

## ***Occasional-type frequency adjectives and quantification over stages\****

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**Abstract** *Occasional*, *odd* and *rare* are different from other frequency adjectives (such as *daily* or *frequent*) in that they are able to pluralize a verbal event outside their immediate scope. While attempts have been made to capture this association to the event (Morzycki 2016; Gehrke & McNally 2011, 2015; Gehrke 2021; Schäfer 2007; Zimmermann 2003; Stump 1981; Sæbø 2016; Bücking 2012), none of them capture all the relevant empirical facts, namely that these sentences are distributive, stage-level and can optionally involve a verbal or a nonverbal event plurality. We present an analysis in which *occasional-type* frequency adjectives quantify over stages, following Barker’s (1999) definition of a stage as an ordered pair of an event and an individual  $\langle e, x \rangle$ . This analysis better accounts for the data and leads to a larger discussion of the nature of stages.

**Keywords:** modification, frequency adjectives, stages, distributivity, scope, English

### **1 Introduction**

Some frequency adjectives (FAs), namely *occasional*, *odd* and *rare*, pose a seeming paradox between syntactic hierarchy and semantic interpretation (Stump 1981; Morzycki 2016; Gehrke & McNally 2011; Gehrke 2021; Bücking 2012; Gehrke & McNally 2015; Schäfer 2007; Zimmermann 2003; Sæbø 2016). When used attributively in English<sup>1</sup>, there is an intuition that they are sometimes related not only to the noun next to them, but also to the verbal event.

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<sup>1</sup> Out of the languages we have investigated, English is fairly unique in having access to this reading. According to informal reports, the following languages were found not to allow them: Danish, Norwegian, Swedish, German, Dutch, Italian, Romanian and Hungarian. Turkish and Russian show at least some level of acceptability. We do not have an explanation for why English is special in this regard.

- (1) The occasional/odd/rare sailor strolled by.  
~ ‘There is more than one situation that instantiates a sailor strolling by, and this happens rarely.’

The puzzle is how these adjectives are able to associate with the event as well as the individual, from their position as an adjective.

As it stands, no analysis fully reflects the interpretation of these sentences in a satisfying way. Part of the issue is that almost every analysis splits FAs into slightly different subcategories, resulting in the wrong predictions (see 5.3). The crucial point for our current investigation is that the *occasional* type of FA has the special property of being able to cause a plurality of the verbal event (i.e., **pluractionality**) without making use of a plural number in the DP or additional pluractional adverbs, like we would otherwise expect from English (Link 1987, 1991; Champollion 2019; van Geenhoven 2005; Nouwen 2016). Compare the frequency adverbs *occasionally/infrequently/daily* to their adjectival counterparts *occasional/infrequent/daily* below:

- (2) **Frequency adverb**  
✓ Occasionally/✓ Infrequently/✓ Daily, a sailor strolled by.
- (3) **Frequency adjective**  
The/An ✓ occasional/× infrequent/× daily sailor strolled by.

We see this as evidence that *occasional*, *odd* and *rare* form a subgroup separate from the rest in that they themselves assert a pluractional reading. While earlier accounts have focused mainly on the scopal paradox and how to unify all FA types, our proposal will focus mainly on the special behavior of ***occasional-type* FAs**.

Underpinning our novel contribution are the two empirical observations that these sentences can only result in a **distributive** reading (see section 2) and that these adjectives facilitate a reading where the individual is **manifested** through the vehicle of the particular VP event (see 3.1.1). While neither of these observations is new, no analysis has so far been able to account for both of them in one elegant way. The main goal of our investigation is to understand what it is about the meaning of *occasional-type* FAs that gives rise to precisely this combination of properties. Approaching the sentence from this perspective will give us better insight into the original problem of how to reconcile the syntax and the semantics.

The paper is structured as follows: In section 2, we present the relevant data; in section 3, we review the two main approaches, namely the quantificational and the adnominal approaches, and show how, despite their respective benefits, neither can fully capture the data; in section 4, we present what will form the basis our analysis, namely stages; in section 5, we present our proposal; section 6 concludes.

## 2 Data

There are many moving pieces relevant to getting a full picture of the data. We will focus on some key components that will be relevant for our analysis, namely 1) distributivity; 2) manifestation; 3) the optionality of the plurality of a **verbal** event. As we proceed, we will show that the accounts proposed in the literature so far can capture one or two of these, but not all three.

Sentences containing *occasional*-type FAs must specifically end up with a plural, distributive reading (especially noted by [Zimmermann 2003](#)):

- (4) The occasional car drove by.  
 → one car per (infrequent) driving-by event  
 ↗ one driving-by event involving a low number of cars

There is no situation where the event does not force a one-to-one mapping between the event and the individual. In this sense, we wish to treat *occasional*-type FAs like the quantifier *each* in that distributivity must be baked into the semantic properties of the word itself.

