

# *For*-adverbials and the scope of indefinites\*

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## 1 Introduction

- *For*-adverbials are commonly considered the most reliable diagnostic of the distinction between atelic and telic predicates (Vendler, 1957; Verkuyl, 1989):

- (1) a. John ran / drove towards the store / drank wine for an hour. *atelic*  
b. ?John ran a mile / drove to the store / drank 1l of wine for an hour. *telic*

- As an idealization, atelicity and telicity correspond to two higher-order properties:
- An atelic predicate has the **subinterval property**: whenever it holds at an interval I, it holds at every subinterval of I. (Attributed to Bennett and Partee, 1972)

- (2) John ran from 3 to 5pm.  $\Rightarrow$  John ran from 3 to 4pm. *atelic*

**Definition:**  $\text{Subinterval}(P) \stackrel{\text{def}}{=} \forall I [\text{AT}(P, I) \rightarrow \forall J [J \sqsubset I \rightarrow \text{AT}(P, J)]]$

- Everybody assumes that we can disregard short intervals (minimal-parts problem).
- A telic predicate is **temporally quantized**: Whenever it holds at an interval, it does not hold at any one of its subintervals. (Based on Krifka, 1986)

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(3) John ran a mile from 3 to 5pm.  $\not\Rightarrow$  John ran a mile from 3 to 4pm. *telic*

**Definition:** Temporally-quantized(P)  $\stackrel{\text{def}}{=} \forall I [\text{AT}(P, I) \rightarrow \forall J [J \sqsubset I \rightarrow \neg \text{AT}(P, J)]]$

## 2 Same-object effects with indefinites

- Indefinites in the syntactic scope of universal quantifiers can take semantic scope both over and under it:

(4) Every man loves a woman.  $\exists > \forall; \forall > \exists$

- del Prete (2011)'s terms: *Same-object* (SO) and *different-object* (DO) readings.

(5) a. SO = the indefinite picks out one object  
 b. DO = the indefinite can range over potentially different objects

- Indefinites in the syntactic scope of *for*-adverbials only get a SO reading (Carlson, 1977; Kratzer, 2007):

(6) a. John pushed a cart for an hour.  $\checkmark$ SO, \*DO  
 b. I dialed a wrong phone number for five minutes.  $\checkmark$ SO, \*DO  
 c. She bounced a ball for 20 minutes.  $\checkmark$ SO, \*DO  
 d. He kicked a wall for a couple of hours.  $\checkmark$ SO, \*DO  
 e. She opened and closed a drawer for half an hour.  $\checkmark$ SO, \*DO  
 f. I petted a rabbit for two hours.  $\checkmark$ SO, \*DO

- A common idea is that *for*-adverbials are universal quantifiers over moments (*for an hour = at each moment of an hour*) or at least very short intervals.

- Then SO = wide scope, DO = narrow scope.

- **SO effect puzzle:** Why should the semantic scope of an indefinite be sensitive to something outside its syntactic scope?

- Same effect in German (Kratzer, 2007):

(7) a. Ich hab' eine falsche Telefonnummer fünf Minuten lang gewählt.  
 I have a wrong telephone.number five minutes long dialed.  
 b. Ich hab' fünf Minuten lang eine falsche Telefonnummer gewählt.  
 I have five minutes long a wrong telephone.number dialed.

- Not a pragmatic effect: plausibility concerns can be overridden

(8) ??John found a flea on his dog for a month. (Zucchi and White, 2001)

From Deo and Piñango (2011):

- (9) a. ??John noticed a discrepancy/two discrepancies for a week.  
b. ??John discovered a new proof/two new proofs for a week.

- Not limited to singular indefinites:

(10) John saw thirty zebras for three hours.  $\checkmark$ SO ( $30 > \forall$ ); \*DO ( $\forall > 30$ )

## 2.1 Exceptions to the wide-scope generalization

### 2.1.1 Salience and world knowledge effects

- Different-object interpretations are possible when a salient level of granularity can be inferred from context or from world knowledge (Champollion, 2010):

(11) *Context:* discussing the daily intake of patients  
The patient took two pills for a month and then went back to one pill.

