Distributitional modification: The case of frequency adjectives (Gehrke and McNally 2015)
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1 Introduction

Natural language affords various strategies for composing propositions about the quantity of entities that participate in a given event or have a given property.

- We argue that one such strategy is distributitional modification, exemplified by frequency adjectives (FAs), notably occasional, odd, and rare (see also Bolinger 1967, Stump 1981, Larson 1998, Zimmermann 2003, schaefer07, gehrkemcnallysalt).

(1) a. The occasional sailor strolled by. (Bolinger 1967)
   b. OSM does not have building footprints for Grand Rapids (except for the odd building).
      (http://gis.stackexchange.com/questions/53718/where-how-can-i-find-buy-make-building-footprints-for-kent-county-mi-grand-rap)
   c. Their propaganda did its work, and in several years only the rare person in Russia could remember that the United States had its own peace program ... (COCA)

- Other FAs: daily, monthly, etc.; (in)frequent, sporadic, periodic

- Have been attributed three different readings (internal, generic, adverbial; see below)
  e.g. the ‘adverbial reading’: The possibility of an adverbial paraphrase (2)

(2) a. The occasional sailor strolled by. = Occasionally, a sailor strolled by. (1a)
   b. The storm was punctuated by a sporadic crash of thunder.
      = Sporadically, the storm was punctuated by a crash of thunder. (Stump 1981)
   c. She wrote me frequent letters. = Frequently, she wrote me letters.

Challenges:

- How to account for this apparent wide scope of a DP-internal adjective?
- How to generally account for different readings that have been identified for FAs?

Previous claims we’ve made:

- Gehrke and McNally (2011): FAs denote properties not of sets of individuals but crucially of descriptions of kinds.

- The FA contributes the entailment that the kind description is instantiated not by a single token but rather by a set of tokens with a particular sort of distribution.

- **One corollary:** Sentences like (1)a constitute propositions about **event kinds**

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1 As part of our study we have extracted examples from the British National Corpus (BNC), the Corpus of Contemporary American English (COCA), the Corpus of Global Web-Based English (GloWbE), and Google books corpus of American English, all available at http://corpus.byu.edu; we have obtained others from Google searches. Examples from the corpus.byu.edu site will be identified simply by the name of the source corpus; examples from Google searches will be identified by their full URL.
This talk: General picture of FAs as distributional modifiers

- FAs fall into two distinct classes: Temporal(ly) vs. non-temporal(ly distributing) FAs.
- Different readings of FAs can be accounted for by one uniform semantics for each class.
- Paraphrases can come about in different fashion, e.g. (2):
  1. Non-temporal FA as a second order kind modifier (2a)
  2. Temporal FA as an intersective event kind modifier (2b)
  3. Temporal FA with a non-event noun, incorporation (2c)
     (conditions: atomic event-entity-mapping, stereotypicality, bare plural; cf. Gehrke and McNally 2014)
- The analysis of the FA as an ordinary modifier is superior to earlier analyses that treat the FA as a covert quantifier.

2 Previous & new empirical generalizations (“the three readings”)

The internal reading

(3)  
  a. A frequent sailor (= one who sails frequently) won the regatta.
  b. A frequent recipient of awards (= one who frequently receives awards) took the Rotary Club prize again.

- Possible paraphrase of [FA N]: “N who/that V’s / is V’d FA-ly”
- Restricted to participant nouns (e.g. recipient, sailor, employee), including stage nouns (e.g. batter, passenger, guest, customer; cf. Gupta 1980; Carlson 1982)
- Odd with event nouns (e.g. visit, swimming, discussion) (4a): A token event occurs only once in time, and thus will not be manifest on multiple occasions.
- Odd with sortal nouns (e.g. beer, car, chair, i.e. nouns other than participant and event nouns) (4b): Their semantics does not entail participation in an eventuality.
- Possible with all kinds of determiners (5)

(4)  
  a. a frequent visit ≠ a particular visit that happens frequently
  b. a frequent letter ≠ a particular letter that V’s/is V’d frequently

(5)  
A/Some/One/The/That/Each frequent sailor I know owns his boat.

NEW Possible with some FAs (6), but not with others (7)

(6)  
  a. a daily/weekly Internet user = one who uses the Internet daily/weekly
  b. a frequent/infrequent/sporadic/periodic visitor = one who visits frequently/etc.
  c. a(n) occasional reader of the newspaper = one who reads the newspaper occasionally

(7)  
  a. an odd user/visitor/reader ≠ one who uses/visits/reads on odd occasions
  b. a rare writer/winner/employee ≠ one who writes/wins/is employed rarely

The generic reading

(8)  
  a. A(n) monthly/frequent/occasional check-up is essential.
  b. A(n) yearly/infrequent/rare visitor is not a problem.
  c. A daily/sporadic cup of coffee is harmless.
d. The odd glitch is tolerable.
e. ...there is little evidence to show that the rare drink will impair the healthy growth of a baby. (http://answers.yahoo.com/question/index?qid=20110501003637AAeLyDj)

- Possible paraphrase (Stump 1981): *now and then, from time to time, every day etc.*; (9)

(9)  a. A check-up on a monthly/frequent/occasional basis is essential.
    b. A visitor on a yearly/infrequent basis is not a problem.
    c. A cup of coffee on a sporadic basis is harmless.
    d. A glitch on odd occasions is tolerable.
    e. A drink on rare occasions will (not) impair the healthy growth of a baby.