Secondly, native speakers of English judge these sentences as not reporting the density of individuals themselves but rather the density of **manifestations** of a nominal type (noted especially by [Gehrke & McNally 2015, 2011](#)). In sentences like (5), we are not counting individual sailors, but rather the number of times the speaker has observed an event that could be described as “a sailor strolled by”. In principle, the same sailor could be involved in several of the strolling-by events, but the identity of that sailor is not at issue, and no claim is made that sailors themselves are rare or infrequent:

- (5) The occasional sailor strolled by.  
 → low number of instantiations of sailors strolling by, spread out across some spatiotemporal dimension  
 ↗ a low number of individual sailors

Because this reading is obligatory, we see it necessary to reflect this in the meaning of *occasional*-type FAs as well.

Finally, it is important to note that not all constructions involving *occasional*-type FAs will result in a plurality of a **verbal** event ([Stump 1981](#); [Gehrke & McNally 2015, 2011](#)). Sometimes *occasional*-type FAs relate to some nonovert, contextually-dependent event that has been added to the DP structure. For example, it is clear that in the sentence below, *occasional* associates with some nonovert, implicit event (here intuitively interpreted as a drinking event):

- (6) The occasional cup of coffee isn't harmful.

*Occasional*-type frequency adjectives and quantification over stages

- ~ 'It isn't harmful to drink a cup of coffee every now and then.'
- ∕ 'Sometimes, it isn't the case that drinking a cup of coffee is harmful.'

When the adjective is associated with the verbal event, the determiner is restricted to the definite or indefinite article, and numbers and quantifiers/quantity words are prohibited:

- (7) a. Antonio watched **an/the** occasional horror movie.  
~ Occasionally, Antonio watched a (single) horror movie.
- b. \*Antonio watched **one/two/three** occasional horror movie(s).  
∕ 'Occasionally, Antonio watched one/two/three horror movie(s).'
- c. \*Antonio watched **every/some/many** occasional horror movies.  
∕ 'Occasionally, Antonio watched every/some/many horror movie(s).'

The nonverbal event reading can arise with numerals, as long as the right context is established. Imagine a context in which Antonio and his friends will sometimes meet up and watch horror movies together, and these meetings only take place occasionally. Under this context, we can imagine a sentence like (8).

- (8) Antonio watched two or three occasional horror movies.  
~ 'When the group would occasionally meet to watch horror movies, Antonio joined them two or three times.'

Contrastingly, although *two or three* cannot appear higher than *occasional* in (7-b), it can in fact appear below *occasional*. When this is the case, the article stays singular but there is a plural marking on the noun, due to the plural marking on the numeral. This reading does not require additional context:

- (9) Antonio watched the/an occasional two or three YouTube clips.  
~ 'Every once in a while, Antonio watched two or three YouTube clips.'

Two or three YouTube clips are repeated for each watching event. We see the same effect when a quantifier like *every* is used (note that we again see a plural marking on the noun but a singular determiner):

- (10) Every two or three sailors will have at least one friend in common.  
~ 'If we pick out a group of two or three sailors, those two or three sailors will have at least one friend in common.'

When comparing to *every* it is clear that *occasional*, when associated with a verbal plurality reading, must be located higher in the structure than when the plurality is nonverbal. The determiner restriction for the verbal plurality reading is a frequently-mentioned quirk of this construction (Zimmermann 2003; Schäfer 2007). Stump

(1981) argues that the article is "semantically bleached", to which Gehrke & McNally (2015) and Gehrke (2021) respond that this wrongfully predicts that the article can be removed, e.g. \**occasional sailor strolled by*. It is not clear how this is a logical result of Stump's (1981) comment: In the syntax, English automatically disallows this option because of its determiner requirement, and in the semantics, it is easy to imagine the (in)definite article as semantically null in the sense that it is generally believed to on its own be non-quantificational (Heim 1982), and that the difference between the indefinite and the definite article lies in discursual factors such as the uniqueness or familiarity of the nominal referent.

To summarize, the key empirical observations are that *occasional*-type FAs force 1) a distributive reading; 2) a stage-level reading; 3) an association with either the verbal event or a nonovert, nonverbal event.

### 3 Quantifiers or adjectives?

There are essentially two approaches to the puzzle of how to analyze the meaning of *occasional*-type FAs. The first is that *occasional*-type FAs are part of a complex quantifier and thus get scope over the verbal event (Morzycki 2016; Larson 1998, 1999; Stump 1981). The second is that they are adjectives that modify the noun next to them, but with the special property that they instantiate individuals (Gehrke & McNally 2011, 2015; Bücking 2012). Under the adnominal approach, the connection to the verbal event is seen as purely contextual. Both approaches have notable benefits but they fall short in different ways. We evaluate both approaches and identify the characteristics necessary for a correct analysis.

#### 3.1 The quantificational analysis

The quantificational analysis involves A-to-D movement to form a complex quantifier [*the + occasional*] (Morzycki 2016; Larson 1998, 1999; Stump 1981). Zimmermann (2003) is the biggest proponent of this approach, capturing a number of important intuitions: the distributive reading, the explicit connection to the verbal event and a close, symmetrical relationship between the individual set and the event set. However, we will show that Zimmermann (2003) is not able to explain readings where a nonverbal event is plural. More crucially, his analysis cannot reflect the stage-level reading of these sentences. Finally we will show that event plurality is not inherently associated with temporality, and that context cannot be the core driving force behind the connection to the verb.