(12) We built a huge snowman in our front yard for several years. (Deo and Piñango, 2011)

- This inference takes time (self-paced reading tests, Todorova et al. (2000)):

- (13) a. Even though Howard sent a large check to his daughter for many years,  
she refused to accept his money. *longer reading time*  
b. Even though Howard sent large checks to his daughter for many years,  
she refused to accept his money. *shorter reading time*

### 2.1.2 Bare plurals and mass nouns

- Bare plurals and mass nouns do not have to take distributive wide scope over *for*-adverbials (Carlson, 1977; Verkuyl, 1972; Dowty, 1979)

(14) a. John found fleas on his dog for a month.  
b. John discovered crabgrass in his yard for six weeks.

(15) a. Tourists discovered that quaint little village for years.  
b. Water leaked through John's ceiling for six months.

### 2.1.3 Interveners

- Interveners are overt temporal adverbials which allow an indefinite to have a different-object interpretation when they occur between it and the *for*-adverbial:

- Context-dependent temporal definites (Deo and Piñango, 2011)

(16) Jane ate an egg/two eggs **at breakfast** for a month.

- Temporal universal quantifiers (Zucchi and White, 2001)

(17) John found a flea on his dog **every day** for a month.

- Pluractional adverbials (see also Beck and von Stechow, 2007)

(18) John found a flea on his dog **day after day** for a month.

**Summary** The following facts need to be explained:

1. Indefinites in the scope of *for*-adverbials lead to SO effects
2. SO effects survive in the face of scopal restrictions and adverse pragmatic pressures
3. There is a diverse class of exceptions to them:
  - (a) salience and world knowledge effects
  - (b) bare plurals and mass nouns
  - (c) intervening temporal definites, quantifiers, and pluractionals

## 3 Claim and roadmap

- *For*-adverbials are not quantifiers. SO effects are not surprising – they are the default case. (Following Kratzer (2007).)
- DO effects (except for bare plurals and mass nouns) are an instance of **nonatomic phrasal distributivity**. “Nonatomic”, because the domain of time does not have atoms; “phrasal”, because it is an entire VP that is distributed.
- We will build a bridge between distributivity and *for*-adverbials.
- Section 4 reviews distributivity theory and focuses on the motivation for Link’s and Schwarzschild’s D operators.

- Section 5 extends Schwarzschild’s D operator to the temporal domain and applies it to *for*-adverbials.

## 4 A crash course in distributivity theory

### 4.1 Lexical vs. phrasal distributivity

This distinction refers to the size of the distributively interpreted predicate.

- **Lexical distributivity/collectivity** involves lexical (non-complex) predicates:

- (19) a. The children smiled. *distributive*  
 b. The children were numerous. *collective*

- **Phrasal distributivity/collectivity** involves a VP, typically with an indefinite:

- (20) a. The girls are wearing a dress. *distributive*  
 b. The girls are sharing a pizza. *collective*  
 c. The girls are building a raft. *collective/distributive*

- Link (1987): Phrasal distributivity cannot be captured by lexical operations or meaning postulates, and must be modeled by a VP-level operator  $D^{Link}$  (“each”).

- (21)  $\llbracket D^{Link} \rrbracket = \lambda P_{\langle et \rangle} \lambda x \forall y [y \leq_{Atom} x \rightarrow P(y)]$   
 (Takes a predicate  $P$  over individuals and returns a predicate that applies to any individual whose atomic parts each satisfy  $P$ .)

- (22) a. The girls built a raft.  
        $\approx$  The girls built a raft together. *collective*  
 b. The girls  $D^{Link}$ (built a raft).  
        $\approx$  The girls each built a raft. *distributive*

### 4.2 Atomic vs. nonatomic distributivity

- Sentences like (20a) and (19a) involve atomic distributivity (i.e. over singular individuals).
- Nonatomic distributivity involves sums of singular individuals, as well as entities in nonatomic (continuous) domains.
- Just as in atomic domains, we can distinguish between lexical and phrasal distributivity.