- Natural when FA-DP is an argument to a generic predicate (e.g. (8)) (Stump 1981; Schäfer 2007), and when DP is interpretable as generic independently of the presence of the FA:

(10)  a. A check-up is / Check-ups are essential.
      b. A visitor is / Visitors are not a problem.
      c. A cup of coffee is / Cups of coffee are harmless.

- With episodic predicates, the FA is unacceptable or not paraphrasable as in (10):

(11)  a. An occasional cup of coffee has left circular stains on the table.  (Stump 1981)
      b. The Premier Division-based Scotland side were only beaten, in fact, by a goal of almost tragic proportions, conceded when an infrequent error was characteristically punished by Riedle.  (BNC)

- Schäfer (2007): Restricted to (in)definites, semantically bleached possessives:

(12)  a. An/The/Your occasional beer is good for you.
      b. Each occasional beer is good for you.
      c. Two/Many occasional beers are good for you.

NEW Some FAs require the indefinite (13), others the definite article (14); only *occasional* allows both (12a); correlates with (un)availability of the internal reading (cp. (6), (7)).

(13)  a. ??The/??Your daily shower is good for you.
      b. ??The/??Your infrequent/frequent beer is good for you.
      c. ??The/??Your sporadic/periodic inspection is necessary.

(14)  a. An odd glitch is/Odd glitches are tolerable.
      ≠ The occurrence of glitches on odd occasions is tolerable.
      b. A rare drink/Rare drinks will not impair the healthy growth of a baby.
      ≠ A drink on rare occasions will not impair the healthy growth of a baby.

- With the FAs in (13), the generic reading is systematically available only with event nouns.  With other nouns: they have to be coercible into event descriptions (cf. Schäfer 2007):

(15)  a. A frequent cup of coffee helps keep John awake.
      = Drinking a cup of coffee frequently helps keep John awake.
      b. Occasional newspaper articles are part of John’s job.
      = (e.g.) Writing/Editing newspaper articles occasionally is part of John’s job.
The adverbial reading (first observed in Bolinger 1967)

(16) The occasional sailor strolled by. = Occasionally, a sailor strolled by.

- Possibility of adverbial paraphrase, apparent wide scope of the FA
- This is not possible with FAs under the internal ((17a)) or generic reading ((17b)).

(17) a. A frequent sailor won the regatta.
   \(\neq\) Frequently, a sailor won the regatta.
b. A frequent checkup is essential.
   \(\neq\) Frequently, a checkup is essential.

- Stump (1981); Zimmermann (2003); Schäfer (2007): Restricted to (in)definites, semantically bleached possessives:

(18) a. We saw an/the/your occasional car on the road.
   = Occasionally, we saw a car on the road.
b. We saw each occasional car on the road.
   \(\neq\) Occasionally, we saw each car on the road.
c. We saw two/some/many occasional cars on the road.
   \(\neq\) Occasionally, we saw two/some/many cars on the road.

NEW Same determiner restrictions wrt particular FAs as with the generic reading ((19)-(21))

(19) a. The/\(\text{an}\) odd sailor strolled by.
   = On odd occasions, a sailor strolled by.
b. He might point out the/\(\text{an}\) odd bird or tell us the name of a plant, but these park excursions were not botanical treks.
   = On odd occasions, he might point out a bird... (COCA)
c. ...Brown himself did imbibe the/\(\text{an}\) odd drink (he appears not to have been a temper-ance advocate).... (COCA)
   = On odd occasions, Brown himself did imbibe a drink...

(20) a. The pier is still used by the/\(\text{a}\) rare passenger.
   = Rarely, the pier is still used by a passenger.
b. she runs her family’s Sea-Vue Motel and Restaurant on a patch of northern Florida coastline...that sees only the/\(\text{a}\) rare tourist.
   = ...that rarely sees a tourist (COCA)
c. In Hinsonville, the/\(\text{a}\) rare family had just one parent, and that condition was usually quickly altered by the second marriage of the widow or widower. (Google books)
   = Rarely, a family had just one parent.

(21) a. The occasional sailor strolled by.
   = Occasionally, a sailor strolled by.
b. An occasional sailor strolled by.
   = Occasionally, a sailor strolled by.
NEW Same restriction to event nouns with the first group of FAs (22), (23); i.e. those FAs that allow the internal reading$^2$

(23) a. An (in)frequent/sporadic/periodic sailor strolled by. 
$\neq$ (In)frequently/Sporadically/Periodically, a sailor strolled by.

b. The (in)frequent/sporadic/periodic sailor strolled by.
$\neq$ (In)frequently/Sporadically/Periodically, a sailor strolled by.

c. Frequent sailors strolled by. 
$\neq$ Frequently, a sailor/sailors strolled by.