According to generalized quantifier theory, there is by default an asymmetry between the restrictor set and the scope set (Barwise & Cooper 1981). As previously noted in the literature, *occasional*-type FAs seem to modify the frequency of the

**combination** of the set of individuals and the events they participate in, requiring a closer, more symmetrical relationship between the two sets. Zimmermann (2003) solves this by introducing an ordered pair of the event and the individual,  $\langle e, x \rangle$ , thus uniting them and letting them be pluralized together.<sup>2</sup> Below is Zimmermann's (2003) representation of the Infrequency Operator making up what he analyzes as a complex quantifier. In addition to the existential quantification over the pair  $\langle e, x \rangle$ ,  $e$  is part of a contextually specified event  $e^*$ . The contextual event  $e^*$  provides a placeholder for an event that is presupposed to exist, and the details of which are filled in when the verb predicate is selected. The connection between the quantifier and the verbal event is therefore indirect. A specified non-overlap relation ensures that the events in the pair do not overlap in time, as is standard in the pluractionality literature (cf. Lasersohn 1995):

- (11)  $\text{INFREQ}\langle e, x \rangle =$   
 $\lambda Q \lambda S. \exists \langle e, x \rangle [\text{part-of}(e, e^*) \wedge Q(x)]: (S(e, x) \wedge \forall \langle e', x' \rangle, \langle e'', x'' \rangle [S(e', x') \wedge S(e'', e'') \wedge Q(x') \wedge Q(x'')]: ((e' = e'') \vee (e' \neq e'' \ \& \ \neg(\tau(e') \circ \tau(e''))))$   
 $\tau = \text{time of occurrence}; \circ = \text{overlap relation}$

By using an ordered pair, Zimmermann (2003) manages to not only solve the asymmetry problem but also account for the distributive reading.

### 3.1.1 Problem 1: manifestation

The first problem is that Zimmermann (2003) cannot explain why we specifically end up with a stage reading when *occasional-type* FAs are used, like we saw in (5). Zimmermann (2003) correctly categorizes his Infrequency Operator as a pluractionality marker, but the operator is placed in the same category as other quantifiers that force distributivity, such as *each* and *every*. This leaves out the difference that *each* and *every* have to individuate the members of the set of participants, while *occasional-type* FAs repeat stages without individuation. Both kinds of quantifiers result in a distributive reading, but there is a clear difference between the sort of set making up the individuals scoped over by *each* and the vaguer pool from which the separate instantiations of an individual are picked out when *occasional* is used.

- (12) Each sailor strolled by.  
 $\sim$  'There is a number of sailors and there is a number of strolling-by events, and these line up one-to-one.'
- (13) The occasional sailor strolled by.

<sup>2</sup> See Doetjes & Honcoop (1997) for a careful argumentation for symmetrical quantification as motivation for event-individual pairs.

~ ‘There is a number of instantiations of *some* sailor, and there is a number of strolling-by events, and these line up one-to-one, and they do so rarely.’

As established in section 2, when *occasional*-type FAs are used, it is not the case that there is a set of individual sailors. Instead, there is a (vague) total set of events and a (vague) total set of individuals, and each event manifests one of these individuals. The intuition that *occasional*-type FAs quantify over instantiations needs to be part of the analysis, without losing the benefit of the ordered pair.

### 3.1.2 Problem 2: nonverbal plurality

A second problem with Zimmermann’s (2003) analysis is that it cannot account for situations where a nonverbal event is plural, like we saw in (6). If *occasional* is part of a complex quantifier [*the+occasional*], we would expect it to only be able to select the verbal event as its second set, but this is not the case.

Sentences where a nonverbal event is pluralized show the same interpretational restrictions as when a verbal one is. Only a distributive reading is possible in (14). Crucially, you cannot get a reading where there is a low number of (assumed by context) coffee-drinking-situations:

- (14) The occasional cup of coffee won’t harm anyone.  
 → one cup of coffee per drinking event, the pairs of which are spread out  
 ↯ a low number of cups of coffee involved in one drinking event

Part of the problem with a determiner analysis is also syntactic in nature. To our knowledge, there is no syntactic precedent to the movement of an adjective head to a determiner head. Defining it as head movement also does not explain how these adjectives can be intensified, e.g. by *very* below:

- (15) The very occasional sailor strolled by.

For *very* to be able to do this, we would have to conclude that *very occasional* makes up a phrase and that this entire phrase has been moved into D. Furthermore, Zimmermann (2003) takes adjective ordering as a sign that *occasional* is high and therefore part of the determiner, but if this had been a sign of movement, we would expect *occasional* to only be high when we have verbal plurality, but this is not the case. In (16), the intended meaning is not one where the verb is pluralized (i.e., the *being entitled*), but one where it is the nonverbal event of *having a bad day* that is evoked rarely:

- (16) a. I think I’m entitled to the occasional bad day. (*The Office*; season 8,

episode 13)

- b. #I think I'm entitled to the bad occasional day.