- Nonatomic lexical distributivity is shown in examples like this:

(23) Five thousand people gathered near Amsterdam. (van der Does, 1993)

- Here the predicate *gather near Amsterdam* can be applied distributively (i.e. several gatherings) to nonatomic entities (a single person cannot gather)
- Nonatomic phrasal distributivity is usually unavailable (e.g. Lasersohn, 1989):

(24) Rogers, Hammerstein and Hart wrote a musical.

- a. **True** if the three of them wrote a musical together. ✓ *collective*
- b. **True** if each of them wrote a musical by himself. ✓ *atomic distributive*
- c. **False** if Rodgers and Hammerstein wrote a musical together, and Rodgers and Hart wrote another musical together. \**nonatomic distributive*

(25) **Scenario** Al, Bill, Jim and Ed each weigh 100kg.

- a. **True:** The men weigh 300kg. ✓ *collective (together)*
- b. **True:** The men weigh 100kg. ✓ *atomic distributive (per man)*
- c. **False:** The men weigh 200kg. \**nonatomic distributive (per pair)*

- Exception: a level of granularity is made salient through context or world knowledge (Lasersohn, 1995; Schwarzschild, 1991, 1996)

(26) **Scenario** Two pairs of shoes are on display, each pair with a \$50 price tag.

- a. The shoes cost \$100. ✓ *collective (together)*
- b. The shoes cost \$25. ? *atomic distributive (per shoe)*
- c. The shoes cost \$50. ✓ *nonatomic distributive (per pair)*

- Following Schwarzschild (1996), we can model the context dependency of nonatomic distributivity by assuming that there is a VP-level D operator that contains an anaphoric cover over contextually salient entities (pairs of shoes, etc.).

(27)  $\llbracket D^{Schwarzschild} \rrbracket = \lambda P_{\langle et \rangle} \lambda x \forall y [C(y) \wedge y \leq x \rightarrow P(y)]$  (*C* a free variable)

- (28) a. The shoes cost \$50. *collective*
- b. The shoes  $D^{Schwarzschild}$ (cost \$50). *nonatomic distributive*

- Nonatomic distributivity is much easier with a bare plural (Link, 1997):

- (29) a. Rodgers, Hammerstein and Hart wrote a musical. \**pairwise*
- b. Rodgers, Hammerstein, and Hart wrote musicals. *pairwise*

- The missing reading of (29a) clearly involves phrasal distributivity.

- The D operators are only needed to model phrasal distributivity. For lexical distributivity, we can use meaning postulates (Hoeksema, 1983):

- (30) The children smiled.
- a.  $\text{smile}(\oplus(\text{child}))$
  - b. **Meaning postulate:**  $\forall x, y[\text{smile}(x) \wedge \text{smile}(y) \rightarrow \text{smile}(x \oplus y)]$

- The “pairwise” reading of (29b) can be analyzed in the same way (Lasersohn, 1989):

- (31) Rodgers, Hammerstein, and Hart wrote musicals.
- a.  $\exists X [\text{musicals}(X) \wedge \text{write}(\text{rodgers} \oplus \text{hammerstein} \oplus \text{hart}, X)]$
  - b. **Meaning postulate:**  $\forall w, x, y, z[\text{write}(w, x) \wedge \text{write}(y, z) \rightarrow \text{write}(w \oplus x, y \oplus z)]$

- Following Krifka (1992), Kratzer (2007) and others, we can see (30b) and (31b) as instances of a general principle of *lexical cumulativity* that holds for all verbs.

- In the following, I will represent verbs as event predicates (type *vt*) and use explicit functions for thematic roles (Parsons, 1990).

- Then lexical cumulativity can be implemented by meaning postulates like these ones for all verbs V and thematic roles  $\theta$ :

- (32) a.  $\forall e, e'[\text{V}(e) \wedge \text{V}(e') \rightarrow \text{V}(e \oplus e')]$   
 b.  $\forall e, e', x, y[\theta(e) = x \wedge \theta(e') = y \rightarrow \theta(e \oplus e') = x \oplus y]$

- Following Link (1983) I write  $*P$  for the closure of P under sum. Following Kratzer (2007) I add stars to verbs and thematic roles to remind us that their meaning is “pluralized” in the sense of (32).

