

Linking the collective-distributive opposition and the telic-atelic opposition

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1 Main claims

- The constraint that prevents *for*-adverbials from modifying telic predicates is also operative in *all* and *each*.
- *Each* distributes down to atoms; *all*, to subgroups; *for*, to shorter intervals.
- This explains why *all* rejects cumulative readings and some collective predicates.

2 Cumulativity and *all*

- This is the stock example of a cumulative (scopeless) reading:
 - (1) 600 Dutch firms use 5000 American computers. (Scha, 1981)
Cumulative reading: 600 Dutch firms each use at least one American computer and 5000 American computers are each used by at least one Dutch firm.
- Zweig (2008, 2009) notes that *all* cannot give rise to cumulative readings:

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- (2) a. Three safari participants saw thirty zebras.
Available cumulative reading: Three safari participants saw at least one zebra each, and thirty zebras were seen overall.
- b. All the safari participants saw thirty zebras.
Unavailable cumulative reading: Each safari participant saw at least one zebra, and thirty zebras were seen overall.
Available distributive reading: Each safari participant saw thirty zebras.
- Exception: dependent-plural readings, which can be seen as cumulative (Zweig, 2008):
- (3) a. Three safari participants saw zebras.
Available cumulative reading: Three safari participants saw at least one zebra each, and at least two zebras were seen overall.
- b. All the safari participants saw zebras.
Available cumulative reading: Each safari participant saw at least one zebra, and at least two zebras were seen overall.
- The word *each* is never compatible with cumulative readings but only with distributive readings:
- (4) a. Each safari participant saw thirty zebras.
Unavailable cumulative reading: Each safari participant saw at least one zebra, and thirty zebras were seen overall.
- b. Each safari participant saw zebras.
Unavailable cumulative reading: Each safari participant saw at least one zebra, and at least two zebras were seen overall.
- **Dependent Plural Puzzle:** Why can *all* license dependent plurals but not *each*? (Answer in Zweig (2008), extended in Champollion (2010b). Not today.)

Thirty-Zebras Puzzle: What is the relevant semantic distinction between *see zebras* and *see thirty zebras* so that the former is more permissive wrt. cumulative readings?

3 Collectivity and *all*

- *All* is incompatible with some collective predicates (Kroch, 1974; Dowty, 1987; Moltmann, 1997), which I will call *numerous-type*:
- (5) a. The students who came to the rally are numerous.
- b. The boys surrounded the table.

- c. The soldiers in this bataillon sufficed to defeat the army.
 - (6) a. *All the students who came to the rally are numerous.
 - b. *All the boys surrounded the table.
 - c. *All the soldiers in this bataillon sufficed to defeat the army.
- But it is compatible with others, which I will call *gather-type*:

- (7) a. The students gathered in the hallway.
- b. The professors met in the garden.
- c. The soldiers dispersed.
- (8) a. All the students gathered in the hallway.
- b. All the professors met in the garden.
- c. All the soldiers dispersed.

The word *each* is incompatible with any of these.

- (9) a. *Each student who came to the rally is numerous.
- b. *Each boy surrounded the table.
- c. *Each student gathered in the hallway.
- d. *Each professor met in the garden. etc.

Numerous-Gather Puzzle: What is the relevant semantic distinction between *be numerous* and *gather* so that only the latter is compatible with *all*?

Each-All Puzzle: What is the relevant semantic distinction between *each* and *all* so that only the latter is compatible with *gather-type* predicates?

- We will look for an answer in *for*-adverbials and the telic/atelic opposition.

- (10) a. John **talked** for ten minutes. *atelic*
- b. *John **finished talking** for ten minutes. *telic*
- (11) a. John **ate apples** for ten minutes. *atelic*
- b. *John **ate three apples** for ten minutes. *telic*
- (12) a. John **wore yellow neckties at night** for a week. *dependent plural ok*
- b. #John **wore two yellow neckties at night** for a week. *funny*

Aspect Puzzle: What is the relevant semantic distinction between *eat apples* (atelic) and *eat three apples* (telic) so that only the former is compatible with *for*-adverbials?

- A *for*-adverbial cannot enter cumulative relation with an indefinite:

- (13) a. John saw thirty zebras for three hours.
Unavailable cumulative reading: John saw a total of thirty zebras over the course of a three-hour timespan.
- b. John saw thirty zebras in three hours.
Available cumulative reading: John saw a total of thirty zebras over the course of a three-hour timespan.

4 Explaining the similarities between *for* and *all*

- *For*-adverbials work like this (Dowty, 1979; Champollion, 2015a,b):

- (14) **Presupposition of *for three hours*:** The relevant event consists of one or more VPing events whose runtimes are shorter.
- *John talked for three hours* requires something **true**: that the talking event consists of one or more talking events whose runtimes are shorter.
 - **John finished talking for three hours* requires something **false**: the finish-talking event consists of one or more finish-talking events whose runtimes are shorter.

- Claim: *all* imposes a constraint on the verb phrase predicate which is analogous to the presupposition of *for*-adverbials, except that the “dimension” involved is not runtime but the thematic role of the *all*-phrase, usually *agent*, and the “granularity” involved is not “shorter” but “very small in number”.
- Assume that *all* distributes the VP down to sums that are very small in number.

- (15) **Presupposition of *all*:** The relevant event consists of one or more VPing events whose agents are very small in number.
- *All the children smiled* presupposes that the relevant event consists of one or more smiling events whose agents are very small in number.

