

KIND-LEVEL PREDICATES OF EVENTS INSIDE ANOTHER PREDICATION*

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Abstract. Kind level predicates of events such as *three times*, *the third time*, and *occasionally* can occur as a predicate of an independent predication, or appear as an adverbial, with an event kind-denoting expression as their argument. The reduced forms of such predicates can surface inside a nominal of another predication, e.g., *Four thousand ships passed through the lock last year*; *Susi bought a second guitar*, and *An occasional sailor strolled by*. This paper argues that these predicates are displaced from their base-positions so that an event kind-denoting expression in the verbal category can be merged as the subject in the event-kind predication. The proposed overt movement displaces the categorial features of an expression, leaving its semantic features in situ, an operation symmetrical to a covert movement, which displaces the semantic features without categorial features.

1. The research issue

The main empirical goal of this paper is to propose a possible syntactic generation of the constructions exemplified by (1), under the event readings of the underlined parts.

- (1) a. Four thousand ships passed through the lock last year.
Intended: ‘Ships passed through the lock 4000 times last year.’ (Krifka 1990)
- b. Susi bought a second guitar.
Intended: ‘For the second time, Susi bought a guitar.’ (cf. Tsai 2009)
- c. An occasional sailor strolled by.¹
Intended: ‘Occasionally, a sailor strolled by.’ (Bolinger 1967: 5)

We will claim that the underlined parts in (1), i.e., the numeral, ordinal, and frequency adjective, are kind-level predicates of events, and they are displaced from a position external to the nominal. Theoretically, we explore a new type of movement, which moves categorial features of an expression, leaving their semantic features in situ. Our research is based on the following new observations:

- (2) a. Like the predication of object kinds, the predication of event kinds is also identifiable.

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¹ The nominal *an occasional sailor* may also mean a person who sails occasionally. In this reading, *occasional* modifies the root *sail*. We do not discuss this reading in this paper.

- b. A kind-level predicate of events may appear as an adverbial of another predication.
- c. It may also surface in a nominal of another predication.

In §2, for (2a), we introduce event kind predication, the general constraints on the subjects of such predication, and three basic types of event kind-level predicates, which correlate with the underlined parts of the three examples in (1). In §3, for (2b), we show how such predicates appear as adverbials of another predication. In §4, for (2c), we discuss the constructions in (1), showing that the underlined parts are not included in the semantics of the hosting DPs, and they are event-kind predicates. Then in §5, we first propose that the subjects of DEKEs are vPs, and then show that an event kind-level predicate in a non-adverbial form cannot remain in situ because of its categorial features, and discuss the possibility of the movement of categorial features into a nominal. In §6, we show how this syntactic approach is related to the various semantic analyses of the constructions in (1). §7 concludes.

2. Event kind predication

2.1. Event kind expressions

We distinguish event kind expressions from event expressions in this section. There are two major developments in general linguistics in the last half century or so. One is Davison's (1967) identification of event as a linguistic reality. Larson (1998: 145) considers this development in linguistics almost as important as the discovery of nucleus in physics: the former is hidden in language structures and the latter is hidden in the heart of atom. The other development is Carson's (1977) identification of kind as a linguistic reality. Carlson distinguishes object kinds from objects. The combination of these two developments has led to a new research area: event kinds. Various event kind expressions have been recognized and studied from semantic perspectives in the literature (e.g., Carlson 2003; Gehrke & McNally 2015; Gehrke 2017a, b). See Gehrke (2019) for a general review. But the syntax of event kind is still an understudied topic. In this paper, we explore the issue how event kind predication is structured in syntax.

To start the exploration, let us first review the distinctions between event and event kind expressions. Consider (3a) and (3b).

- (3) a. The disaster happened last year.
- b. The disaster happened three times (last year).

In (3a), the DP *the disaster* is the unique argument of the intransitive verb *happen*, and *last year* is a circumstantial modifier, elaborating additional information about the specific event denoted by the predication. But in (3b), *three times* is not about any specific event. Instead, it provides a core meaning about the token realization of the event kind denoted by the DP *the disaster*: this kind of event has three tokens (last year). The subject of such a construction must not denote any non-iterative event (cf. **His death happened three times*). Moreover, an event kind has no temporal-spatial information, but its realization, i.e., each of its token, does have such information. When one counts events, they count tokens, or realizations of, a certain event kind in a certain context, e.g., last year in (3b). Thus, the numeral expression in examples like (3b) is about the properties of the realization of an event kind (including state and non-stative event kind) in a certain context. A numeral in such a use occurs with the unit word *time*, which is for counting elements (in contrast to the abstract use in mathematics; Wągiel & Caha 2021). Thus, *three times* in (3b) is an event kind predicate.

There is also morphosyntactic evidence for the distinction between event kinds and event

tokens. In Mandarin Chinese (Chinese, henceforth), for a nominal that denotes a specific event, an event classifier (CL) such as *chang* is used, as seen in (4a), whereas for a nominal that denotes a kind, the CL *zhong* ‘kind’ or *lei* ‘kind’ is used, as seen in (4b).¹

- (4) a. Zhe { *zhong/chang } zainan fasheng zai zuotian.
 this CL/CL disaster happen at yesterday
 ‘This disaster happened yesterday.’
- b. Zhe { zhong/*chang } zainan qu-nian fasheng-le san ci.
 this CL/CL disaster last-year happen-PRF three CL
 ‘This disaster happened three times last year.’

The contrast between event and event kind is seen not only in the form of certain elements in arguments, but also in the form of a numeral frequency adverbial in Chinese. Such an adverbial has either an event-internal or event-external use (Cusic 1981; Zhang 2017). The former elaborates certain information about a specific event, signalling that the event is telic (Chen 2020), whereas the latter is about the token number of an event kind in a certain context. The two uses of a numeral frequency expression can be distinguished by different types of event CLs in Chinese (Zhang 2017). The event-internal one can have a body part CL or instrument event CL, whereas the event-external one cannot. In (5a), the instrument event CL *dao* ‘CL^{knife}’ is used, and the example must mean that the three consecutive actions of cutting occur in the same event. In (5b), however, the general event CL *ci* is used, and the example either is synonymous to (5a), or means three separate events of Yani’s cutting of that tree. In the latter meaning, the event kind Yani’s cutting of that tree has three tokens in the context.

- (5) a. Na ke shu, Yani kan-le san dao.
 that CL tree Yani cut-PRF three CL^{knife}
 ‘That tree, Yani cut three times.’
- b. Na ke shu, Yani kan-le san ci.
 that CL tree Yani cut-PRF three CL
 ‘That tree, Yani cut three times.’