- Crucially, these postulates apply only to verbs and not to VPs. So *write a musical* can apply to a sum of events only if they all have the same theme (a musical).

- (33) a.  $\llbracket \text{write} \rrbracket = \lambda e.*\text{write}(e)$   
 b.  $\llbracket \text{write a musical} \rrbracket = \lambda e.*\text{write}(e) \wedge \text{musical}(*\text{th}(e))$   
 c.  $\llbracket \text{write musicals} \rrbracket = \lambda e.*\text{write}(e) \wedge *\text{musical}(*\text{th}(e))$

- (34)  $\llbracket \text{Rodgers, Hammerstein and Hart wrote a musical.} \rrbracket$   
 $= \exists e[*\text{write}(e) \wedge *\text{ag}(e) = \text{rodgers} \oplus \text{hammerstein} \oplus \text{hart} \wedge \text{musical}(*\text{th}(e))]$   
 (Allows for several writing events and for teamwork, but there has to be only one musical in total.)

- (35)  $\llbracket \text{Rodgers, Hammerstein and Hart wrote musicals.} \rrbracket$   
 $= \exists e[*\text{write}(e) \wedge *\text{ag}(e) = \text{rodgers} \oplus \text{hammerstein} \oplus \text{hart} \wedge *\text{musical}(*\text{th}(e))]$

(Allows for several writing events and for teamwork, and there can be several musicals in total.)

- Table 1 summarizes the discussion so far.

Table 1: Distributivity in atomic domains

	lexical (V level)	phrasal (VP level)	lexical (V level)	phrasal (VP level)
atomic	available	available	lexical cumulativity	Atomic D op.
nonatomic	available	only w. context	lexical cumulativity	Cover-based D op.
	(a) Empirical generalization		(b) Explanation	

### 4.3 Distributivity and thematic roles

- The D operators must be generalized so they can target different thematic role positions (Roberts, 1987; Lasersohn, 1998).

- (36)
- |    |  |                          |
|----|--|--------------------------|
| a. | <u>The first-year students</u> D(took an exam).  | <i>Target: agent</i>     |
| b. | John D(gave a pumpkin pie) to <u>two girls</u> . | <i>Target: recipient</i> |
| c. | John D(summarized) <u>the articles</u> .         | <i>Target: theme</i>     |

- More evidence comes from adnominal *each*, an overt form of D (Link, 1986; Champollion, 2011a):

- (37) The boys told the girls two stories each. *Target: agent or theme*

## 5 Application to *for*-adverbials

### 5.1 SO effects: The basic case

- Following Kratzer (2007), we can account for SO effects simply by letting the *for*-adverbial apply its predicate to the entire time interval denoted by its complement.
- Not like this:

- (38) [[for an hour] (naive quantificational analysis)  
 $= \lambda P_{\langle vt \rangle} \exists t [\text{hours}(t) = 1 \wedge \forall t' [t' <_{Atom} t \rightarrow \exists e [P(e) \wedge \tau(e) = t']]]]$

- But like this:

$$(39) \quad \llbracket \text{for an hour} \rrbracket \text{ (measure function analysis)} \\ = \lambda P_{\langle vt \rangle} \lambda e : \text{Subinterval}(P). P(e) \wedge \text{hours}(\tau(e)) = 1$$

- The subinterval property is presupposed.
- Activity predicates do not require any special handling. Lexical cumulativity is vacuous since activity predicates are already lexically pluralized.

$$(40) \quad \llbracket \text{John pushed a cart for an hour} \rrbracket \\ = \exists e : \text{Subinterval}(\lambda e' [\text{*push}(e') \wedge \text{cart}(\text{*th}(e'))]). \\ [\text{*ag}(e) = j \wedge \text{*push}(e) \wedge \text{cart}(\text{*th}(e)) \wedge \text{hours}(\tau(e)) = 1] \\ \text{(There is a pushing event whose theme is a cart, whose agent is John, and whose runtime measures one hour.)}$$

