting too terribly the surface structure in (6bi)?

Second Key Analytic Puzzle: ‘The Cross-Linguistic Problem’

- In many languages, AQ constructions allow for ‘pluractional’ or ‘event distributive’ readings, where the understood restrictor of the DIST operator is a plural event (7a).
- But, in many other languages, such interpretations are not possible (7b).

a. **German Jeweils:** [ Jeweils ein Apfel ] war verrottet.
   DIST one apple was roten
   *One apple was rotten each time / in each basket.*

b. **English Each:** * [ One apple each ] was rotten.

c. **Key Question:** What is the source of this cross-linguistic variation?
2. The Internal Syntax and Semantics of Anti-Quantifiers

(8) First Key Assumption: Pronominal Restrictor for AQ-Marker

- As stated above (6), the AQ-marker \( \text{each} \) in ‘binominal each’) is a distributive operator.
  
  a. The Semantics of \textit{Each} in ‘Binominal Each’

\[
[[ \text{each} ]]^E = [ \lambda x e : [ \lambda P e _t : \forall z. z < x & AT(z) \rightarrow P(z)] ]
\]

- However, in an Anti-Quantifier, this distributive operator combines with a (possible covert) pronominal.

- This pronominal is (usually) bound by the understood restrictor of the distributive operator.

b. The Syntax of Binominal Each, Part 1

\[
[ [ \text{The boys} ]_1 [ \text{bought} [ \ldots \text{one sausage} \ldots ] [ \text{each } \text{pro}_1 ] \ldots ]
\]

- While the pronominal restrictor of the AQ-marker \text{each} is null in English, in other languages, it may have an overt realization.

c. Possible Realizations of AQ Restrictor

(i) German: je-weil-s

(ii) Italian: ciasc-uno

(9) Second Key Assumption: Marked Expression in AQ is Type \textit{<et>}

- The expression marked in the ‘Anti-Quantifier’ construction is an \textit{<et>} predicate.

a. The Syntax of Binominal Each, Part 2

\[
[ [ \text{The boys} ]_1 [ \text{bought} [ \ldots \text{one sausage}_{<et>} \ldots ] [ \text{each } \text{pro}_1 ] \ldots ]
\]

**Problem:** As we already noted, the condition in (9) is too weak, as it will also allow structures like the following:

\[
* [ [ \text{The boys} ]_1 [ \text{bought} [ \ldots \text{sausages}_{<et>} \ldots ] [ \text{each } \text{pro}_1 ] \ldots ]
\]
Third Key Assumption: The Internal Syntax of the Anti-Quantifier

The internal syntax of the Anti-Quantifier is as illustrated below:

- The whole Anti-Quantifier is a DP headed by a (special) null D
- CompDP is a PredP headed by a null Pred head.
- SpecPredP is the numeral expression marked by the AQ-marker
- CompPredP is a PP headed by a (special) null P
- This null P undergoes head movement to the Pred-head.
- CompPP is the QP headed by the AQ-marker (each); CompQP is the (possible null) pronominal restrictor of the AQ-marker.

a. Some Notes About The Component Parts

(i) The postulated P head may have overt reflexes in some languages:

1. *German* je-weil-s (genitive case)
2. *Russian* po dve sosiski kazhdyj (po = preposition)

   • However, the po seems not to be in the position expected by (10)

(ii) In order to derive the surface word-order in the German *jeweils* construction, we must assume some fronting of the PP to Spec DP

\[
[DP [PP \{^{\text{je weils}}\}]_2 [DP \{^{\text{PredP \{^{\text{NP drie Würstchen }\}^{\text{PredP Pred+P}_1 t_2 \ldots}}\}}]}
\]
(11) **Fourth Key Assumption: The Semantics of the Preposition Head**

- The preposition P is a variable over two-place relations.
- It is necessarily co-indexed with and bound by some other expression in the sentence denoting a two-place relation.

\[
[ \text{The boys } ]_1 \ [ \text{bought}_2 \ [ \text{DP} \ D \ [ \text{PredP} \ [ \text{NP} \ \text{three sausages} ] ] \ [ \text{PredP} \ \text{Pred+P}_2 \ [ \text{pp} \ t_2 \ [ \text{QP} \ \text{each pro}_1 ] ] ] ]
\]

(12) **Fifth Key Assumption: The Semantics of the Complex ‘Pred+P’ Head**

We assume a special rule for interpreting the complex ‘Pred+P’ head above:

\[
[[ \text{Pred P} ]]^g = [ \lambda Q_{<et,t>} : [ \lambda P_{et} : [ \lambda f_{ee} : Q ( \lambda x : P(f(x)) \land g(i)(f(x))(x) ) ] ] ]
\]

Under this semantics, \([\text{Pred+P}]\) is a function that takes as argument:

- A *generalized quantifier* \(Q\)
  - This will be the denotation of the QP headed by *each*

- An *<et>-predicate* \(P\)
  - This will be the denotation of the indefinite marked by the AQ marker

- A function \(f\) from entities to entities (a ‘Skolem Function’)
  - This will ultimately serve the function of introducing the understood existential quantification over the *<et>* predicate \(P\).