If the argument is that *occasional* must have started low and moved up to D, the order of *bad occasional* in the nonverbal plurality reading would have been a good argument for incorporation, but as it stands, there is no syntactic argument that *the* and *occasional* make up one head as a result of incorporation.

For now we will leave nonverbal events alone and focus on verbal plurality for the sake of simplicity, but we return to the nonverbal reading in 5.2.

### 3.1.3 Problem 3: temporality

The third problem is that temporality is assumed to be a necessary part of pluractionality (cf. Lasersohn 1995). A major motivation for this has been to ensure a temporal non-overlap between the events for situations like *sailors strolling by*. But there is reason to doubt that temporality needs to be specified in the meaning of the adjective: sentences like the one below are felicitous in cases where the events temporally overlap but are spatially spread out:

- (17) I was looking at my row of tomato plants. The occasional seed had sprouted, but the rest of them left me disappointed.

In these cases the criterion of event identity is not temporal, and the data argues for a more domain-general definition of the spacing out of events (somewhat in line with Gehrke & McNally 2015; contra Stump's (1981) temporal baseline).

### 3.1.4 Problem 4: context

One final problem is the contextual event variable in the restrictor. While justified truth-conditionally, such an event is ad hoc if we cannot give a general motivation for why we find it with precisely *occasional*-type FAs but not other FAs such as *frequent*. As we have seen, under the same contextual constraints, only sentences with *occasional*-type FAs give you the desired pluractional reading:

- (18) a. The occasional/odd/rare sailor strolled by.
- b. #The daily/weekly/monthly/yearly sailor strolled by.
- c. #The frequent/infrequent/regular/sporadic sailor strolled by.

Context cannot be the main factor that licences this reading. An analysis that treats the pluractional reading as illusory and a result of pragmatic implicature cannot explain the distribution we find (contra Bücking 2012 and Gehrke & McNally 2015). A better angle is to treat *occasional*-type FAs as having semantic properties that are



fundamentally different from the other FA types.

### 3.1.5 Summary

The quantificational analysis covers a lot of ground in being able to explain the distributive reading and the symmetry between the two sets. However, it ultimately falls short by 1) not explaining the stage reading; 2) not explaining the possibility of nonverbal event plurality; 3) requiring temporal non-overlap; 4) giving too much power to context.

## 3.2 The adnominal analysis

Those arguing for an adnominal analysis make the important observation that *occasional*-type FAs distribute the manifestation of an individual kind (Gehrke & McNally 2015; Stump 1981; Schäfer 2007). These all make use of a realization relation  $R$ , an operator that takes an individual kind as its first argument and returns an instantiation of that kind (Carlson 1977). We agree that manifestation needs to be part of the denotation, but we argue that an event must also be part of the manifestation approach, ultimately proposing a quantificational analysis that does not require A-to-D movement. We will review Gehrke & McNally's (2015) analysis specifically, for the main reason that they separate *occasional*-type FAs from other FAs for not strictly requiring temporality. Still, our counterargument applies to the approaches of Stump (1981) and Schäfer (2007) as well.

Gehrke & McNally (2015) propose an analysis that draws on the intuition that *occasional*-type FAs distribute the instantiations of an individual. But in their analysis, *occasional* compositionally behaves like an adjective that has the special property of doing this manifestation. They argue that *occasional* contains a distribution function containing the  $R$  relation at an index  $i$ , and this distribution is low:

$$(19) \quad \begin{aligned} [[ \text{occasional sailor} ]] &= \lambda x_k [\mathbf{sailor}(x_k) \wedge \mathbf{occasional}(x_k)] \\ &\rightarrow \lambda x_k [\mathbf{sailor}(x_k) \wedge \mathbf{distribution}(\{x : \mathbf{R}(x, x_k) \text{ at } i\}) = \text{low}] \end{aligned}$$

While Gehrke & McNally (2015) capture the manifestation of the individual, their analysis leaves the connection to the event implicit, resulting in incorrect predictions for the data. We will show that there must be a **compositional** tie to the event and not just a contextual one, meaning that an event argument is selected as well as an individual argument. This goes against an adnominal analysis, in which *occasional*-type FAs only take an individual argument. An adnominal analysis also cannot explain why we specifically end up with a distributive reading, or the closeness of the two sets. In the following, we show two empirical arguments for a compositional pluralization of the event, namely event availability and proportional ambiguity.

### 3.2.1 Problem 1: event locality

According to Gehrke & McNally's (2015) analysis, *occasional*-type FAs do not take an event argument, but they acknowledge that it still seems that context forces the plurality of some event. If this event plurality is only established through context, *occasional* should be able to imply the plurality of any event available in the discourse. This is not the case: for example, if *occasional* is located inside an embedded clause, the adjective cannot be associated with a plural event outside that clause.<sup>3</sup>

- (20) I hope an occasional sailor strolls by.  
    ↯ 'I occasionally hope a sailor strolls by.'  
    ~ 'I hope a sailor occasionally strolls by.'