- Lexical cumulativity causes a predicate like *\*find* applies to sums of finding events, which may have nonadjacent runtimes. The following LF entails that one and the same flea is found repeatedly.

$$(41) \quad \llbracket \text{John found a flea for a month} \rrbracket \\ = \exists e : \text{Subinterval}(\lambda e' [\text{*find}(e') \wedge \text{flea}(\text{*th}(e'))]). \\ [\text{*ag}(e) = j \wedge \text{*find}(e) \wedge \text{flea}(\text{*th}(e)) \wedge \text{months}(\tau(e)) = 1] \\ \text{(There is a sum of finding events whose theme is one flea, whose agent is John, and whose runtime measures one month.)}$$

- This explanation does not work for plural indefinites, however:

$$(42) \quad \text{John saw thirty zebras for three hours.} \quad \checkmark \text{SO } (30 > \forall); \text{*DO } (\forall > 30)$$

- Predicates like *see thirty zebras* do not have the subinterval property: picture a safari in which the thirty zebras are seen in succession.

$$(43) \quad \llbracket \text{see thirty zebras} \rrbracket = \lambda e [\text{*see}(e) \wedge \text{*zebra}(\text{*th}(e)) \wedge |\text{*th}(e)| = 30] \\ \text{(True of any possibly plural event in which a total of thirty zebras are seen)}$$

- However, applying distributive QR (called SQI in Landman (1996)) to *thirty zebras* leaves a trace behind whose value is an atomic individual  $x$ . For any fixed atomic  $x$ , the predicate *see  $x$*  has the subinterval property. In this case, QR is driven by the need to satisfy the presupposition of the *for*-adverbial.

$$(44) \quad \llbracket \text{see } t_1 \rrbracket = \lambda e [\text{*see}(e) \wedge \text{*th}(e) = g(1)] \\ \text{(True of any possibly plural event in which the atomic individual } g(1) \text{ is}$$

seen)

- One can then nondistributively QR *three hours* above *thirty zebras* to ensure that the three-hour timespan does not covary with the zebras.

(45) [[three hours]  $\lambda 2$  [[thirty zebras (each)]  $\lambda 1$  [[John saw  $t_1$ ] [for  $t_2$ ]]]]

- In the LF in (45), the silent *each* stands for the effect of distributive QR.

## 5.2 Explaining salience and world knowledge effects

- We have seen that a salient granularity licenses a different-object interpretation:

(46) *Context:* discussing the daily intake of patients  
The patient took two pills for a month and then went back to one pill.

- The VP of this sentence cannot combine directly with the *for*-adverbial because it does not have the subinterval property:

(47) [[take two pills]] =  $\lambda e$ [\*take( $e$ )  $\wedge$  \*pill(\*th( $e$ ))  $\wedge$  |\*th( $e$ )| = 2]  
(True of any possibly plural event in which a total of two pills is taken)

- I therefore assume that there is a silent operator that shifts the meaning of the VP so that it has the subinterval property.

- We have seen that nonatomic distributivity requires a salient level of granularity:

(48) **Scenario** Two pairs of shoes are on display, each pair with a \$50 price tag.  
The shoes cost \$50.  $\checkmark$  *nonatomic distributive (per pair)*

- I propose that different-object effects under *for*-adverbials are due to D operators that target the  $\tau$  (runtime) function instead of a thematic role.

(49) a. The shoes  $D^{Schwarzschild}$ (cost \$50). *(i.e. per pair)*  
b. [This patient  $D^{Schwarzschild}$ (took two pills)] for a month. *(i.e. per day)*

- Since there are no atoms in the temporal domain, we expect that only  $D^{Schwarzschild}$  and not  $D^{Link}$  should be able to target  $\tau$ .

- Since Schwarzschild's operator is anaphoric on context, we expect that different-object effects are only possible in special contexts and not out of the blue.

- Link’s and Schwarzschild’s D operators always target the subject. The following event-based version of Schwarzschild’s D operator can target any thematic role. In particular, they can target  $\tau$ . For details, see Champollion (2010), chapter 8.