(13) **Sixth Key Assumption: The Semantics of the Null D Head**

The special null D head in the Anti-Quantifier introduces existential quantification over the *<ee>* (Skolem) function \(f\).

\[
[[ \text{D} ]] = [ \lambda F_{<ee,t>} : \exists f. F(f) ]
\]
(14) **Putting the Pieces Together**

![Diagram of DP structure]

- a. \[[\text{PP}]^g\] = \[[\text{QP}]^g\] = \[\lambda P_{et} : \forall z. z < g(1) \& AT(z) \to P(z) \]
- b. \[[\text{Pred } P_2]^g\] = \[\lambda Q : [\lambda P : [\lambda f : Q ( [\lambda x_{ee} : P(f(x)) \& g(2)(f(x))(x))])]]
- c. \[[\text{PredP}^1]^g\] = \[\lambda P : [\lambda f : \forall z. z < g(1) \& AT(z) \to P(f(z)) \& g(2)(f(z))(z)]]
- d. \[[\text{PredP}^2]^g\] = \[\lambda f : \forall z. z < g(1) \& AT(z) \to \text{three.sausages}(f(z)) \& g(2)(f(z))(z)\]
- e. \[[\text{D}]^g\] = \[\lambda F_{<ee,t>} : \exists f. F(f)\]
- f. \[[\text{DP}]^g\] = \[\exists f. \forall z. z < g(1) \& AT(z) \to \text{three.sausages}(f(z)) \& g(2)(f(z))(z)\]

- As shown above, the entire Anti-Quantifier *three sausages each* is of *type t* (!?)
- This DP is true iff there is an <ee> function \(f\) such that for all atomic sub-parts \(z\) of \(g(1)\), \(f(z)\) is a triplet of sausages, and \(z\) and \(f(z)\) bear the relation \(g(2)\) to each other.

(15) **Key Observation**

As shown in (15b), we can obtain the T-conditions of sentence (15a) if we set \(g(1) = \text{the.boys}\), and \(g(2) = \text{buying}\).

- a. The boys bought three sausages each.
- b. \(\exists f. \forall z. z < \text{the.boys} \& AT(z) \to \text{three.sausages}(f(z)) \& z \text{ bought } f(z)\)
  (where \(f = [\lambda x : \text{the sausages that } x \text{ bought}]\))

Thus, to complete the picture, we need a story of how (14) can compose with the rest of the sentence and achieve the effect in (15).
3. **The External Syntax and Semantics of Anti-Quantifiers**

(16) **Question**
- According to the semantics in the preceding section, an Anti-Quantifier like *three sausages each* is of **type t** (14)
- How on earth, then, does it semantically compose with the rest of the sentence?

(17) **Special Rule: Index-Triggered Lambda Abstraction (ITLA)**

If X bears the index i or its sister bears the index i, then $[[X]]^{g}$ can (but need not) be:

$[[X]]^{g} = \lambda x : [[ X ]]^{g(x)}$.

- Recall the discussion and use of this rule by Lin (1998)

(18) **Truth-Conditional Derivation for Sentence (15a)**

```
\[
\begin{array}{c}
S \\
\text{DP}_1 & \rightarrow & \text{VP} \\
\text{The boys} \quad \text{Bought} \quad \text{three sausages} \quad \text{Pred} P_2 \quad \text{each} \quad \text{pro}_1 \\
\text{DP} \quad \text{VP} \\
\text{bought} \\
\end{array}
\]
```

(i) $[[ \text{three sausages each } ]]^{g}$ = (by ITLA)

$[ \lambda R : [[ \text{three sausages each } ]]^{g(R)} ]$ = (by (14))

$[ \lambda R : \exists f . \forall z. z < g(1) \land AT(z) \Rightarrow \text{three.sausages}(f(z)) \land R(f(z))(z)]$

(ii) $[[ \text{VP} ]]^{g}$ = (by ITLA)

$[ \lambda x : [[\text{VP}]]^{g(x)} ]$ = (by FA)