Similarly we see that, when used attributively in an DP containing a relative clause, *occasional* cannot be associated with a verbal event inside the relative clause:

- (21) The occasional journalist who ate cinnamon rolls went to the café.  
    ↯ 'The journalist who occasionally ate cinnamon rolls went to the café.'  
    ~ 'Occasionally it was the case that a journalist who ate cinnamon rolls went to the café.'

An adnominal analysis wrongly predicts that either of these readings should be available. We see this as a sign that the verbal event must be pluralized compositionally.

### 3.2.2 Problem 2: proportional ambiguity

A second justification for a direct link between the adjective and the event is that these sentences are proportionally ambiguous. Quantity words like *many* have been shown to be ambiguous between a cardinal reading, a proportional reading and a reverse proportional reading, depending on which set the speaker wishes to alter the size of (see e.g. Partee 1989; Rett 2018).<sup>4</sup> This can be taken as a diagnostic for a direct connection between the quantifier or quantity word and the set represented by the verb predicate. We see that when we associate *occasional*-type FAs with a plural verbal event, we can add stress to adjust the size of one of the sets such that it is the proportion of that set whose intersecting members that is small. Without

<sup>3</sup> We thank Ethan Poole for bringing this up.

<sup>4</sup> One might argue that this connection to quantity words is a sign that the plurality of the verbal event is a result of measurement being carried over to the verbal event through homomorphism (among others Krifka 1992; Nakanishi 2007). As far as we can tell, either approach would make the same prediction. Our main concern is whether the verb is necessary to the semantics and not just contextually derived. We welcome arguments that the data can only be explained by a measurement-based approach.

any contrastive stress, the adjective simply counts the intersection between the two sets (22). If we put stress on *sailor*, we end up with a proportional reading: there may be many people participating in strolling-by events, but only a few of them are sailor individuals (23). Conversely, if we put stress on *strolled by*, we get the reverse proportional reading, where there may be many sailor individuals, but only a few of them are participants in strolling-by events (24).

(22) The occasional sailor strolled by.  
 $= | \text{sailor} \cap \text{strolled by} | < k$

(23) The occasional **sailor** strolled by.  
 $= \left| \frac{\text{sailor} \cap \text{strolled by}}{|\text{sailor}|} \right| < k$

*k is a fraction or %*

(24) The occasional sailor **strolled by**.  
 $= \left| \frac{\text{sailor} \cap \text{strolled by}}{|\text{strolled by}|} \right| < k$

In order for the proportional ambiguity to be available, *occasional*-type FAs need to have compositional access to both sets in order to adjust their size. An adnominal analysis will not be able to predict anything but a low number of sailor instantiations.

### 3.2.3 Summary

The adnominal analysis, as it is presented by Gehrke & McNally (2015), highlights a core part of the interpretation of these sentences, namely the fact that *occasional*-type FAs must manifest an individual. However, if we do not treat these adjectives as quantificational we cannot account for the locality restriction or the proportional ambiguity. The R relation pluralizes the individual but does not specify a distributive relationship between the individual and the event, meaning that a Carlsonian (1977) analysis cannot predict a distributive, symmetrical relationship between the set of individuals and the set of events.

### 3.3 Taking stock

We have identified the empirical foundation of these adjectives, namely 1) the distributive reading; 2) the symmetry between the individual and event sets; 3) the manifestation of the individual; 4) their quantificational nature. We have argued that while the quantificational analysis and the adnominal analysis cover some crucial empirical facts, neither captures all of the ones listed here. We argue that if we reanalyze stages as ordered pairs of events and individuals (following Barker 1999), all of these intuitions can be attributed to the single mechanism of forming a stage.

#### 4 Reanalyzing stages

We have established that a correct analysis of these adjectives must account for the closeness between the adjective and the verb event, and the repetition of instantiations of the individual. These are not new observations, but the two details have yet to be combined in a natural, satisfying way. We will show how a particular interpretation of stages can help us do exactly that.

We advocate an analysis of stages that does not simply give us a "timeslice of an individual", but instead an instantiation of the combination of an individual and an event. This more closely aligns with Carlson's (1977) original idea of stages as not "simply things that *are*" but rather "much more closely related to events than to objects" (p. 448). From real-world knowledge we can say that one cannot observe an individual without that individual being involved in an event (or several events). We believe all our problems of symmetry, distributivity and the stage-level reading can be achieved if we adopt an analysis that defines stages as ordered pairs of events and individuals (Barker 1999).

Barker (1999) is concerned with another case of pluralized manifestations, namely the ambiguity of the sentence below (made famous by Krifka 1990):

(25) Four thousand ships passed through the lock last year.