Thus, event-kind expressions and event expressions can be morphosyntactically different.

After introducing event kind expressions, in the next subsection, we elaborate the subject and predicate of an event kind predication.

2.2. Predication of event kinds: subjects and predicates

In English, for object-kind predication, well-recognized kind-level predicates include *extinct*, *wide-spread*, and *rare*; and well-recognized subject forms are DPs that have the kind CL *kind* (e.g., *this kind of bees*), and various forms of nominals, if the predicates are exclusively kind-level predicates. Moreover, the direct object of *invent* or *exterminate* is also a kind-denoting argument (Krifka et al. 1995: 10).

In English, for event-kind predication, its kind-level predicates include N *times*, as seen in (3b) or (6), the adverbs *rarely*, *occasionally*, *often*, *again*, *periodically*, *frequently* (see Gehrke & McNally 2015), and the ordinal expression *the N-th time*, as seen in (6).

¹ Abbreviations in the glosses: CL = classifier, DE = modification, ORD = ordinal, PRF = perfective aspect.

- (6) a. The disaster happened {occasionally/three times/the third time}.
 b. The event that Susi stole a book happened {occasionally/three times/the third time}.

While the numeral expression [N *times*] is used to count event tokens (2.1), the ordinal expression [*the N-th time*] is used to arrange event tokens temporally, and frequency expressions such as *occasionally* and *frequently* are used to encode the low or high distribution of the tokens of a certain event kind. Such event kind-level predicates are fundamentally different from event token-level predicates, e.g., circumstantial adverbials, such as *last year* in (3a). The former is about an event kind, whereas the latter is about a specific event. The three types of expressions in the brackets in (6) are intrinsic event-kind predicates.

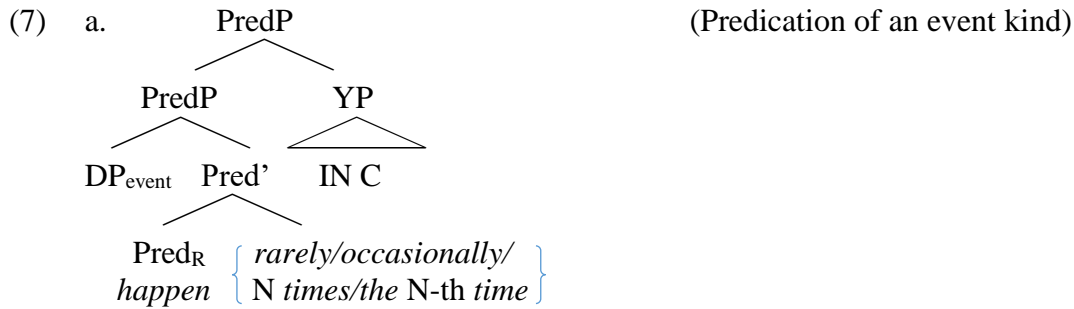
Other types of expressions may also be used as kind predicates, if the subject exclusively denotes an event kind. The forms of such subjects may contain the kind CL *kind* or *type* as well as an event noun, e.g., *this kind of trip*, *this kind of state*. Other forms may also be the subject of an event kind predication, if the predicate is an event kind-level one.

The subject of an event kind predication must not denote any non-iterative event (2.1). It cannot be a negative form, either, since the negation of anything cannot be instantiated as tokens. For example, one cannot use the sentence *No disaster happened three times* to mean that the event kind ‘no disaster’ has three tokens, although a whole event kind predication can be under negation (e.g., *It is not true that the disaster happened three times last year*).

2.3. The general structure of an event kind predication

In this section, we present a general syntactic structure for the predication of event kind. In a predication, the predicate expresses a certain property that holds for the subject. In Carlson (1977), the semantic relation between the object kind **dog** and its token x_o can be represented as **R** (x_o , **dog**), which means x_o realizes a token of the kind **dog** (also see Gehrke 2019: 206). Accordingly, we assume that there is a R (realization or instantiation) relation between an event kind and its tokens, and the relation is mapped to the relation between a subject and predicate. The token property holds for the relevant event kind.

A predication relation is established between a predicate and its subject. It is a syntactic, as well as semantic, relation (e.g., Rothstein 1983, den Dikken 2006). Following works such as Bowers (1993) and den Dikken (2006), I assume that such a relation is represented by the relation between the Spec and complement of a functional head. Thus, a subject must locally c-command its predicate in their base-positions. A predication can be represented by the generalized PredP, which can be a vP (see den Dikken 2006), for example. This PredP is headed by Pred. For the predication of an event kind, we assume that the PredP is headed by Pred_R (the subscription R is for realization or instantiation; cf. McNally’s 2011 head Instantiation), which can be realized by a verb such as *happen* in (6). Expressions such as *three times*, *the third time*, *rarely*, and *occasionally* are always selected by Pred_R, to be part of an event kind predication. The structure in (7a) represents the general structure of the predication of event kinds. C here means the relevant context or context restriction. A token realization must have a context restriction, even when there is no overt temporal-spatial element in the clause. This C is related to the temporal-spatial expressions such as *last year* in (3b), which is an adjunct of a projection in the clausal spine.



b. [IP ... [PredP [DP the disaster] [Pred' happened [three times]]] last year]

(7b) is the structure of (3b). It is an event kind predication. The predicate *happened three times* realizes or instantiates the event kind expressed by the subject *the disaster*. The expression *three times* is the complement of Pred_R .

In this section, we have delivered three major pieces of information. First, like the predication of object kinds, the predication of event kinds is also identifiable. Second, for events, kind-level predicates include three types of expressions: the numeral expression *N times*, the ordinal expression *the N-th time*, and frequency adverbials such as *rarely* or *occasionally*. They are always selected by Pred_R , being part of the event kind predication. Third, the subjects of such predicates must neither denote non-iterative events nor be negative.

3. Event-kind predicates appearing as adverbials

We have seen independent predication of event kinds such as (6). In this section and the next section, we discuss two types of non-independent predication of event kinds, respectively: the adverbial type and the DP-internal type.

We have identified expressions such as *occasionally*, *N times*, and *the N-th time* as intrinsic event-kind predicates (2.2). They not only occur as the complement of the verb *happen* or *occur*, as in (6)/(7), but also appear as an adverbial, as in (8).

(8) Susi stole a book {occasionally/three times/the third time}.