(24) a. A daily/weekly/monthly sailor strolled by. 
$\neq$ Daily/Weekly/Monthly, a sailor strolled by.

b. The daily/weekly/monthly sailor strolled by. 
$\neq$ Daily/Weekly/Monthly, a sailor strolled by.

3 Changing the perspective: Temporal vs. non-temporal distribution

Temporal(ly distributing) FAs (e.g. (in)frequent, sporadic, periodic; daily, monthly etc.):

- Nouns modified by temporal FAs can appear in the plural (25a)
- Restriction to indefinite articles with sg. nouns (adv., gen.) (25b)
- Do not allow distribution over a non-temporal domain (25c)

Non-temporal distribution: The individuals in question can be temporally co-located as long as they are properly distributed over some other contextually-identified domain (e.g. space) (cf. Stump 1981).

- Temporal FAs can be used predicatively (25d).

    b. The house underwent a/?the monthly/frequent/periodic/sporadic cleaning.
    c. ??A/?The monthly/frequent/periodic/sporadic sailor is 6 feet tall.
    d. The reviews were ?monthly/frequent/periodic/sporadic.

Non-temporal(ly distributing) FAs (e.g. odd, rare):

- Nouns modified by non-temporal FAs cannot appear in the plural (26a).
- Restriction to definite articles with sg. nouns (adv., gen.) (26b)
- Allow distribution over a non-temporal domain (26c)
- Non-temporal FAs cannot be used predicatively (26d).

(26) a. ??The house underwent odd cleanings. (on relevant reading)
    b. The house underwent ??an/the odd cleaning.
    c. ??An/The odd sailor is 6 feet tall.
    d. ??The sailor was odd. (on relevant reading)

!! occasional is ambiguous

$^2$This second class of FAs allows an adverbial paraphrase with non-event nouns only under particular conditions (22) Gehrke and McNally (for details and an account, see 2014): 1. Unique discernible events, uniformity across subevents, temporal continuity within events (Atomic Event-Entity Mapping); 2. Stereotypicality; 3. Bare plurals.

(22) She sent me frequent letters / ??a frequent letter / ??frequent posters.
<table>
<thead>
<tr>
<th>Type of FA</th>
<th>Temporal</th>
<th>Nontemporal</th>
<th>Both</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(in)frequent, periodic, sporadic daily, etc.</td>
<td>odd, rare</td>
<td>occasional</td>
</tr>
<tr>
<td>Internal reading</td>
<td>✓</td>
<td>*</td>
<td>✓</td>
</tr>
<tr>
<td>Adverbial reading</td>
<td>✓</td>
<td>*</td>
<td>✓</td>
</tr>
<tr>
<td>with non-event nouns</td>
<td>?a</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Determiner used with the generic and/or adverbial reading</td>
<td>✓ ?a</td>
<td>✓ the</td>
<td>✓ the</td>
</tr>
<tr>
<td>Nontemporal distribution</td>
<td>*</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Predicative use on relevant reading</td>
<td>✓</td>
<td>*</td>
<td>✓</td>
</tr>
</tbody>
</table>

Table 1: Empirical generalizations

4 The proposal

Background assumptions:

- Reference to token (ordinary) entities and events, as well as kinds of entities and events
- **Nominal kinds** (Carlson 1977), implemented via a “layered” DP (Zamparelli 1995) (27): Nouns denote properties of kinds that are converted into properties of token entities via Num(ber) (see e.g. Farkas and Swart 2003; McNally and Boleda 2004; Déprez 2005; Espinal 2010; Müller-Reichau 2011, and references cited there for related proposals)
- **Verbal kinds** work analogously (e.g. Landman and Morzycki 2003; Ginzburg 2005; Sailer 2010; Gehrke 2012, 2015; Arsenijević, Boleda, Gehrke, and McNally 2014)

\[(27)\]

\[\begin{align*}
  a. \quad & \lambda x_k[\text{car}(x_k)] \\
  b. \quad & \lambda y \exists x_k[\text{car}(x_k) \land R(y, x_k)]
\end{align*}\]

- Kinds can be realized by sets of tokens (Gehrke and McNally 2011).
- FAs impose conditions on the distribution of these sets of tokens at a given index.

4.1 Temporal FAs

Temporal FAs denote simple properties of event kinds or tokens:

\[(28)\]

\[\lambda e_\alpha[\text{FA}_{\text{temp}}(e_\alpha)]\]

Satisfaction conditions for \(\text{FA}_{\text{temp}}\):

- A **distribution** is a relation between a (non-singleton) set of events and a well-defined stretch of time (or, as will be the case with nontemporal FAs, possibly space).
- FA applies to single event kinds (29a): A set of token event realizations can be retrieved, whose distribution can then be characterized.
- FA applies to token pluralities of eventualities (29b): The atoms of that plurality can be retrieved and be attributed a particular distribution.

\[(29)\]

\[\forall e_k, i[\text{FA}_{\text{temp}}(e_k) \text{ at } i \leftrightarrow \text{distribution}(\{e : R(e, e_k) \text{ at } i\}) = \text{dist}]\]
b. \( \forall e, i \left[ \text{FA}_{\text{temp}}(e) \text{ at } i \leftrightarrow \text{distribution}\left( \{ e' : \text{atomic-part-of}(e' < e) \text{ at } i \} \right) = \text{dist} \right] \)