$[ \lambda x : [ \lambda R : \exists f . \forall z. z < x \land AT(z) \Rightarrow \text{three.sausages}(f(z)) \land R(f(z))(z)][[[\text{buy}]]] = [ \lambda x : \exists f . \forall z. z < x \land AT(z) \Rightarrow \text{three.sausages}(f(z)) \land z \text{ bought } f(z) ]$

(iii) $[[ \text{S} ]]^{g}$ = (by FA)

$[ \lambda x : \exists f . \forall z. z < \text{the.boys} \land AT(z) \Rightarrow \text{three.sausages}(f(z)) \land z \text{ bought } f(z) ](\text{the.boys}) = \exists f . \forall z. z < \text{the.boys} \land AT(z) \Rightarrow \text{three.sausages}(f(z)) \land z \text{ bought } f(z)$
(19) **Explanation for Characteristic Properties of Anti-Quantifiers, Part 1**

a. **Property:**
   The expression bearing the AQ-marker (each, jeweils) must be indefinite.

   (i) * The boys saw [ **those sausages** each ]

b. **Explanation:**
   • This follows trivially from the semantics given for [Pred P] in (12)
   • Note again, though, that this semantics predicts the possibility of sentences like that in (i) below.

   (i) * The boys bought [ **sausages** each ]

(20) **Explanation for Characteristic Properties of Anti-Quantifiers, Part 2**

a. **Property:**
   The expression bearing the AQ-marker must be a clausemate with the understood restrictor of the distributive operator (see Oh 2001, 2005)

   (i) * The store clerks said that Peter bought [ **one balloon** each ]

b. **Explanation:**
   • Given our compositional rules, the only way for the subordinate subject to combine semantically with the subordinate VP is for that subject to bind the restrictor of the AQ-marker (each)
   • Thus, the restrictor of the subordinate AQ-marker **must** be the subordinate subject;
     o There’s simply no way to ‘bypass’ the subordinate subject and allow the restrictor of the AQ-marker to be the matrix subject.

**Note:** The explanation in (20) is quite interestingly different from the rather promissory account offered by Oh (2001, 2005).

(21) **First Key Analytic Puzzle: ‘The Compositionality Problem’**

How can we derive the T-conditions of sentences containing Anti-Quantifiers (distributive numerals) without diverging too greatly from their surface structure?

• We can posit certain null pronominals (pro, P) providing the restrictor and the scope of the AQ distributive marker **internal to the AQ itself**.

• The rule of ITLA allows us to bind those pronouns, and thereby provide their values from other expressions in the sentence.
4. The Derivation of Pluractional / Event-Distributive Readings

(22) Second Key Analytic Puzzle: ‘The Cross-Linguistic Problem’

How do we derive the ‘pluractional’ or ‘event distributive’ reading for sentences like (22a)? Why is such a reading not possible for parallel English sentences like (22b)?

a. German *Jeweils: [Jeweils ein Apfel] war verrottet.*
   One apple was rotten each time / in each basket.

b. English *Each: [One apple each] was rotten.*

(23) Another New Semantic Rule: Type-Triggered Lambda Abstraction (TTLA)

If X and Y are sisters, and (i) \([X]^g\) is of type \(t\), and (ii) \([X]^g\) is not in the domain of \([Y]^g\), and (iii) X contains a free variable \(pro_i\), and (iv) \([pro_i]^g\) is of the same type as \([Y]^g\), then \([X]^g\) can (but need not) be: \(\lambda x : [X]^g(x)\).

(24) New Semantic Assumption: Event Arguments and Their Type

- In order to capture the event-distributive reading, we will need to explicitly represent the event argument that we’ve been ignoring until now.

- Crucial Note:
  In order for everything to work out, we must assume that events are no different in type from entities: that is, we do not have a separate type \(\epsilon\) for events.
  Consequently:
  - *Transitive Verbs* are now of type \(<\text{eeet}>\).
  - *Intransitive Verbs* are of type \(<\text{eet}\>\).

  Note: As the reader can confirm for themselves, if we don’t assume that events are also of type \(e\), then we will need to introduce massive type ambiguity in the AQ markers (*each, jeweils*), the null pronominals and the complex [Pr P] head.

(25) Important Note: Revision of Our Semantics for \([\text{Pred P}]\)

Given the addition of the event argument, we need to slightly adjust our semantics for the complex \([\text{Pred P}]\) head.\(^1\)

\[
[[\text{Pred P}]]^g = [\lambda Q_{\text{eet}},\lambda P_{\text{et}} : [\lambda f_{\text{ee}} : \exists e. Q ( [\lambda x_e : P(f(x)) & g(i)(f(x))(x)(e) ] ) ] ]
\]

Note, though, that we will still make use of the semantics in (12) in the derivation below.