In an example like (8), there is no verb such as *happened* to head the event-kind predicate (i.e., the underlined parts in (8)), and thus the Pred_R of the event kind predication is null. Also, in such a construction, there is no argument-sharing between the predication headed by the verb and the event kind predication, unlike some types of secondary predicate constructions such as depictive constructions (e.g., *Bill ate a fish raw*). The integration of the event-kind predication in (8) is more like that of the manner predication in (9). The subject of *slowly* is not shared with that of the predication headed by *danced*, i.e., it has nothing to do with *Bill*. Instead, the subject is an event argument related to the predication *Bill danced*.

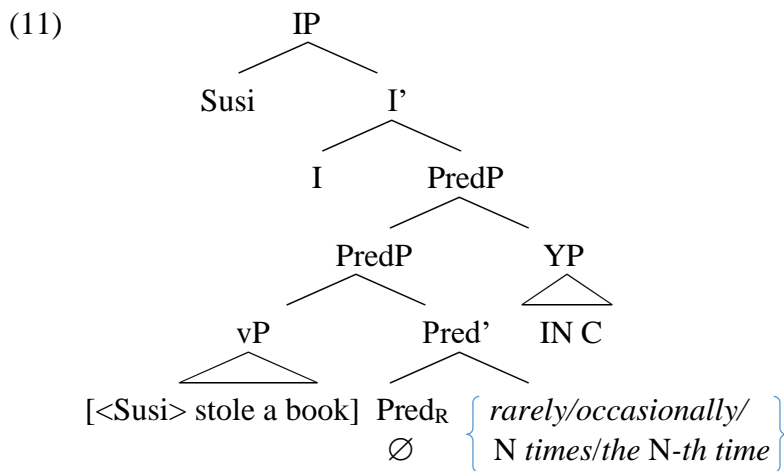
(9) Bill danced slowly.

One way to analyse the structure of (9) is (10), where the event argument is encoded by the vP *Bill danced* directly, Pred takes *slowly* as its complement, and takes the vP as its Spec ; and then, the PredP is merged with I ; the subject in the vP moves to SpecIP . The movement of *Bill* is launched from the left branch of PredP , assuming that a left branch is not an island for extraction in general (see Bošković 2005, among others; I am grateful to an anonymous reviewer here). Moreover, this analysis is compatible with Larson's (1988) theory that an

adverbial modifier can be a complement in the verbal spine of the clause structure.

(10) [IP Bill_i [I' ∅ [PredP [_{vP} t_i danced] [Pred' ∅ [AdvP slowly]]]]]

Following Carlson (2003: 198), we assume that the theta-domain vP can denote an event kind. Then, (8) can mean that the event kind denoted by the vP *Susi stole a book* is instantiated in the way expressed by the underlined part in the relevant context. Thus, the vP and the underlined part may have a subject-predicate relation. The structure of (8) can be similar to (10). Moreover, recall that for an event kind predication, expressions like *three times*, *the third time*, *rarely*, *occasionally* must be selected by Pred_R. We therefore propose that the structure of (8) is (11), where the event kind argument is encoded by the vP *Susi stole a book* directly, Pred_R takes *three times*, etc., as its complement, and takes the vP as its Spec; and then, the PredP is merged with I; the subject in the vP moves to SpecIP later. This structure is similar to the one in (7b) except that Pred_R is null, and its Spec is a vP.



In this structure, the semantic type of the event-kind denoting vP is *e*, even though the vP is a clause. There is no truth value for the kind-denoting clause. Also, there are two predication relations encoded in a construction like (12a): one is encoded by a vP, as shown in (12b), and the other is encoded by a PredP. The former is the subject in the latter, as shown in (12c).

- (12) a. Susi stole a book {occasionally/three times/the third time}. (= (8))
 b. [_{vP} Susi stole a book]_i
 c. [PredP vP_i [Pred' ∅ [{occasionally/three times/the third time}]]]

In our analysis, the underlined parts in (12a)/(8) are not adjuncts. Instead, they are event kind predicates and are selected by the head Pred_R, and have their own event kind subject, which is the vP. Like the subject of the matrix event kind predication discussed in 2.2, the vP must not denote any non-iterative event and cannot be negative. In (12a)/(8), the event that Susi stole a book is iterative, and is not negative. In contrast, neither the non-iterative event in (13a) nor the negative event in (13b) is acceptable.

- (13) a. *Susi died { occasionally / three times / the third time }.
 b. *[Susi did not steal a book] { occasionally / three times / the third time }.
 Intended: *The event kind that Susi did not steal a book happened { occasionally / three times / the third time }.

In this section, we have shown that first, the three types of event kind-level predicates

identified in the simple predication in §2 can all occur with another predication: the numeral expression *N times*, the ordinal expression *the N-th time*, and a frequency adverb such as *occasionally*. Second, the subjects of such predicates also have two constraints: they must not denote non-iterative events and must not be negative. Thus, a predicate of an event kind can appear as an adverbial of another predication. In the next section, we introduce another way of integrating an event kind predication into the structure of another predication.

4. Event-kind predicates surfacing inside a DP of another predication

4.1. DP-internal Event-Kind Element (DEKE)

We have introduced three types of intrinsic event kind predicates: the numeral expression *N times*, the ordinal expression *the N-th time*, and a frequency adverb such as *rarely* or *occasionally*, in both simple predication constructions (§2) and non-simple predication constructions (§3). We now introduce the fact that their reduced forms, i.e., a bare numeral, a bare ordinal, and adjectives such as *rare* and *occasional*, may occur inside a DP of another predication, although adverbs like *again* and *often*, which have no reduced or adjective forms, never appear in a nominal.

In order to simplify the research issue, we consider only DPs in which the noun is a sortal noun. We thus exclude DPs that have an event noun such as *trip* and a stage noun such as *guest* and *customer* (see Krifka 1990: 489, 516; Gehrke & McNally 2015: 841; Larson 1998).

The reduced forms of the three types intrinsic event kind predicates in DPs are introduced in 4.1.1 through 4.1.3, and their general association with event kind is addressed in 4.1.4.

4.1.1. Numeral DEKE

Consider the numerals in the examples in (14) (they are from or adapted from Krifka 1990).

- (14) a. Four thousand ships passed through the lock last year.
 Intended: ‘Ships passed through the lock four thousand times last year.’
- b. The library lent out 23,000 books last year.
 Intended: ‘Books were lent out 23,000 times from the library last year.’

The intended event counting reading of (14a) allows the meaning that certain ships passed through the lock multiple times. Similarly, the event counting reading of (14b) allows the meaning that certain books were lent out multiple times. In such examples, the numeral denotes how the relevant event kind is instantiated with respect to the token number in the context.