The sentence can be true either if *four thousand* counts the number of individual ships involved in the passing-through events, or if *four thousand* counts the instances of *ships passing through*, regardless of the number of individual ships involved in the four thousand total passing-through events. Barker (1999) and Doetjes & Honcoop (1997) both argue that *four thousand* quantifies over an ordered pair, but Barker (1999) uses this ordered pair to provide an alternative to Carlson's (1977) stages (but Doetjes & Honcoop 1997 make a brief comment along the same lines). In Barker's (1999) system, numbers can either count individuals or stages. Separate stages can involve the same individual but will always necessarily involve a new event.

(26)  $S_1 = \langle x_1, e_1 \rangle$   
 $S_2 = \langle x_1, e_2 \rangle$

These pairs are stages of the individual, and the events are filled in by the verb but refer to specific events. Events  $e_1$  and  $e_2$  are unique nonoverlapping events of passing through the lock. The event supplies the set of relevant nominal stages.

Once we recognize that stages of individuals must be made up of ordered pairs, we automatically gain the notion that *occasional-type* FAs necessarily express the frequency of instantiations, and that these instantiations do not involve individuation. As we will see in the following, stages as ordered pairs can naturally capture the

integral parts of the data without needing separate justifications.

## 5 Proposal

We now present our analysis of *occasional*-type FAs and comment on other important points and consequences. In 5.1, we lay out the proposal. In 5.2, we show how this analysis can account for nonovert, nonverbal events as well. In 5.3, we comment on other FA types.

### 5.1 Analysis

We here present our analysis of *occasional*-type FAs. As is common in the pluractionality literature (Lasersohn 1995), the capital letters  $E$ ,  $X$  and  $S$  represent the total sets of units of that type, i.e., all units of  $e$ ,  $x$  and  $s$ , respectively.

- (27)  $[[\textit{occasional}]] = \lambda P \lambda Q \exists E, X, S [[\forall s \in S, s \text{ is a stage of some } x \in X \text{ with respect to some } e \in E, \text{ and if } s_1 \text{ is a stage of some } x \in X \text{ with respect to some } e \in E \text{ then } s_1 \in S] \& P(X)] [Q(E) \& |S| \text{ is low by some contextually relevant standard}]$

*Occasional*-type FAs take an individual argument and an event argument, respectively  $P$  and  $Q$ , and existentially quantify over a set of events  $E$ , a set of individuals  $X$  and a set of stages  $S$ . The set of stages contains all and only those pairings of  $x$  and  $e$  that are ‘stages’ of  $x$  with respect to  $e$ . It is the total set of stages  $S$  that is low by some contextually relevant standard. Since stages are individuated by means of event identity, and since the identity conditions for events are both temporal and spatial, we are no longer restricted to temporality for event multiplicity, so location can also play a role. This distinguishes our analysis of pluractionality from that of Zimmermann (2003) and Lasersohn (1995). With the view of stages we have adopted, we can keep the distributive reading and the close connection between the event and the individual, while within the same mechanism manifesting the individual. This leaves us with the desired reading: in the classic *sailor* example, *occasional* expresses a low number of *sailors-strolling-by* stages taking place in a context-determined frame.

The analysis has some implications. The first one is that stages inherently make up ordered pairs of events and individuals. To our knowledge, this definition of a stage has only been argued for by Barker (1999), but it does not go against our general intuition: when an individual is part of a stage, there must also be an event that allows that manifestation to happen (see also Kratzer 1995). Through our analysis we also see that Barker’s (1999) proposal extends to other data than simply that which shows individual-stage ambiguity.

The second large implication is that some adjectives are quantificational, which ties into the larger question of how other cases of nonlocal adjectival modification can be analyzed. Future work should consider how these cases might benefit from the kind of analysis proposed here, such as *first*, *average* (Carlson & Pelletier 2002; Kennedy & Stanley 2008, 2009)<sup>5</sup> and *good* when used with instruments (Sandoval, Greeson & Morzycki 2022).

- (28) a. The **first** man landed on the moon in 1969.  
      ~ ‘The first time a man landed on the moon was in 1969.’  
      b. The **average** American has 2.3 children.  
      ~ ‘On average, Americans have 2.3 children.’  
      c. Clyde plays **good** piano.  
      ~ ‘Clyde plays the piano well.’

Unfortunately we have to leave these comparisons to future work. In the following, we will tie up some loose ends, specifically relating to nonverbal event plurality and other FA types.

## 5.2 Nonverbal event plurality

In subsection 3.1.2 we show that Zimmermann’s (2003) quantificational analysis will not be able to explain why we have the option of pluralizing a nonovert event added to the DP structure. Below, how can *occasional* pluralize some sort of contextually-determined event taking the individual as its object? In this sentence we can easily imagine an drinking event, but under the right context we can in principle imagine any kind of event.

- (29) The occasional glass of wine is good for you.  
      ~ ‘Drinking a glass of wine occasionally is good for you.’

One may ask how our analysis is able to explain this reading. Our suggestion is that in these sentences, a nonovert, contextually-dependent event function  $EVT_C$  is added to the DP structure. A very simple version would be something like (30). We have assumed that events do not take external arguments (Kratzer 1996), but this does not affect the analysis:

- (30)  $[[EVT_C]] = \lambda x . EVT_C(x)$ , where  $EVT_C$  is a contextually supplied predicate.