---

\(^1\) In his dissertation, Zimmermann avoids this by allowing existential closure over the event argument to optionally occur at the level of the V-head itself. When this occurs, the V-head is of type \(<\text{eet}>\), as desired.
(26) **Truth Conditional Derivation for (22a)**

- To derive the pluractional reading of (22a), we assume that the subject *jeweils ein Apfel* undergoes short movement to S.

\[
\begin{align*}
&\text{DP}_3 \rightarrow S' \rightarrow S \\
&\text{[jeweils pro] } D \text{ one apples } Pred \ P_2 \\
&\text{were rotten} \\
&\text{t}_3 \\
&\text{VP}
\end{align*}
\]

(i) \[ [\text{S}]^g = \text{(by ITLA)} \]

\[ [\lambda x : [[ t_3 \text{ were rotten } ]]^{g(3/x)} ] = \]

\[ [\lambda x : \lambda e : \text{x is rotten in e } ] \]

(ii) \[ [\text{DP}_3 ]^g = \text{(by TTLA)} \]

\[ [\lambda R : [[ \text{jeweils one apple } ]]^{g(2/R)} ] = \text{(by (14))} \]

\[ [\lambda R : \exists f . \forall z. z < g(1) \& \text{AT}(z) \rightarrow \text{one.apple}(f(z)) \& R(f(z))(z)] \]

(iii) \[ [\text{S'}]^g = \text{(by FA)} \]

\[ [\lambda R : \exists f . \forall z. z < g(1) \& \text{AT}(z) \rightarrow \text{one.apple}(f(z)) \& R(f(z))(z)] \]

\[ ([\lambda x : \lambda e : \text{x is rotten in e } ] ) \]

\[ \exists f . \forall z. z < g(1) \& \text{AT}(z) \rightarrow \text{one.apple}(f(z)) \& f(z) \text{ is rotten in z} \]

*There exists a function f from entities (events) to entities such that for all atomic members z of g(1), f(z) is one apple, and f(z) is rotten in z.*

- Note that given these T-conditions, it follows that the atomic entities z must be *events*
- Thus, the plurality g(1) is a plurality of events.
- Thus, these T-conditions amount to:

  *There exists a plurality of events e, and every atomic subevent e’ in e is such that there is one apple that is rotten in e.*

---

(27) **Summary of the Analysis**

In order to derive the event distributive / pluractional reading, we raise the AQ to a high position, where it scopes over the remainder of the clause. This allows:

a. The restrictor pronominal *pro* to remain unbound, and thus be construed as referring to some (salient) plural event.

b. The sister of the AQ to be a relation between entities and events. Thus, we can have it supply the value of the null P head via TTLA.
(28) **Question:**

Why is a derivation like that above not possible for the English sentence in (22b)?

(29) **Observation 1: AQ Markers and Adnominal Quantifiers**

- In the languages that do not allow for ‘event distributive’ / ‘pluractional’ readings of sentences containing AQs, the AQ-marker is formally identical to an adnominal distributive marker.

  a. The boys bought [ three sausages each ]
  b. [ Each boy ] bought three sausages.

- In the languages that do allow for ‘event distributive’ / ‘pluractional’ readings, the AQ-marker is *not* formally identical to an adnominal distributive marker.

  a. Die Jungen kauften [ jewels drie Würstchen ].
     the boys bought DIST three sausages
  b. * [ Jeweils Jungen ] kauften drie Würstchen
     DIST boys bought three sausages

(30) **Observation 2: Events as Distributive Restrictors**

- Even languages which – like English – disallow ‘event distributive’ / ‘pluractional’ readings, the understood restrictor of an Anti-Quantifier can in principle be an event, just so long as that (plural) event is denoted by a DP.

  a. Those parties cost [ $5000 each ]

(31) **Conclusion:**

- The facts in (30) show that the impossibility of ‘event distributive’ / ‘pluractional’ readings in languages like English cannot be due to a semantic constraint on the understood restriction of the AQ marker.

- Rather, it must be due to some syntactic restriction, likely related to the fact in (29).
(32) **The Analysis: Obligatory Phi-Features in the AQ-Marker**

a. In languages where the AQ-marker is also an adnominal quantifier, the AQ-marker bears uninterpretable φ-features.

   o Presumably, it bears these φ-features as a *result* of its being adnominal.

b. In sentences where the AQ-marker is adnominal, it checks these uninterpretable φ-features off from its NP complement.