I label the underlined part in each of the examples in (14) as a DP-internal Event-Kind Element (DEKE), which occurs with a non-event noun. Since the DEKEs in such examples are numerals, they can be called numeral DEKEs. The DP that hosts a DEKE is not restricted to any fixed syntactic position, since it can be either a subject, as in (14a), or an object, as in (14b).

4.1.2. Ordinal DEKE

Consider the numerals in the examples in (15).

- (15) a. Susi bought {the/a} second guitar.
 Intended: ‘For the second time, Susi bought a guitar.’

- b. The second guitar is more expensive.
 Intended: ‘The guitar that was obtained in the second time is more expensive’.

In the event-ordering reading of (15a) and (15b), the ordinal expresses how the event kind is instantiated with respect to the temporal order of the tokens in the context. The ordinals in this use can be called ordinal DEKEs. Like the DP that hosts a numeral DEKE, the DP that hosts an ordinal DEKE is also not constrained in its syntactic position: it can be an object, as in (15a), or a subject, as in (15b).

4.1.3. Adjectival DEKE

Consider the frequency adjectives in (16) (from Zimmermann 2003: 249 and Gehrke 2017a: (2)). Such examples were first discussed in Bolinger (1967: 5) and Stump (1981: 227). In such examples, semantically, the predicate *strolled by* or *is six feet tall* has nothing to do with the eventive root *sail* of the noun *sailor*, and thus the noun is used as a non-event noun in the context.

- (16) a. {The/An} occasional sailor strolled by.
 Intended: ‘Occasionally, a sailor strolled by.’
- b. {The/An} occasional sailor is six feet tall.

In (16a), the word *occasional* denotes the low token distribution of the event kind that a sailor strolled by. In (16b), the same word expresses the low token distribution of the event kind of the occurrence of a sailor in the context, rather than the low token distribution of the event kind that a sailor is 6 feet tall (cf. Gehrke 2017a: 10). Thus, the event kind under discussion is related to the overt predicate directly in (16a), but not in (16b). In both cases, the frequency adjective is associated with an explicit or implicit event kind, and thus it is a DEKE consistently. I thus called the frequency adjective in the former case Dir-frequency DEKE and the one in the latter case Indir-frequency DEKE. The underlined parts in (17) below are also Indir-frequency DEKEs ((17a) is from Gehrke 2017b (57a)). As pointed out by Larson (1998: 163), unlike (16a) above, (17b) below cannot be paraphrased as ‘Oddly, a Samoan showed up.’

- (17) a. The rare granny is 6 feet tall. b. The odd Samoan showed up.²

An early extensive discussion of the distinctions of different types of frequency adjectives is Gehrke & McNally (2015). The Dir- and Indir-frequency DEKEs correlate with Sæbø’s (2016) wide and narrow readings of frequency adjectives, respectively. The former has a wide construal because it is associated with the predicate of the containing clause. This type of DEKE is one type of the so-called non-local modifiers of nouns in Schwarz (2006) and Morzycki (2019, to appear). In contrast, the latter has a narrow construal because it is not associated with such a predicate; instead, it looks like “a DP internal matter” (Sæbø 2016: 9). He views the two readings “two different sides of the *odd-rare-occasional* coin” (p. 9). He further states that the complex determiner *ei(-) og anna(-)* ‘one-and-other’ in Norwegian is a counterpart of the English DEKE *occasional* only in the wide construal. Although he does not give contrastive examples to show the unacceptability of this complex determiner in the narrow reading, the

² *Odd* in (17b) is under its frequency reading. It does not mean ‘weird, strange’ or ‘unpaired’. Also, adjectives such as *daily* and *monthly* occur with event nouns only (Gehrke & McNally 2015), beyond our discussion range.

claimed restricted use of the determiner morphologically supports the distinction of the two uses of frequency DEKEs.

Like the DPs that host a numeral or ordinal DEKE, the DPs that host a frequency DEKE are also free in their syntactic positions. They can be subjects, as in (16) and (17) above, direct objects, as in (18a), indirect object, as in (18b), and other positions, as in (18c) and (18d) (see Zimmermann 2003: 260 for more examples).

- (18) a. We saw {an/the/your} occasional car on the road. (Gehrke & McNally 2015: 845)
 b. Bill sent an occasional woman flowers (Zimmermann 2003: 260)
 c. My hair is clean except for the very occasional flea. (our informant)
 d. We passed moored boats manned by fishermen and the rare woman. (Sæbø 2016:1)

4.1.4. *The general association of various types of DEKEs to event kinds*

The types of DEKEs introduced in the above subsections have the general meanings in (19).

- (19) a. The kind of the event occurred N times in the context. (N = numeral DEKE)
 b. The kind of the event occurred the N-th time in the context. (N-th = ordinal DEKE)
 c. The kind of the event denoted by the predicate occurred in the A frequency in the context. (A = Dir-frequency DEKE)
 d. The kind of the state of the existence of an individual is realized in the A frequency in the context. (A = Indir-frequency DEKE)

A non-DEKE expression in a nominal denotes information about kind, quality, or quantity of the head noun (e.g., Rijkhoff 2008), including negative information on a property expressed by the head noun, e.g., *fake*. However, a DEKE, which appears in a nominal, does not provide such information to the non-event head noun. Instead, the various types of DEKEs are about token realizations of event kinds, consistently. Like the event-kind predicates discussed in the previous sections, DEKEs are about the numbers, orders, or distributions of the tokens of the relevant event kind. Moreover, a DEKE is a reduced form of an event kind predicate discussed in §2 and §3, also consistently. These two consistencies call for a unified syntactic analysis of various types of DEKEs and call for a link of their syntactic structures to those presented in §2 and §3. In 4.2, I will give arguments for the claim that a DEKE is related to an event kind, not the hosting DP, which has a non-event noun.

DEKE constructions are productive. But there are cross-linguistic variations in the availability of certain specific types of DEKEs (see Gehrke 2017a: Sec. 4 on frequency DEKEs and her discussion on Zimmermann's 2003 claims on the issue).