Sandoval et al. (2022) give a similar solution for scopally odd sentences involving *good* and instrument predicates (28-c), whereby an EVENT operator takes the Num head position and introduces a genericity operator (cf. Chierchia 1998):

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<sup>5</sup> See Morzycki 2016 for an explicit parallel to *occasional*.

$$(31) \quad [[ \text{EVENT} ]] = \lambda P_{\langle e,t \rangle} . \cap [\lambda e . \exists x^0 [e \text{ is an event of playing } x^0 \wedge P(x^0)]]$$

Our  $\text{EVT}_C$  is a simplified version of Sandoval et al.'s (2022)  $\text{EVENT}$ , and we believe they can both account for the nonverbal event reading. However, our analysis requires that there are compositional differences between the verbal event and the nonverbal event readings, and that this operator is not present for verbal event readings. For us the nonovert event operator is only inserted when there is no connection to the verbal event.

Zimmermann's (2003) analysis cannot permit the introduction of  $\text{EVT}_C$  because of the location of the *occasional*-type FA after his proposed A-to-D movement. Since we do not move the adjective,  $\text{EVT}_C$  can be inserted above the adjective. The order of selection by the adjective then remains identical to what we see in the verbal event reading: compare the structure of the verbal event reading in (32) to the nonverbal event reading in (33). *Occasional* behaves in the same way, and the only difference lies in which event set is selected after the individual set.

(32) [[occasional] [sailor]] strolled by]

(33) [[[[ $\text{EVT}_C$ ] [[occasional] [glass of wine]]] [is good for you]]

We then do not need to commit to an analysis in which the DP always contains a contextual event, and we end up with the desired result that the verb predicate simply describes the proposition we have formed with  $\text{EVT}_C$ .

### 5.3 Other FA types

Nearly all analyses have been molded by how one subdivides FAs. Because *occasional*-type FAs are the only type that shows scopal oddities, they have been the focus of this paper, but the other FA types need to be addressed to get the full picture of FAs. We show data to support a split between what we call **periodic** FAs (e.g. *daily*, *weekly*) and **vague** FAs (e.g. (*in*)*frequent*<sup>6</sup>, *sporadic*, (*ir*)*regular*).<sup>7</sup> What we

<sup>6</sup> Some native speakers have informed us that *The infrequent sailor strolled by* is acceptable for them.

We expect some inter-speaker variation with regard to where these lines are drawn, but we do not consider this to affect how these categories differ as a whole. Even if a speaker includes or excludes other FAs in the *occasional*-type, the behavior of adjectives with this label is the same.

<sup>7</sup> Daniel Greeson (p.c.) pointed out to us that an anaphoric expression such as *on those occasions* can refer back to an event modified by *infrequently* but not *seldom/rarely*:

- (i) a. I infrequently drink beer, ✓ and on those occasions it's Dos Equis.
- b. I seldom/rarely drink beer, # and on those occasions it's Dos Equis.

Greeson takes this as one of the reasons to think of *infrequently* as individuating the events of a set, while *seldom* and *rarely* do not. If we assume the same lexical entries for adverbial and adjectival

find is that only periodic FAs can modify individual nouns. Compare judgments for the two types below:

- (34) Dave's daily/weekly/monthly/yearly glass of wine spilled all over the table.  
~ 'One particular glass of wine, in a series of single glasses of wine drunk by Dave once a day/week/month/year, spilled all over the table.'
- (35) #Dave's frequent/infrequent/sporadic glass of wine spilled all over the table.

Treating FAs like *daily* and *frequent* as being of the same category predicts that *frequent glass of wine* should be acceptable, but the fact that this is not the case calls for a more nuanced account.<sup>8</sup> Both FA types can modify eventive nouns:

- (36) a. Maria was looking forward to her weekly/monthly/yearly dinner party.  
b. Maria was looking forward to her frequent/infrequent/regular/sporadic dinner party.

Both FA types are equally able to modify agentive nouns like *dancer*, *eater* and *guitar player* (see Larson 1998; Maienborn 2020, also Morzycki 2016):

- (37) Olga is a weekly dancer.  
~ 'Olga dances weekly.'
- (38) Olga is a(n) frequent/infrequent/regular/sporadic dancer.  
~ 'Olga dances frequently/infrequently/regularly/sporadically.'

We do not commit to any specific analysis of these nouns, but we take the possibility to modify nouns like *trip* or *dancer* to mean that vague FAs need an event.

Periodic FAs are clearly more flexible. In the following, we argue that this is a sign that, unlike vague FAs, periodic FAs do not need to express the frequency of an event. While the flexibility of periodic FAs makes it tempting to group it with *occasional-type* FAs, it is still the case that *daily* cannot create a verbal plurality. The elegant way to treat periodic FAs is to see them as a lexically vague one-place predicate, and not as modifiers of the distribution of events. Instead, *daily* as an underspecified meaning of "something relating to a day". We see this in the use of *daily lives* in (39), taken from the British National Corpus (BNC)<sup>9</sup>:

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roots, this data aligns with our analysis of *occasional-type* FAs.