- More formally: $x \in *(\lambda y.B(y))$ means: x consists of one or more parts of which B holds

- (16) **Presupposition of *for x hours*:** $e \in * \lambda e' (VP(e') \wedge \text{runtime}(e') < \text{runtime}(e))$
 (The relevant event consists of one or more VPing events whose *runtimes* are *shorter*)

- (17) **Presupposition of *all* in agent position:** $e \in * \lambda e' (VP(e') \wedge \varepsilon(\text{ag}(e')))$
 (The relevant event consists of one or more VPing events whose *agents* are *very small in number*.)

- *All* requires distributivity (Dowty, 1987):

- (18) a. All the children smiled. \Rightarrow Each child smiled.
 b. All the juries returned a guilty verdict. \Rightarrow Each jury did.
 c. The juries returned a guilty verdict. \nRightarrow Each jury did.

Baseline example:

- (19) All the children smiled.
 Presupposition: $e \in * \lambda e' (\text{smile}(e') \wedge \varepsilon(\text{ag}(e')))$
 (The relevant event consists of one or more smiling events whose agents are very small in number. This will be true because *smile* distributes.)

- General notion (Champollion, 2010a, 2015a,b):

- (20) **Stratified reference:** $SR_{f,g}(P)(x) \stackrel{\text{def}}{=} x \in * \lambda y (P(y) \wedge g(f(y)))$

- (21) a. $\llbracket \text{for an hour} \rrbracket = \lambda \tau_{\langle vi \rangle} \lambda M_{\langle it \rangle} \lambda P_{\langle vt \rangle} \lambda e : SR_{\tau, \lambda h. h < \tau(e)}(P)(e). P(e) \wedge \text{hours}(\tau(e)) = 1$
 b. $\llbracket \text{each (of the) NP} \rrbracket = \lambda P \lambda e : SR_{\text{agent}, \text{Atom}}(P)(e). [P(e) \wedge * \text{agent}(e) = \bigoplus \text{NP}]$
 c. $\llbracket \text{all the NP} \rrbracket = \lambda P \lambda e : SR_{\text{agent}, \lambda x. \varepsilon(x)(\text{agent}(e))}(P)(e). [P(e) \wedge * \text{agent}(e) = \bigoplus \text{NP}]$

- (22) a. All the safari participants saw thirty zebras. **cumulative*
 b. All the safari participants saw zebras. \checkmark *cumulative*

We can rule out the cumulative reading of (22a) as a presupposition failure:

- (23) **Failing presupposition:** $SR_{\text{agent}, \varepsilon}(\llbracket \text{see thirty zebras} \rrbracket)(e)$
 (The relevant event consists of subevents with small numbers of people as agents and in each of which thirty zebras are seen.)

The cumulative reading of (22b) is available, though:

- (24) **Satisfied presupposition:** $SR_{\text{agent}, \varepsilon}(\llbracket \text{see zebras} \rrbracket)(e)$
 (The relevant event consists of subevents with small numbers of people as agents and in each of which at least one zebra is seen.)

Aspect Puzzle: What is the relevant semantic distinction between *eat apples* (atelic) and *eat three apples* (telic) so that only the former is compatible with *for*-adverbials?

- Only *eat apples* has stratified reference with respect to time

Thirty-Zebras Puzzle: What is the relevant semantic distinction between *see zebras* and *see thirty zebras* so that the former is more permissive wrt. cumulative readings?

- Only *see zebras* has stratified reference with respect to agents.

5 Explaining the behavior of *numerous* and *gather*

- Kuhn (2014): *gather* has stratified reference; *numerous* doesn't

5.1 *All* distinguishes between *be numerous* and *gather*

- (25) a. *All the boys were numerous / surrounded the table.
b. All the boys gathered / met / held hands / dispersed.

- Presupposition of (25a): The relevant state can be divided into one or more parts each of which is in the denotation of *be numerous* and has a very small “agent”.
- This fails because these parts don't qualify as *be numerous*.
- Kuhn's observation (though see Winter (2001)): Gather-type predicates have stratified reference down to small numbers of people. Whenever a plurality of people gathers, any subgroup of them also gathers.

- (26) All the boys gathered.
Presupposition: The relevant event can be divided into one or more parts each of which is in the denotation of *gather* and has a small number of people as an agent.

5.2 *Gather* distinguishes between *each* and *all*

- Why are *gather*-type collective predicates incompatible with *all* but compatible with *each*?

- (27) a. All the students gathered.
b. *Each student gathered.

- Idea:
 - *Every* and *each* distribute over events whose agents are atoms (individual people)
 - *All* distributes over events whose agents must be small in number but need not be atomic
- *Each* presupposes that the relevant event can be divided into parts which are in VP and whose agents are atoms.
- *All* presupposes that the relevant event can be divided into parts which are in VP and whose agents are small numbers of people.
- Think of *all* as a coarse sieve, and *each* as a fine sieve. *Smile* distributes down to individuals, so it passes through both sieves. *Gather* distributes only to subgroups, so it passes only through the first.

Numerous-Gather Puzzle: What is the relevant semantic distinction between *be numerous* and *gather* so that only the latter is compatible with *all*?

- Only gather-type collective predicates have stratified reference.

Each-All Puzzle: What is the relevant semantic distinction between *each* and *all* so that only the latter is compatible with *gather*-type predicates?

- *Each* requires stratified reference down to atoms; *all* requires stratified reference down to entities that are small but not necessarily of cardinality one.

6 Conclusion

- *Each* is a “completely distributive” determiner: it distributes all the way down.
- *For* is a “slightly distributive” adverbial: it distributes to shorter subevents.
- *All* is an “almost distributive” determiner: it distributes but not all the way down.
- *Gather*-type predicates are “a bit distributive”; *numerous*-type predicates aren’t.
- Stratified reference allows us to express this picture formally.

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