For a numeral DEKE, it has been claimed in the literature that the number must be a large one, such as 4000. Barker (1999: 689; also Doetjes & Honcoop 1997: 267) claims that a numeral DEKE construction is used when “there are too many individuals to keep track of easily, in which the individuals involved are so similar that they are difficult to distinguish, or in which events are typically widely separated in time from each other or from the utterance time.” It is true that a numeral DEKE is used when the relevant individuals are difficult to distinguish, but the number of the individuals does not have to be many. For example, (20a), where a very low number occurs, allows an event counting reading if the speaker does not know the identity of the people: it is possible for the same person to be visited twice (I thank James Myers for this example). Also, Doetjes & Honcoop (1997: 267) report that the low number 20 in (20b) also allows a DEKE reading if the students to be examined come from three classes with overlapping enrollment. We thus agree with an anonymous reviewer: the above large numeral hypothesis

can be challenged. Note that no such constraint is seen on ordinal DEKEs, since the associated individuals must be distinguished for the ordering.

- (20) a. Two people visited my homepage yesterday.
b. If she wants me to examine 20 students, she must block out more than one day for me.

On the other hand, a frequency DEKE must be an adjective of infrequency (Larson 1998: 163). Thus, the sentence *A frequent customer strolled by* never means ‘Frequently a customer strolled by’. In this paper, I focus on the possible syntactic derivations of DEKE constructions, leaving this semantic constraint on frequency DEKEs aside (see 6.3).

In this section, we have seen that the reduced forms of the three types of intrinsic event-kind predicates discussed in §2 and §3 can all show up in nominals.

4.2. Differences of DEKEs from their correlated non-DEKE expressions

This section shows certain differences between DEKEs and the non-DEKE expressions of the same syntactic category in a DP. The differences presented in the first two subsections call for a unified analysis of DEKEs and the event predicates discussed in §2 and §3; the differences in the next three subsections (4.2.3 ~ 4.2.5) suggest that DEKEs and the non-DEKE expressions of the same syntactic category may come from different sources; and the difference in the last two subsections (4.2.6 and 4.2.7) indicate that various types of DEKEs are subject to the same position constraint, and interact with D in the same way.

4.2.1. DEKEs do not scope over negation

A DEKE is not associated with negation. Unlike a non-DEKE numeral in a DP, a numeral DEKE may not scope over negation (cf. Doetjes & Honcoop 1997: 298), as seen in (21). The non-negative requirement for numeral DEKE constructions is discussed in Doetjes & Honcoop (1997), but they do not link the requirement to event kinds. The same restriction is observed in ordinal DEKEs, as seen in (22). In (23), if the intended meaning is that there were few tokens of the event kind encoded by the verbal expression, the negation of the verbal expression is also not allowed. The Indir-frequency DEKE *rare* in (24a) is about the occurrence of a granny in the context. As shown in (24b), the *granny* nominal also cannot be in a negative form.

- (21) Last year, 4,000 ships didn’t pass through the lock. (Doetjes & Honcoop 1997: 266)
Non-DEKE: 4,000 ships are such that each of them didn’t pass through the lock last year.
DEKE: *There were 4,000 events in which a ship did not pass through the lock last year.
- (22) It is the second guitar that Susi did not buy.
Non-DEKE: There is a guitar, which is the second one somewhere. Susi didn’t buy it.
DEKE: *There was a second token of the event kind that Susi did not buy a guitar.
- (23) An occasional sailor did not stroll by.
Non-DEKE: A specific sailor who sails occasionally did not stroll by.
DEKE: *Occasionally, a sailor did not stroll by.
- (24) a. No granny is 6 feet tall. b. *No rare granny is 6 feet tall.

If a DEKE, as a reduced form of an intrinsic event kind predicate, is about the instantiation of an event kind, this restriction is explained: if an event kind is undefined, there is no way to instantiate it, and thus no DEKE may occur. This is the same restriction on the simple and non-

simple event kind predications discussed in §2 and §3.

4.2.2. DEKEs do not scope over non-iterative events

The DEKE and non-DEKE expressions interact with the verbal expressions of the constructions in different ways. DEKEs provide information on the quantity, order, or distribution of the tokens of some event kind. They are thus not compatible with any non-iterative event. The numeral *2000* in (25a) does not mean that there were 2000 times of the discovery event, the ordinal *second* in (25b) does not mean that there was a second time of the invention, and the frequency adjective *occasional* in (25c) can only mean that the sailor, who sailed occasionally, died, rather than that a sailor died occasionally.

- (25) a. 2000 scientists discovered the virus.
b. This girl invented the second window-cleaning robot.
c. The occasional sailor died.

The non-DEKE uses of the underlined elements in the examples indicate that a nominal-internal element can denote a non-iterative event, in contrast to a DEKE. The constraint on DEKEs is the same restriction on the event kind predications discussed in §2 and §3. The ban of a non-iterative event for numeral DEKE constructions is discussed in Krifka (1990) and Doetjes & Honcoop (1997), but they do not link the ban to event kind predication.

In these two subsections (4.2.1 and 4.2.2), we have shown that various types of DEKEs exhibit the same constraints as the event predicates discussed in §2 and §3.

4.2.3. DEKEs may not be conjoined with non-DEKE expressions

A DEKE cannot be coordinated with a non-DEKE expression. Since conjuncts tend to be semantically of the same type (Schachter 1977), the restriction shows that the semantics of the former is different from that of the latter. For example, an event (kind) cannot be red, and as seen in (26b), the frequency DEKE *occasional* cannot be coordinated with the modifier *red* (cf. Gehrke & McNally 2015: 861). See Stump (1981: 249 (87) and Morzycki (To appear (7)) for similar pairs of examples. Likewise, if two numerals are conjoined, it is impossible to interpret only one of them as a DEKE, as seen in (27). Similarly, if two ordinals are conjoined, it is also impossible to interpret only one of them as a DEKE, as seen in (28).

- (26) a. The occasional red car drove by.
b. *The occasional and red car drove by.

- (27) Fifty and one hundred ships passed through the lock.
≠ 50 ships passed through it 100 times./ ≠ 100 ships passed through it 50 times.

- (28) a. Susi bought her second and third guitar last week.
Possible: Susi bought a guitar the second time and the third time within a week.
Impossible: Susi bought a guitar the second time and it was the third one in a certain place.
b. Susi bought the second and third guitar last week.
Possible: There are multiple guitars displayed somewhere. Susi bought two guitars there at the same time: the second and the third one.
Impossible: Susi bought the second guitar in a certain place and it was the third

time for her to buy a guitar.

In all of these examples, one fails to conjoin a DEKE with a non-DEKE expression of the same category in a DP. A DEKE is semantically incompatible with a DP-internal non-DEKE expression, and thus it shows its semantic independence from other nominal-internal elements.