The adjective combines with the noun via a predicate conjunction rule (see e.g. Larson 1998):

(30) a. \([\text{frequent}]: \lambda e_k[\text{frequent}(e_k)]\]
b. \([\text{frequent downdraft}]: \lambda e_k[\text{downdraft}(e_k) \land \text{frequent}(e_k)] = \lambda e_k[\text{downdraft}(e_k) \land \text{distribution}(\{ e : R(e, e_k) \text{ at } i \}) = \text{high}]\)

- The NP *frequent downdraft* denotes a property of the downdraft event kind, whose instantiations have a high distribution over the given index \(i\).
- Intersective condition on the kind: The FA creates a subkind, characterized by the distribution of the instances of the superkind.
- This subkind can be contrasted with other subkinds characterized by other distributions.

→ Characterization of kinds of eventualities according to their distribution in time (e.g. classification of meetings as daily, weekly, monthly, annual, etc.)

The combination of such a kind description with Number results in a description of token individuals of a kind whose distribution is determined by the FA; e.g. (31).

(31) \([[[\text{NumP}[\text{NP} \text{ daily broadcast}]]]]: \lambda e \exists e_k[\text{broadcast}(e_k) \land \text{daily}(e_k) \land R(e, e_k)]\]

The plural case (32):

- The FA modifies a nominal that has already been converted into a description of a plurality of tokens (i.e. at the level of NumP).
- The whole phrase denotes the set of token pluralities of downdrafts whose atoms form a set with a high distribution at some temporal index.

(32) \([[[\text{NumP} \text{ frequent [NumP downdrafts]]}]]: \lambda e \exists e_k[\text{downdrafts}(e_k) \land R(e, e_k) \land \text{frequent}(e)]\]

4.1.1 Some basic facts accounted for

The intersective analysis correctly predicts:

- Temporal FAs occupy post-nominal position in Romance languages (e.g. Spanish), a position reserved for intersectively interpreted modifiers (33).

(33) un problema frecuente ‘a frequent problem’ (Spanish)
a problem frequent

- Temporal FAs can coordinate with other intersective modifiers of the same general sort (e.g. event kind modifiers) (34a,c).

- There is a certain freedom in the ordering of these modifiers (34b,d).³

³This combinatorial freedom is somewhat restricted. The greater the semantic difference between the information provided by the two modifiers, the more difficult it is to combine them absolutely freely (e.g. *a yearly and external review; a yearly external review = an external yearly review*). However, we suspect that pragmatic factors intervene in accounting for these restrictions, as similar effects are found on adjective coordination and ordering more generally (e.g. *a tall, fascinating child* vs. *a fascinating, tall child*) (see e.g. Bouchard 2005; Svenonius 2008, and references cited there for discussion of adjective ordering).
4.1.2 Capturing the different paraphrases

We use frequent for illustration:

(35) a. \[ \text{[frequent]}: \lambda e_\alpha [\text{frequent}(e_\alpha)] \]
    b. \( \forall e_k, i [\text{frequent}(e_k) \text{ at } i \leftrightarrow \text{distribution}(\{e : \text{R}(e, e_k) \text{ at } i\}) = \text{high}] \)

The internal reading: The FA modifies a deverbal participant noun or a stage noun.

(36) John is a frequent sailor.

\[ \rightarrow \] These nouns have an additional event [kind] argument in their semantic representation (see e.g. Winter and Zwarts 2011):

(37) a. \[ [[[N \text{ sailor}]]]: \lambda x_k \lambda e_k [\text{sail}(e_k) \land \text{Agent}(x_k, e_k)] \]
    b. \[ [[[N_{\text{num}}P \text{ sailor}]]]: \lambda y \exists x_k, e_k [\text{sail}(e_k) \land \text{Agent}(x_k, e_k) \land \text{R}(y, x_k)] \]

- Since the FA is sortally restricted to apply to events, the only option is for it to apply to the event argument in the noun’s representation:

(38) \[ [[[N \text{ frequent sailor}]]]: \lambda x_k \lambda e_k [\text{sail}(e_k) \land \text{Agent}(x_k, e_k) \land \text{frequent}(e_k)] \]

- When Number is added, the result is a description of those token individuals of the sailor kind who participate in that kind of event that can be described as frequent sailing:

(39) \[ [[[N_{\text{num}}P \text{ frequent sailor}]]]: \lambda y \exists x_k, e_k [\text{sail}(e_k) \land \text{Agent}(x_k, e_k) \land \text{frequent}(e_k) \land \text{R}(y, x_k)] \]

Predictions of this analysis, which are borne out:

- Expressions with representations like that in (39) can combine with any determiner; cf. (5).
- Any token-level modification has to appear further away from the head noun than the (kind-level modifying) FA (see McNally and Boleda 2004, for related examples); cf. (40).

(40) a. Martin is a skilled frequent sailor.
    b. ??Martin is a frequent skilled sailor.

The generic reading: The FA-modified noun appears with a generic predicate.