<sup>8</sup> To add to the English data, we see that Norwegian shows the same judgments. These judgments are based on an exploratory acceptability judgment task run online (N=61), as well as the feedback of informal informants. This particular result was especially clear. Many thanks to Myrte Vos for assistance in setting up the experiment. More information about the study is available upon request.

<sup>9</sup> British National Corpus, Version 3 (BNC XML Edition). 2007. Distributed by Oxford University Computing Services on behalf of the BNC Consortium. <http://www.natcorp.ox.ac.uk/> (last accessed on December 13, 2021).



- (39) If we could all step back and watch ourselves in our **daily** lives, we might all learn a great deal . . . (W\_ac\_soc\_science)

The reading is not that there is a new instantiation of a life for each day, but rather that we all have a life and that our lives *during the day* (or rather in mundane everyday periods of our lives). Another example that clearly shows the "day-related" meaning of *daily* is its contrast to *nightly*, demonstrated in another BNC example below:

- (40) we must pay the penalty for our chivalry in the shape of **daily** outrage and **nightly** fears (W\_non\_ac\_soc\_science)

It is unlikely that *daily outrage*, especially when conjoined with *nightly fears*, means that there were instantiations of outrages and fears happening with a specified interval. The interpretation is rather that during the day, there was outrage, and during the night, there were fears. It is not specified whether the *outrage* or *fears* have to occur with the passing of approximately one *day* or *night* in between them (a reading that is crucial to Schäfer 2007). *Nightly* is clearly reluctant to a frequentative reading, since it is uncommon for English speakers to refer to the passing of nights without the event occurring during the night. It is likely easier to give *daily* a frequentative reading because *day* can also refer to a 24-hour period in English.

To avoid saying that there are two lexical entries for *daily*, one frequentative and one non-frequentative, we suggest the simplest solution, namely to treat *daily* as a "regular" intersective adjective combining with the set of the sister noun through predicate modification. Periodic FAs are not really **frequency** adjectives at all, according to this analysis. *Daily* provides the root *day* in an adjectival form, and the "frequentative" reading comes from inference from being combined with a noun that can be somehow repeated. Stump (1981) uses the seeming acceptability of sentences like *We had a weekly meeting* to mean that *weekly* can also give the plural verb reading, but according to the facts presented here, this acceptability is due to the vagueness of the adjective and the genericity of the sentence (cf. Krifka, Pelletier, Carlson, ter Meulen, Chierchia & Link 1995). We conclude that periodic FAs are simply "regular" adjectives of type  $\langle e, t \rangle$ . Here is the denotation:

- (41)  $[[ \text{daily} ]] = \lambda x_{\langle e \rangle} . \text{relating-to-a-day}(x)$

What about vague FAs like *frequent*? We observe that these are genuinely temporal in meaning and specifically say something about intervals. The events associated with vague FAs must be **temporally** spread out and never along a spatial dimension:

- (42) \*There was an infrequent birthday party in the park today.  
 $\not\sim$  'In the park, there was a scattering of separate birthday party events happening at the same time (observed by the speaker).'

The unacceptability of the sentence above shows how vague FAs are different from *occasional-type* FAs in two main ways: 1) they existentially quantify over events, not an event-individual pair; 2) they have explicit temporal semantics. We think that a denotation along the lines of Zimmermann (2003) will work for these cases,<sup>10</sup> although we leave the details to future work.

Many earlier approaches to understanding FAs try to unify all FAs under the same category, but we believe that by splitting them up in this manner we can better account for the data. Treating these FAs as different from *occasional-type* FAs will also help us explain why many languages have periodic and vague FAs, but not the *occasional* type. Norwegian is an example of this:

- (43) a. Den daglege kanelbolla mi smakte herleg.  
the daily cinnamon.roll.DEF my tasted delicious  
'My daily cinnamon roll tasted delicious.'
- b. Hyppige samtalar er nøkkelen til eit sunt vennskap.  
frequent conversations are key.DEF to a healthy friendship  
'Frequent conversations are the key to a healthy friendship.'
- c. \*Ein sjeldan bil passerte huset.  
a rare car passed house.DEF  
'The occasional/odd/rare car passed the house.'

## 6 Conclusion

We have shown that when *occasional-type* FAs are used, we can only end up with a distributive, stage-level reading. We also present data to support the view that these adjectives must be compositionally tied to the pluralized event, leading us to a quantificational analysis. We have argued that *occasional-type* FAs quantify over stages, which make up ordered pairs of events and individuals. By adopting this view of stages, we can unify three crucial parts of the meaning of these sentences: 1) that the event and the individual are in a symmetrical relationship; 2) that instantiations are repeated scarcely; and 3) that it is the combination of the event and individual that is instantiated so scarcely. In our analysis, *occasional-type* FAs spread out the members of the set of stages, and this spreading out is unrelated to temporality. Instead, the dimension along which events are spread out is unspecified.

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<sup>10</sup> We thank Daniel Greeson for input about this.

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