Note that a DEKE-hosting DP can be conjoined with another DP, as seen in (29). However, such examples can be the result of clausal conjunction plus ellipsis. For example, (29a) can be a reduced form of (30). Therefore, the existence of such apparent conjunction of two DPs does not affect our discussion of conjunction of two DP-internal elements.

- (29) a. Three thousand freight barges and one thousand yachts passed through the lock last year. (Krifka 1990: 507)
b. Susi bought the second guitar and the flute.

- (30) Three thousand freight barges passed through the lock last year and one thousand yachts passed through the lock last year.

4.2.4. DEKEs are invisible in DP pronominalization

Unlike a non-DEKE expression in a DP, a DEKE is not included in pronominalization. The DP that hosts a numeral or ordinal DEKE can be referred back to by a pronoun, as seen in (31).

- (31) a. Four thousand ships passed through the lock last year. They each had to pay a fee at the next harbour. (Barker 1999: 689; also see Krifka 1990: 516)
b. Susi bought the second guitar. It is cheaper than the piano.

In English, an overt pronoun needs an overt antecedent (cf. Heim 1982). The DEKE-hosting DP is the only possible DP to be the antecedent of the pronoun in each of the examples in (31). The pronouns are not eventive pronouns. Under the DEKE reading of (31a), the example can be understood as follows: an underspecified number of ships passed through the lock 4000 times in total last year, and each of them had to pay a fee at the next harbour. The predicate *each had to pay a fee at the next harbour* is clearly about ships, rather than events. Also, since there are 4000 such event tokens, the participant of each event token, i.e., a ship, had to pay a fee at the next harbour. This entails that there are also 4000 tokens of the fee-payment event kind, but the pronoun *they* refers to the ships only (cf. Barker 1999: 685). Similarly, under the DEKE reading of *second* in (31b), the pronoun *it* refers to the guitar, excluding the semantics of the ordinal.

Stump's (1981: 248) following example shows that the whole cluster *an occasional sailor* cannot serve as antecedent of *one* in the second clause, and this example "can only mean '... and Bill saw a sailor, too', not '... and Bill saw an occasional sailor, too'."³

- (32) John saw an occasional sailor, and Bill saw one, too.

This pronominalization fact, again, leads us to see that the semantics of a DEKE is not

³The DP that hosts an Ind-frequency-DEKE cannot be picked up by an anaphoric pronoun and thus (i) is unacceptable, as pointed out by an anonymous reviewer. This judgment is confirmed by my informants.

(i) *The {occasional/odd/rare} granny is 6 feet tall. She looks healthy. (cf. (17a))

included in the hosting DP.

4.2.5. DEKEs are invisible to the specificity of indefinite DPs

Unlike a nominal-initial numeral, a numeral DEKE is never a generalized quantifier. The hosting DPs do not show the properties of generalized quantifiers for indefinites. If a DP-internal non-DEKE numeral occurs in an indefinite DP, the DP can be either specific or non-specific. In (33a), if *100* has a narrow scope, each person must read any 100 books; whereas if *100* has a wide scope, there are 100 specific books that everyone must read. The numeral is a generalized quantifier, and the DP has two readings, as expected. In (33b), there is no numeral, and the bare plural has a narrow scope only.

- (33) a. Everyone must read 100 books. $\forall > 100$ or $100 > \forall$
b. Everyone must read books. $\forall > \exists$

In contrast to (33a), if the numeral in (34a) is used as a DEKE, it never means that certain specific books were lent out 23,000 times (cf. Doetjes & Honcoop 1997: 297). Thus the DEKE-hosting DP behaves like the bare plural in (33b), which is nonspecific. Thus, a DEKE is semantically absent in the hosting DP. Similarly, (34b) never means that Susi must buy the same guitar twice. The indefinite object is nonspecific, just like that of the sentence *Susi must buy a guitar* (without a stress on *a*), where no DEKE occurs. The effect shows that such an indefinite DP behaves as if the numeral or ordinal DEKE does not occur there.

- (34) a. The library must lend out 23,000 books next year.
Available: The library must lend out books 23,000 times next year.
Not: The library must lend out certain specific books 23,000 times next year.
b. Susi must buy a second guitar.
Available: Susi must buy another guitar, in addition to her current one'.
Not: She must buy a certain guitar twice.

Thus, from this perspective, although a numeral or ordinal DEKE surfaces in a DP, it is semantically invisible in the DP.

In these three subsections (4.2.3 ~ 4.2.5), we have shown that various types of DEKEs exhibit their semantic independence from their hosting DPs. Two more differences between DEKEs and non-DEKE expressions, to be presented below, suggest that DEKEs of various types have similar interactions with D.

4.2.6. DEKEs are local to the D position

Unlike a non-DEKE expression in a DP, a DEKE cannot follow a non-D element. As pointed out by Stump (1981: 248), if frequency DEKEs “were regular adjectives, the result of combining such an adjective with a common-noun phrase should itself in principle be combinable with another adjective; but expressions like *occasional sailor* [...] in fact resist the addition of further adjectives”, as shown in (35b) (Stump 1981: 248; Larson 1998: 162 (45); see Gehrke & McNally 2015: 860 (86a) and (88), and Morzycki, To appear, (4) and (5) for similar examples). Another pair of examples in (36) shows the same point. In (37a), *fat* can follow a numeral, whereas in (37b), the DEKE *rare* cannot (our informants).

- (35) a. An occasional well-dressed sailor strolled by.

- b. A well-dressed occasional sailor strolled by. (No DEKE reading)
- (36) a. The rare fat granny is 6 feet tall.
 b. *The fat rare granny is 6 feet tall.
- (37) a. The two fat grannies strolled by.
 b. *The two rare grannies strolled by.

A DEKE can be phrasal. The frequency DEKEs in (38) contain *very* ((38c) is adapted from Sæbø 2016: 1; cf. Morzycki, to appear: (8)). Thus, in the presence of *very*, a DEKE is still local to D (cf., footnote 7).

- (38) a. The very rare granny is 6 feet tall. (our informant)
 b. My hair is clean except for the very occasional flea. (our informant)
 c. We passed moored boats manned by fishermen and the (very) rare woman.

A similar locality constraint is seen in ordinal DEKEs. One can order objects linearly in the left-right axis, or order events temporally in the early-late axis. In the Chinese example in (39a), the ordinal *di-er* ‘second’ precedes *zuo-bian-de* ‘left-side’. The ordinal can be either object-oriented or event-oriented (i.e., used as a DEKE). But in (39b), the same ordinal follows *zuo-bian-de*. Then, only the non-DEKE use is available. The absence of a DEKE use in this case indicates that a DEKE never follows a modifier of the noun.