- Two cases: the modified noun does (41) or does not (at first sight) (42) describe an event.
- In both cases, as a rule, the generic reading requires the indefinite article or bare plural and is incompatible with the definite article.

(41) a. A periodic inspection is important.

\[4\]The exact mechanism via which the adjective accesses this argument is not crucial; see e.g. Pustejovsky (1995); Larson (1998); McNally and Boleda (2004) for different implementations.
b. Periodic inspections are important.
c. ??The periodic inspection is important.

(42) a. A frequent glass of wine is healthy.
b. Frequent glasses of wine are healthy.
c. ??The frequent glass of wine is healthy.

- Without the FA, the definite also lacks a generic reading (in both cases; (43)).

(43) a. The inspection is important.
b. The glass of wine is healthy.

→ As the FAs simply contribute an additional intersective condition on the nominal description, their presence or absence does not have an impact on the eventual availability of a (non)generic interpretation of the nominal.5

The semantics of (41a) is given in (44).

- General analysis of generic sentences involving indefinite singular and bare plural DPs; we exemplify just the indefinite singular.
- The source of genericity in indefinite generic sentences is external to the subject DP; the indefinite is nonquantificational (e.g. Farkas and Sugioka 1983; Cohen 2001; Greenberg 2002; Krifka 2013).

(44) \( Gen_{e_k} : \text{inspection}(e_k) \land \text{periodic}(e_k) [\text{important}(e_k)] \)

The semantics of cases involving non-event nouns, such as (42):

- Coercion of the denotation of the noun to an event description (e.g. (45a) is paraphrasable as in (45b))

(45) a. A daily beer is healthy.
b. V-ing a beer on a daily basis is healthy.

- We use a function E to induce the appropriate coercion (cf. Schäfer 2007):6

(46) \( Gen_{e_k} : E(\text{beer})(e_k) \land \text{daily}(e_k) [\text{healthy}(e_k)] \)

The adverbial reading: Paraphrasability of the FA in terms of a sentence-level adverb

- With FA\(_{\text{temp}}\)s, this paraphrasability is only systematically possible with event nominals:

(47) The department has undergone a periodic review (over the last 10 years).
    = Periodically, the department has undergone a review.

- The DP is an instance of an indefinite kind nominal, such as the ones in (48) (see e.g. Dayal 2004; Müller-Reichau 2011).

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5We assume that the same explanation extends to the failure of the definite article to appear with temporal FAs on the so-called adverbial reading (see below), which also involves interpreting the FA-modified nominal as a kind description.
6This sort of coercion is well known (consider cases such as the interpretation of the book in enjoy the book), and our analysis is compatible with any independently-motivated account of coercion (see e.g. Asher 2011, for a recent proposal). For an account that spells out coercion in the case of FAs, see Bücking (2012).
(48)  a. A giant tortoise has recently become extinct.
    b. Fred invented a pumpkin crusher.

The semantics of (47):⁷

(49)  a. \([\text{periodic review}] : \lambda e_k [\text{review}(e_k) \land \text{periodic}(e_k)]\]
    b. \([\text{a periodic review}] : f_i (\lambda e_k [\text{review}(e_k) \land \text{periodic}(e_k)])\]

Gehrke and McNally (2011):

- Due to the distribution condition on the set of tokens that realize this kind, such set could not participate in one token event of the sort described by the verb.
- However, nothing would prohibit it from participating in the \textit{kind} of event described by the verb, if the latter could be instantiated by multiple tokens.

→ Sentences with the adverbial reading correspond to propositions about event kinds:

(50)  \[\exists e_k [\text{undergo}(e_k, d, f_i (\lambda e'_k [\text{review}(e'_k) \land \text{periodic}(e_k)]))]\]

Satisfaction conditions for sentences that are used to make assertions about event kinds:

- In order for an event kind to exist at some index \(i\), at least one realization of the event kind should exist at \(i\); cf. (51).

(51)  \[\forall e_k, x_\alpha, P, i [P(e_k, x) \text{ at } i \leftrightarrow \exists e, x_\alpha [R(e, e_k) \land P(e, x_\alpha) \text{ at } i]]\]

- Each element of the set that realizes the participant should participate in a token event of the relevant event kind.
- In such cases, it will follow automatically that the corresponding token events will satisfy the same distribution as the token participants.
- Thus, for (50) to be true, there will have to be a set of token review-undergoing events with a distribution that can be described as “periodic”.

⇒ With a single denotation for the temporal FAs, we have accounted for the three classic readings associated with these adjectives.

### 4.2 Non-temporal FAs

The semantics for nontemporal FAs is identical to the one for temporal FAs, except for:

- Nontemporal FAs are not sortally restricted to describing event distributions.
- They lack the predicative use.