   ![Diagram of DP with AQ-marker checking φ-features]

   - 1. φ-transfer
   - 2. φ-checking

   ![Diagram of S with AQ-marker in Anti-Quantifier]

   - 1. φ-transfer
   - 2. φ-checking

c. In sentences where the AQ-marker is in an Anti-Quantifier, it checks these φ-features off from its (null) pronominal complement.

d. However, *qua* pronoun, the complement of the AQ-marker in the Anti-Quantifier only receives its φ-features through co-indexation with a higher DP bearing those φ-features.

   ![Diagram of S with AQ-marker in Anti-Quantifier with qua pronoun]

   - 1. φ-transfer
   - 2. φ-checking

e. Therefore, if the pronominal restrictor of the AQ marker were ever left unbound – as in (26) – it would not have any φ-features. Consequently:

   - The AQ marker would not be able to check off its uninterpretable φ-features
   - The derivation will crash (syntactically)
5. Summary and Some Follow-Up Questions

(33) Key Proposals of Zimmermann (2002a,b)

a. Distributivity From Distributive Numerals
   - Distributive numerals (aka ‘Anti-Quantifiers’, ‘Distance Distributives’) 
     syntactically contain the distributive operators they are understood to 
     contribute.
   - Nevertheless, we can derive the semantics of these constructions from 
     something very close to their surface syntax.
     - We posit certain null pronominals (pro, P) providing the restrictor and 
       the scope of the distributive marker internal to the AQ itself.
     - The special composition rule of ITLA allows other overt expressions 
       in the sentence to bind those pronouns, thereby providing their values.

b. Cross-Linguistic Variation w.r.t. ‘Pluractional Readings’
   - Pluractional readings of sentences containing distributive numerals are 
     derived by allowing the understood restrictor of the distributive operator go 
     unbound
     - This allows the restrictor to be construed as a contextually salient 
       plural event.
   - The absence of such pluractional readings for binominal each in English (and 
     related constructions) is due to certain formal properties of the distributive 
     numerals in those languages
     - These properties conspire to prevent the distributive restrictor from 
       being unbound, and thus from being construed as a plural event…

(34) Follow-Up Question 1

a. Question: 
   In all the examples above of AQ constructions with ‘participant distributive’ 
   readings, the AQ is a direct object. How, then, do we analyze sentences like the 
   following, where the AQ is in subject position?

   [ Jeweils zwei Offiziere ] begleiteten die Ballerinen nach Haus.
   DIST two officers accompanied the ballerinas to home
   The ballerinas were each accompanied home by two officers.

b. Answer: 
   In his dissertation, Zimmermann shows how these can be analyzed using TTLA. 
   Note, however, that the analysis requires covert movement of die Ballerinen, and 
   so diverges from being ‘surface compositional’ (Zimmermann 2002: 272)
(35)  **Follow-Up Question 2**

a.  **Question:**
In the truth-conditional derivation in (26) of the ‘pluractional reading’, it’s pretty crucial that the AQ is the highest argument in the clause.

- This high position allows the sister of the AQ to be a relation between entities and events, and so allows the null preposition $P_i$ to be construed as such a relation.

- Note that we could not derive a comparable ‘pluractional’ reading from the transitive LF in (18), since the sister to the AQ is a *transitive* verb.

- How, then, are we to analyze sentences like the following in Korean, where AQs in direct object position easily allow for pluractional readings?

```
John-kwa Mary-ka kabang sey-kay-ssik-lul wunpanhaessta.
John-and Mary-NOM suitcase three-CL-DIST-ACC carried
John and Mary carried three suitcases each.  
(Oh 2001: 326)
```

b.  **Answer:** In his dissertation, Zimmermann argues that it is empirically correct for German to state that an AQ allows a pluractional reading only if it is *structurally highest* in the clause.

- However, this structurally highest position can be derived via scrambling a lower argument higher. (Zimmermann 2002: 252)

- Thus, it is in principle possible to analyze the Korean sentences above, as long as one countenances a certain amount of covert movement (see (34b))

(36)  **General Point of Criticism**

While this analysis does achieve a (largely) surface-compositional account of AQs, this simplification of their (LF) syntax comes at a high cost for the semantics:

a.  The special rule of ITLA, and the special (non-compositional) rule of TTLA

b.  The special stipulative lexical entry for the complex [Pr P] head. (As well as the fact that it seems we need more than one such entry.)

c.  The special stipulative lexical entry for the D head of the AQ.

d.  The assumption that *events* and *entities* are of the same logical type. (Or else, the wide array of type-ambiguity that is required.)