- (39) a. Yani mai-le di-er ba zuo-bian-de jita.
 Yani buy-PRF ORD-two CL left-side-DE guitar
 ‘Yani bought the second guitar on the left side.’ (non-DEKE)
 ‘Yani bought a guitar on the left side the second time.’ (DEKE)
- b. Yani mai-le zuo-bian-de di-er ba jita.
 Yani buy-PRF left-side-DE ORD-two CL guitar
 ‘Yani bought the second guitar on the left side.’ (non-DEKE)

A similar locality constraint is also seen in numeral DEKEs. The following Chinese example in (40a) is ambiguous, but (40b) is not. The numeral *siqian* ‘4000’ in the latter follows the modifier *zhanxin-de* and is not a DEKE (see Zhang 2015 for this construction).

- (40) a. Qu-nian siqian liang zhanxin-de kache tongguo-le zhe zuo qiao.
 last-year 4000 CL new-DE truck pass-PRF this CL bridge
 ‘Last year, 4000 new trucks went through this bridge.’ (non-DEKE/DEKE)
- b. Qu-nian zhanxin-de siqian liang kache tongguo-le zhe zuo qiao.
 last-year new-DE 4000 CL truck pass-PRF this CL bridge
 ‘Last year, 4000 different new trucks went through this bridge.’ (non-DEKE)

Another relevant fact is that in Irish, an adjective follows the modified noun in the default order, and if an article occurs, it shows up at the left-edge of an DP, as seen in (41a) (cf. Nolan 2012: 224); however, the adjective *corr* in its ‘peculiar’ meaning follows the noun in (41b), as expected, but the adjective in its DEKE use precedes the noun in (41c) and (41d) (Gehrke 2017a from her *p.c.* with James McCloskey). Thus, the DEKE *corr* in (41c) and (41d) is local to the

For the same reason, no DEKE occurs with a pronoun. (46) has no DEKE version:

(46) It rained {200 times/the second time/occasionally} this year.

C. If a nominal is a mass noun, which cannot be combined with a numeral or ordinal directly, no numeral or ordinal DEKE may appear with it, as seen in (47).

(47) *4000 radioactive waste was transported through the lock last year.
Intended: ‘Radioactive waste was transported through the lock 4000 times last year.’

D. Nominals initiated with a plural container or standard measure word denote abundant plurals (greater than two; cf. Pi 1995), as seen in (48a) and (48b), and they are not compatible with a numeral or ordinal, as seen in (48b); accordingly, when a numeral occurs with such a measure word, no DEKE meaning is available, as seen in (48c). In other words, no numeral or ordinal DEKE may appear with such nominals.

(48) a. Tons of radioactive waste were transported through the lock last year.
b. (*60) bags upon bags of marshmallows were stolen this week. (cf. Pi 1995)
c. Sixty tons of radioactive waste were transported through the lock last year.⁵
Not available: ‘Tons of radioactive waste were transported through the lock sixty times last year.’

In these four cases, if there is no appropriate position for a DEKE to surface, a DEKE is rejected. *We thus see that an adjectival DEKE is still an adjective (cf. Gehrke & McNally 2015), a numeral DEKE is still a numeral, and an ordinal DEKE is still an ordinal.* Although they are out of place in a DP semantically (4.2), they are legal in the hosting DP categorially. We propose our analysis to capture the two sides of a DEKE in the next section.

5. The syntax of DEKE constructions

5.1. The subject of a DEKE

In 4.2.1 and 4.2.2, we concluded that a DEKE *functions like an event kind predicate*. In this section, we discuss the subject of this predicate. Like the constructions discussed in §3, there is no overt form such as *this kind of event* occurring with a DEKE, and no word such as *happen* occurring with a DEKE. But the semantic function of a DEKE is similar to that of the adverbial expressions discussed in §3.

We first discuss the subject of a numeral and ordinal DEKE. It should encode an event kind, a vP, as in the constructions discussed in §3, but this vP also hosts the DP in which a DEKE surfaces. Analytically, (49a) has two predications, (49b) and (49c). The former is

⁵ The multiple event readings of examples like (48c) and (i) (Krifka 1990: 487) and (ii) (Doetjes & Honcoop 1997: 267) do not count event tokens. Instead, they sum the quantity of incremental themes of multiple events (see Doetjes & Honcoop 1997: 278 (33)), similar to (iii). In such constructions, the predicate allows non-iterative events, and thus the numeral expression, e.g., *10 liters* or *5000 books*, cannot function as a kind-level predicate of events.

(i) The dry cleaners cleaned 5.7 million bags of clothes in 1987.

(ii) Your toy fountain spouted up 10 liters of water yesterday; we’ll need a new battery.

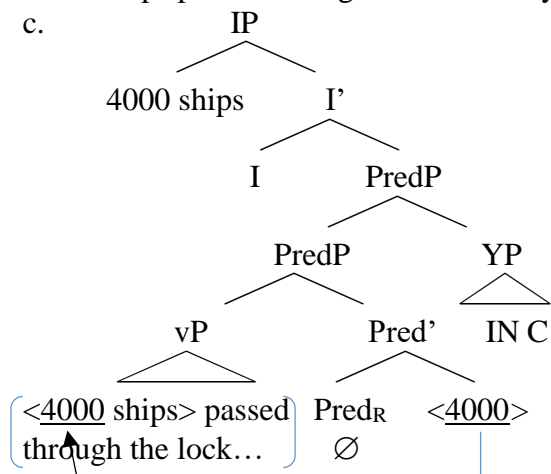
(iii) John burned and Mary tore 5000 books in total. (cf. Postal 1998; Zhang 2014)

5.2. The displacement of a DEKE from an event kind predication

In this subsection, we propose a possible syntactic derivation that relocates a DEKE from the position of an event kind predicate into a DP: A DEKE moves to a nominal.

Let us consider the derivation of (54a). We assume that the DEKE *four thousand* has the same base-position as the adverbial *four thousand times* in (54b). Thus the basic derivation of (54a) is similar to that of (54b). The structure of the latter construction has been discussed in §3. Our proposed structure in (54c) for (54a) is similar to the structure in (11), except that the complement of Pred_R has moved into a DP within the vP.

- (54) a. Four thousand ships passed through the lock last year. (Intended: 4000 times)
 b. Ships passed through the lock last year four thousand times.
 c.