→ Their semantics is exclusively that of a modifier (of event kinds):

(52)  \[\text{[FA}_{\text{nontemp}] : \lambda P \lambda x_k [(\text{FA}(P))(x_k)]}\]

⁷For the sake of illustration we treat the resulting DP as denoting the entity returned by a choice function \(f_i\) on the set denoted by \textit{periodic review} (Reinhart 1997; Kratzer 1998). Whether the choice function variable is treated as existentially quantified or as a contextually-valued free variable is not crucial here; we treat it as a free variable.
The satisfaction conditions for nontemporal FAs are the same as those for temporal FAs (compare (53b) with (29a)).

\[ \forall P, x_k, i [\text{FA}_{\text{nontemp}}(P)(x_k) \text{ at } i \leftrightarrow P(x_k) \land \text{distribution}(\{y : R(y, x_k) \text{ at } i\}) = \text{dist}] \]

An example:

\[ \begin{align*}
54a. & \quad [\text{odd}] : \lambda P \lambda x_k [\text{odd}(P)(x_k)] \\
54b. & \quad [\text{odd car}] : \lambda x_k [\text{odd(car)}(x_k)] \\
54c. & \quad \forall x_k, i [\text{odd(car)}(x_k) \text{ at } i \leftrightarrow \text{car}(x_k) \land \text{distribution}(\{y : R(y, x_k) \text{ at } i\}) = \text{low}] \\
\end{align*} \]

4.2.1 Some basic facts accounted for

The proposal that nontemporal FAs do not denote simple (first order) properties of (kinds of) individuals is crucial to explaining various contrasts between them and temporal FAs.

- Nontemporal FAs do not coordinate with intersective modifiers:

\[ \begin{align*}
55a. & \quad ??? \text{The museum had the odd/rare and brief visit from school groups.} \\
55b. & \quad ??? \text{The occasional and fast car drove by.} \\
\end{align*} \]

- Changing the order of these FAs with respect to other modifiers clearly produces a corresponding change in interpretation, something typical of predicate modifiers:

\[ \begin{align*}
56 & \quad \text{Only the odd/rare/occasional 2-door car will have enough leg room in the back seat.} \\
56 & \quad \neq \text{Only the 2-door odd/rare/occasional car will have enough leg room in the back seat.} \\
\end{align*} \]

Restrictions to singular definites: Restriction to the unique maximal kind

- The nominal that the FA combines with denotes the set of kinds described by that nominal.
- This set includes the general kind and any recognizable subkinds.
- Whenever we convert the kind description to a description of tokens, there is always only one unique kind that the tokens are entailed to be realizing: the maximally general kind.
  \[ \rightarrow \text{When the FA combines with a kind description, it returns the description of the unique kind upon whose realizations distributional conditions are being imposed.} \]
  \[ \rightarrow \text{Nominals containing these FAs reject any determiner that does not entail uniqueness (restriction to the and the bleached possessive).} \]

4.2.2 Capturing the different paraphrases

Nontemporal FAs do not allow the internal reading:

- The internal reading arises when the FA intersectively modifies an internal event argument within the representation of a nominal.
- This is impossible with nontemporal FAs, as they crucially apply to descriptions of (kinds of) individuals, rather than to (kinds of) individuals themselves.

The generic and adverbial readings can be straightforwardly accounted for in fundamentally the same way as they were accounted for with temporal FAs; differences:
• The kind term contributed by the nominal containing a nontemporal FA is marked with the
definite article and thus has a unique denotation.

• The kind variable in the denotation of the nominal is not available for binding e.g. by a generic
adverbial operator.

(57) a. The odd glitch is tolerable.
   b. tolerable(\(\ell x_k[\text{odd(glitch)}(x_k)]\))

(58) a. The occasional beer is healthy. = V-ing a beer on an occasional basis is healthy.
   b. healthy(\(\iota e_k[E(\text{occasional(beer)})(e_k)]\))

(59) a. The occasional sailor strolled by.
   b. \(\exists e_k[\text{strolled by}(e_k, \ell x_k[\text{occasional(sailor)}(x_k)])]\)

⇒ With one semantics we account for all “readings” of the adjective.
⇒ The different paraphrases are simply a byproduct of other elements in the sentences in which
they occur.

5 Advantages over previous analyses

Two basic sorts of previous analyses:

• FAs under the adverbial reading are complex determiners, and thus different from FAs under
the internal or generic readings (which are not directly accounted for; see Stump 1981; Larson

• The unified account for all readings of all FAs, treating the FA as a modifier (Schäfer 2007;
Gehrke and McNally 2011; Bücking 2012)

The main points of this section:

• FAs are not determiners (see also Gehrke and McNally 2011, for more arguments).

• The recognition of the distinction between temporal and nontemporal distribution, missing in all
previous proposals, solves a number of puzzles that have not been accounted for.

5.1 The determiner analysis of the adverbial reading

We use the analysis in Zimmermann (2003) to illustrate:

• FAs under the adverbial reading syntactically incorporate into the determiner, as in (60) (Zim-
mermann 2003, 271, minor details modified).

(60) \([\text{IP}[\text{QP}[\text{the/an+occasional}]][\text{NP } t_1 \text{ sailor}]]_2[\text{VP } t_2 \text{ strolled by}]]\)

• The result is a complex pluractional quantifier INFREQ over event-individual pairs that are
found within a larger, contextually identified event (61a).

• The semantics for a sentence containing an INFREQ is presented informally in (61b) (adapted
from Zimmermann 2003, 272, non-crucial details simplified).