(50) **Definition: Schwarzschild-style D operator for event predicates**

$$\llbracket D_{\theta, \mathbf{C}}^{Schwarzschild} \rrbracket \stackrel{\text{def}}{=} \lambda P_{\langle vt \rangle} \lambda e [e \in * \lambda e' \left( \begin{array}{l} P(e') \wedge \\ \mathbf{C}(\theta(e')) \end{array} \right) ]$$

(Takes an event predicate  $P$  and returns a predicate that holds of any event  $e$  which consists entirely of events that are in  $P$  and whose  $\theta$ s **satisfy C**.)

- The generalized D operator has two parameters: a thematic role  $\theta$  and a granularity parameter  $\mathbf{C}$  (Schwarzschild’s cover parameter).
- Following Schwarzschild (1996), I assume that the  $\mathbf{C}$  parameter can be set either to the predicate *Atom* or to an anaphorically salient level of granularity. But since time is a continuous domain, D can only target time if  $\mathbf{C}$  is not set to *Atom*.
- This leads to the picture in Table 2.

Table 2: Distributivity in the temporal domain

	lexical (V level)	phrasal (VP level)	lexical (V level)	phrasal (VP level)
atomic	<b>n/a</b>	<b>n/a</b>	<b>n/a</b>	<b>n/a</b>
nonatomic	available	only w. context	lexical cum.	Cover-based D op.
	(a) Empirical generalization		(b) Explanation	

- In a context where there is a salient level of granularity, such as  $\lambda t. \text{days}(t) \leq 1$  in the context “Discussing the daily intake of patients”,  $D^{Schwarzschild}$  has a salient antecedent and can therefore apply to the VP *take two pills*.

$$(51) \quad \llbracket D_{\tau, \lambda t. \text{days}(t) \leq 1}^{Schwarzschild} (\text{take two pills}) \rrbracket \\ = \lambda e [e \in * \lambda e' \left( \begin{array}{l} * \text{take}(e') \wedge * \text{pill}(* \text{th}(e')) \wedge |* \text{th}(e')| = 2 \wedge \\ \text{days}(\tau(e')) \leq 1 \end{array} \right) ]$$

(True of any plural event that consists of one or more events of taking two pills which each take place within a day.)

- The result has the subinterval property, at least if we disregard times that are shorter than a day. This predicate can therefore be combined with *for a month* and then with *the patient*:

- (52)  $\llbracket \text{The patient } D_{\tau, \text{days}(t) \leq 1}^{\text{Schwarzschild}}(\text{took two pills}) \text{ for a month} \rrbracket$   
 $= \exists e [ * \text{ag}(e) = \text{the.patient} \wedge \text{months}(\tau(e)) = 1 \wedge$   
 $e \in * \lambda e' \left( * \text{take}(e') \wedge * \text{pill}(* \text{th}(e')) \wedge |* \text{th}(e')| = 2 \wedge \right)$   
 $\left. \text{days}(\tau(e')) \leq 1 \right) ]$   
 (There is a plural event that consists of one or more events of taking two pills which each take place within a day. Its agent is the patient, and its runtime measures a month.)

- Given a “generous” interpretation of *months*, this formula is verified by a plural event with a discontinuous runtime, provided that there is a month between the beginning and the end of this event.

### 5.3 The special status of bare plurals and mass terms

- Consider again the distinction between the following examples:

- (53) a. Rodgers, Hammerstein and Hart wrote musicals. *(true)*  
 b. Rodgers, Hammerstein and Hart wrote a musical. *(false)*

- We have seen that the literature on distributivity explains this contrast as follows:
  - In (53a), lexical cumulativity leads to nonatomic distributivity.
  - In (53b), the indefinite has a same-object or a fully distributive interpretation because lexical cumulativity can’t distribute over indefinites. Schwarzschild’s operator doesn’t apply because there is no supporting context.

- We can expand this explanation to the following contrast:

- (54) a. John found fleas on his dog for a month. *OK*  
 b. ??John found a flea on his dog for a month. *odd out of the blue*

- In (54a), lexical cumulativity leads to a “several-findings” interpretation. Following Krifka (1986), the bare plural *fleas* is interpreted as *one or more fleas* (the *two or more* part is an implicature). The subinterval property presupposition can apply successfully to *find one or more fleas*. No D operator.