(61) a. \([\text{an/the occasional N VP}]:\)
   \(\{\text{INFREQ}\langle e, x \rangle : \text{part-of}(e, e*) \land N(x)\}[\text{VP}(e, x)]\)
b. There are some pairs $\langle e, x \rangle$, with $e$ part of a contextually given event $e^*$, and $x$ having property N, such that $e$ is an event of $x$ VP-ing, and any two events of $x$ VP-ing occur at separate points in time.

Two main sorts of arguments in favor of the determiner analysis:

- The FA appears to scope over the entire sentence.
- The FA does not behave like a “typical adjective” in some respects (coordination with and relative order with respect to other adjectives, etc.).

⇒ The latter argument is not convincing; the data can given an alternative account (see Gehrke and McNally 2011, for details).

⇒ Unexpected scope facts

- Normally, nothing prevents a quantifier in object position from taking scope over a sentence in which there is no other quantificational operator. However, consider (62).

(62) Idling beside the propped-open kitchen window he registers the occasional car swishing past, three stories below. (COCA)

- There is no reason in principle why an INFREQ operator contributed by the FA (in conjunction with the determiner) should not be able to effectively scope over the entire sentence.
- Compare, for example (63a), where the determiner many is substituted for the occasional.
- The crucial part of the sentence can be paraphrased as in either (63b) or (63c).

(63) a. Idling beside the propped-open kitchen window he registers many cars swishing past, three stories below.
   b. There are many cars swishing past that he registers.
   c. There are many cars such that he registers them swishing past.

- The determiner analysis predicts that (62) should be paraphrased as in (64a) or (64b), depending on the syntactic analysis one adopts:

(64) a. There are some pairs $\langle e, x \rangle$, with $e$ part of a contextually given event $e^*$, and $x$ a car swishing past, such that $e$ is an event of him registering $x$, and any two events of him registering $x$ occur at separate points in time.
   b. There are some pairs $\langle e, x \rangle$, with $e$ part of a contextually given event $e^*$, and $x$ a car, such that $e$ is an event of him registering $x$ swishing past, and any two events of him registering $x$ swishing past occur at separate points in time.

- (62) entails that there are few cars swishing past, but neither of the informal representations in (64) carries this entailment.
- Rather, these representations only entail that there are few events of the subject referent registering the car (swishing past), and this could be the case if there are many cars (swishing past) and he simply fails to notice most of them.

⇒ The effect of the FA appears to be only over events of swishing past, rather than to events of registering.

⇒ We see no independently-motivated mechanism that could produce this effect, assuming the determiner analysis.
These sorts of examples are not problematic for the analysis proposed here:

- They receive the same analysis as examples such as (59) \((y_i)\) represents the pronoun \(he\); we assume a small clause analysis for illustration):

\[
\exists e, e_k [\text{register}(e, y_i, \text{swishing.past}(e_k, t.x_k[(\text{occasional}(\text{car}))(x_k)]))]
\]

- The satisfaction conditions for this sentence will guarantee that the distribution of token cars is low; this will guarantee that there are few token events of such cars swishing past.

→ The sentence describes a token event of \(y_i\) registering that kind of event that is one of the occasional car swishing past.

→ **Unexpected determiner facts**

- Assumption in the literature: the adverbial reading is only available with the (in)definite articles and semantically bleached possessives.

- Zimmermann accounts for this restriction on the hypothesis that these determiners are semantically empty.

**Problem:** Why must the FA be accompanied by an overt article in the first place (cf. (66))?  

(66) *Occasional sailor strolled by.*

Failure to recognize that there are two patterns to the distribution of determiners with FAs, one for temporal and the other for nontemporal FAs.

→ The claim that semantic emptiness accounts for the determiner restriction is thus incorrect, and as a result the difficulty of explaining how the FA would contribute quantificational or referential force when there must also be a determiner doing so reemerges.

Since the determiner analysis does not relate the generic and adverbial paraphrases, it has nothing to say about why any given FA shows a similar pattern of determiner restrictions on both the adverbial and generic readings.

### 5.2 Analyses that do not distinguish subclasses of FAs

All previous analyses of FAs failed to observe the distinction between temporal and nontemporal FAs and thus left open questions (cf. Gehrke and McNally 2011), which we can now answer:

- Why do different FAs manifest different determiner restrictions?

- Why do different FAs vary in the paraphrases they admit depending on the sort of noun being modified?

Our proposal accounts for another, previously unrecognized contrast between the two classes: whether or not they allow a predicative use.
5.3 Some other languages, in particular German

Spanish seems to have only temporal FAs (67)

(67) ??Pasaba el coche ocasional.
passed the occasional car occasional
Intended: ‘The occasional car passed by.’

Irish might only have a nontemporal FA (James McCloskey, p.c.):

- postnominal corr ‘peculiar, unusual’ (68); prenominal core is like a nontemporal FA (69)
- corr does not require (69a,b), but is compatible with definite article (69c) (McCloskey: presence/absence of definite article has no semantic consequence)
- Irish prenominal adjectives form compounds with the nouns they modify.
  → Complex determiner analysis is out of the question

(68) fear corr ‘a strange/weird man’
man peculiar

(69) a. Tá corr-chorrán féin sa gceantar seo
is odd-sickle still even in-the area this
‘There’s still the odd sickle in this area.’

b. an t-ór ar chreid corr-dhuine go raibh sé ann
the gold C believed odd-person C was it there
‘the gold that the odd person believed was there’

c. Ní bhíodh idir í agus uncaid a hathar ach an corr-fhocal.
NEG used-to-be between her and uncle her father.GEN but the odd-word
‘There was only the odd word (exchanged) between herself and her father’s uncle.’

German also seems to only have temporal FAs

- FA uses of odd and rare translate into German with temporal expressions only (gelegentlich ‘occasional’, selten, which is cognate with seldom)
- Nontemporal interpretations are impossible with gelegentlich (70a)
- No adverbial interpretation of the classical example (70b) (see also Schäfer 2007)\(^8\)
- Only an internal reading is possible, i.e. with participant nouns (70c)

(70) a. *Ein gelegentlicher / der gelegentliche Matrose ist 2 Meter groß.
an occasional the occasional sailor is 2 meters tall

b. *Ein gelegentlicher / der gelegentliche Matrose schlenderte vorbei.
an occasional the occasional sailor strolled by

c. Ein gelegentlicher / der gelegentliche Radfahrer kam vorbei.
an occasional the occasional cyclist came by

- Zimmermann (2003) on German:
  - Instead of the classical adverbial example he uses (71a) (his 27a).

\(^8\)Note that German Matrose ‘sailor’, unlike its English counterpart, is not morphologically derived from a verb like ‘sail’, and thus does not allow the internal reading.
Claim: Adverbial reading only available in subject position; cf. contrast between (71a) and (71b-d) (his 27b-d)

→ This supposedly supports his complex determiner analysis, since German nonsubject quantified phrases have independently shown to not take inverse scope at LF. e.g. preposed topocalized objects can have adverbial reading (72) (his 31)

(71) a. Ein gelegentlicher Kunde betrat den Laden.
    an occasional customer entered the shop
b. #PAGAD zerstörte das gelegentliche Gebäude.
PAGAD destroyed the occasional building
c. #Peter schickte einer gelegentlichen Frau Blumen.
    Peter sent an occasional woman flowers
d. #Wir stoppten bei dem gelegentlichen Rasthaus.
    we stopped at the occasional roadhouse

(72) Ein gelegentliches Bierchen haben wir auch getrunken.
an.ACC occasional.ACC beer..DIMACC have we also drunk

• Data of 11 German native speakers → Zimmermann’s data generalizations are not quite right.

Expected under Zimmermann’s (and our) account:

→ All 11 rejected examples like (71b-d)
→ 8/11 accepted (72)

Not expected under Zimmermann’s account (but fine under ours):

→ (71a): 4/11 unacceptable; 6/11: internal reading; only 1/11 ok with adverbial reading internal reading possible because:
  (a) ‘ok under the reading where this is someone who is a customer occasionally’
  ‘ok in marketing contexts, where customers are divided into regular, occasional, and one-time customers’
  (b) Acceptance of the discourse in (73) (the last speaker did not)
→ Comparison to (72): 9/11 equally liked or even preferred (74) on the relevant reading, although the DP containing the FA remains in object position.

(73) Ein gelegentlicher Kunde betrat den Laden. Er hatte rote Schuhe an.
an occasional customer entered the shop he had red shoes
‘An occasional customer entered the shop. He was wearing red shoes.’

(74) Wir tranken ein gelegentliches Bier.
we drank an-occasional-beer.ACC
‘We drank an occasional beer.’ (= ‘Occasionally, we drank a beer.’)

⇒ The adverbial reading is not reliably available in German (contra Zimmermann).

An adverbial paraphrase is only possible with event coercion (probably in (74)) and with event nouns more generally (75).

(75) a. Die Gruppe hielt eine tägliche / wöchentliche Diskussionsrunde ab.
    the group held a daily weekly discussion session off
    ‘The group held a daily/weekly discussion session.’
b. Das Seminar war seltenen / gelegentlich / periodischen / sporadischen Prüfungen unterworfen.

‘The department underwent infrequent/occasional/periodic/sporadic reviews.’

6 Conclusion

- FAs fall into two different subclasses: temporal(ly) vs. nontemporal(ly distributing)
  - Differences between temporal and nontemporal FAs are attributable to the fact that the former are intersective modifiers sortally restricted to events, while the latter are not.
  - Kinds can be realized by sets of tokens, rather than individual tokens.
  - Some clauses are descriptions of event kinds, rather than descriptions of event tokens.
- This new division solves a number of puzzles that previous analyses failed to explain.
- The account treats FAs as true adjectives, rather than stipulating that they are complex determiners (quantifiers).
- The analysis is not fully unified for FAs (as one class), but a unified analysis of each individual FA is provided (exception: occasional, which is ambiguous).
  - While an analysis that is not fully unified might be argued to lose something in elegance or simplicity, this loss is outweighed by considerable gains in empirical coverage.
  - The loss of uniformity is clearly anchored in lexical variation, where we might expect idiosyncrasy to lie.
- There is generally more than one way in natural language to convey truth-conditionally equivalent information.

References