- (55)  $\llbracket \text{John found fleas for a month} \rrbracket$   
 $= \exists e : \text{Subinterval}(\lambda e' [ * \text{find}(e') \wedge * \text{flea}(* \text{th}(e')) ])$   
 $[ * \text{ag}(e) = j \wedge * \text{find}(e) \wedge * \text{flea}(* \text{th}(e)) \wedge \text{months}(\tau(e)) = 1 ]$   
 (There is a finding event or sum of finding events whose theme is a set of fleas, whose agent is John, and whose runtime measures one month.)

- In (54b), the indefinite has a same-object interpretation because lexical cumulativity can't distribute indefinites. Only Schwarzschild's D operator could, but it doesn't apply because there is no supporting context. Link's D operator is not available because we have a nonatomic domain.

## 5.4 Modeling interveners

- We have seen that temporal definites, quantifiers, and pluractionals can lead to different-object effects:

- (56)
- Jane ate an egg **at breakfast** for a month.
  - John found a flea on his dog **every day** for a month.
  - John found a flea on his dog **day after day** for a month.

- *Every day* and *day by day* mean the same as  $D^{Schwarzschild}$ , except that the granularity is hard-wired to “day” instead of being given by context:

- (57)  $\llbracket \text{every day} \rrbracket = \llbracket \text{day by day} \rrbracket \stackrel{\text{def}}{=} \lambda P_{\langle vt \rangle} \lambda e [e \in * \lambda e' \left( \begin{array}{l} P(e') \wedge \\ \mathbf{days}(\tau(e')) \leq \mathbf{1} \end{array} \right) ]$   
 (Takes an event predicate  $P$  and returns a predicate that holds of any event  $e$  which consists entirely of events that are in  $P$  and whose runtimes **are at most a day long**)

- This leads to an interpretation like the following (ignoring the presupposition of *for a month* for convenience):

- (58)
- $\llbracket \text{John} \llbracket \llbracket \text{found a flea} \rrbracket \text{ every day} \rrbracket \text{ for a month} \rrbracket$
  - $\exists e [ * \text{ag}(e) = \text{john} \wedge \text{months}(\tau(e)) = 1 \wedge e \in * \lambda e' \left( \begin{array}{l} * \text{find}(e') \wedge * \text{flea}(* \text{th}(e')) \wedge | * \text{th}(e') | = 1 \wedge \\ \text{days}(\tau(e')) \leq 1 \end{array} \right) ]$   
 (There is a plural event that consists of one or more events of finding a flea which each take place within a day. Its agent is John, and its runtime measures a month.)

- *At breakfast* also means the same as  $D^{Schwarzschild}$ , except that granularity is hard-wired to “breakfast”.

- (59)  $\llbracket \text{at breakfast} \rrbracket \stackrel{\text{def}}{=} \lambda P_{\langle vt \rangle} \lambda e [e \in * \lambda e' \left( \begin{array}{l} P(e') \wedge \\ \exists \mathbf{i} [\mathbf{breakfast}(\mathbf{i}) \wedge \tau(e') \leq \mathbf{i}] \end{array} \right) ]$   
 (Takes an event predicate  $P$  and returns a predicate that holds of any event  $e$  which consists entirely of events that are in  $P$  and whose runtimes **are within a breakfast**)

- These entries should be integrated into a more extensive account of temporal dependencies, see Pratt and Francez (2001), von Stechow (2002) and Champollion (2011b). This is not trivial.

## 6 Summary

- Why do indefinites take only wide scope over *for*-adverbials unless there is supporting context?
  - *For*-adverbials are not scope-taking elements themselves
- Why do context and *every day* make it possible for indefinites to take low scope?
  - They can both introduce VP-level nonatomic distributivity in the sense of Schwarzschild (1996)
- Why are bare plurals and mass nouns able to take low scope?
  - They cause the VP to have the subinterval property (via lexical cumulativity).

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