If we compare the event kind predicates discussed in §3 and DEKEs, we see a categorial difference. An event or event kind subject cannot take a bare numeral, a bare ordinal, or an adjective as its predicate.

- (55) *Susi stole a book {occasional/three/third}. (cf. (8))

While the event kind predicates discussed in §3 are legal for a vP subject, the categories of DEKEs are not. It is this categorial difference that triggers a DEKE to move.

I claim that there are two initial working sites in building a DEKE construction: in one working site, a null Pred is merged with a DEKE (e.g., *four thousand*); and in the other working site, a vP is built. Then, if the vP is merged with Pred', a selectional problem will appear. Pred must have a Spec (a subject), as well as its complement (a predicate). Moreover, the first merger of Pred does not have a restrictive c-selection: in principle, a predicate can be a VP, AP, NP, PP, etc. However, the category choice for the first merger may affect the second merger. Specifically, if the Pred is merged with an adjective, a bare numeral, or a bare ordinal first, it is unable to merge with a vP anymore. If it were, the following ungrammatical forms, which are similar to (55), would be generated:

- (56) a. *Ships passed through the lock [four thousand].
 b. *Susi bought a guitar [second].
 c. *A sailor strolled by [occasional].

The same c-selection dependency is seen in den Dikken (2006: 30): if a subject is an event-denoting verbal projection, the predicate must not be an adjective in English. The kind predicate *again* is an adverb, and thus it is never used as a DEKE, which means that it can

remain in its base-position (i.e., the complement of Pred that takes a vP subject), without causing any problem. In this case, the syntactic computation of *again* is similar to that of the event kind predicates discussed in §3. Note that we do not make any claim on other categorial relations in a PredP. What we claim is just that if the Spec of PredP is a vP, the complement cannot be an adjective, a bare numeral or ordinal.

This c-selection dependency of the second merger on the first merger is also seen in coordinators, which must merge with two conjuncts. It is well-known that *and* does not have any c-selection. However, if *and* is merged with a nominal conjunct first, it cannot be merged with a verbal conjunct anymore (or vice versa; e.g., **slept and Jane / *Jane and slept*).

One way to solve the c-selection problem in building a PredP is to move the adjectival complement of Pred away, so that the Pred' can go on to merge with a vP. The rationale of this strategy is similar to the removal of certain problematic elements in structure-labelling (Chomsky 2013, 2015), and similar to the removal of certain problematic element that may lead to an island effect for extraction (Ross 1969; Merchant 2001). The ungrammaticality of the examples in (55) and (56) comes from the c-selection dependency of the second merger on the first merger in building a PredP. In order to avoid the problem, one can remove the element that causes the problem. Thus, if the adjectival features of a DEKE move away, Pred' will be able to merge with a vP. Note that a conjunct cannot move (Ross 1967), because of the unstrandable property of a coordinator (see Zhang 2010).

In Chomsky (1995: 270), an overt movement chain has two sub-chains: a chain of categorial features and a chain of other formal features; and the former is a carrier of the latter; moreover, a covert movement does not have the categorial chain. In a DEKE construction, since it is the category features that are incompatible with the further merger of the Pred' with a vP, what we need to remove is the categorial features (as well as the PF-features) of the DEKE. Then wherever this chain lands, it does not have any semantic features, and thus does not take part in the semantic composition of the hosting phrase. In this proposed overt movement, the semantic features of the DEKE remain in situ.

Let us see the details of the derivation of the Dir-frequency DEKE construction in (51a), *An occasional sailor strolled by*. First, the null head Pred is merged with the DEKE *occasional* in Working site A, as seen in (57a). Then the category features of the DEKE undergo sideward movement (Nunes and Uriagereka 2000, Hornstein 2001, Nunes 2004), merging with the NP *sailor* in Working site B, as seen in (57b). The resultant complex NP is then merged with D, forming the DP [an AP sailor], as seen in (57c). The resultant DP takes part in further syntactic operations, and eventually, a vP is built, in this working site, as seen (57d). This vP is then merged with Pred' in Working site A. After the merger of the vP with Pred', a PredP is built, as seen in (57e). In this PredP, *occasional* is pronounced in the AP position, instead of its base-position; and it is interpreted in its base-position, rather than the AP position. Finally, in step (57f), [an occasional sailor] moves to SpecIP, a movement similar to that of *Susi* in (11).

- (57) a. Working site A: [_{Pred'} [_{Pred}⁰ ∅ [_{AP} occasional]]]
 b. Working site B: [_{NP} AP sailor]
 c. Working site B: [_{DP} an AP sailor]
 d. Working site B: [_{vP} [an AP sailor] strolled by]
 e. Working site A: [_{PredP}[_{vP} [an AP sailor] strolled by][_{Pred'}[_{Pred}⁰ ∅ [occasional]]]]]
 f. [_{IP} [an AP sailor][_{I'}⁰∅[_{PredP}[_{vP}<an AP sailor>strolled by][_{Pred'}[_{Pred}⁰∅ [occasional]]]]]]]

The proposed DEKE movement is symmetrical to the well-recognized covert movement, which moves semantic features, without categorial features (Chomsky 1995: 270). In both types of movement, categorial features and semantic features are computed separately.

In this analysis, the DP formed in step (57c) can be integrated later as any argument in the hosting vP (subject or object). If the DP is not a subject in the vP, as in examples in (18), it is integrated in another position in the next step in Working site B. This captures the fact that there is no constraint on the syntactic position of the DP that hosts a DEKE (see 4.1.4).

In this analysis, the semantic features of a DEKE are independent from the hosting nominal, although its categorial features are integrated into the nominal. This explains the properties discussed in 4.2.

The derivations of other DEKE constructions, including numeral and ordinal DEKE constructions have similar steps as in (57).

We now consider the derivation of an Indir-frequency DEKE construction, such as (58).

(58) The rare granny is 6 feet tall.

The first three steps of the derivation in (59) are similar to the first three steps in (57). The categorial features of *rare* move, surfacing as an AP in Working site B. Then, in (59d), the DP [*an AP granny*] is merged with the null predicate OCCURS IN C (see McNally 2011 for a similar null existential predicate), forming a vP. In (59e) this vP is merged with Pred', forming a PredP. Meanwhile, in Working site C, the phrase [*6 feet tall*] is built, as seen in (59f). Then the DP undergoes a sideward movement from Working site A to Working site C, merging with [*6 feet tall*] and forming another vP, as seen in (59g). Then in this working site, the vP “grows” into an IP, and the DP moves to SpecIP (see 5.4 for the form of the D element with the DEKE).

- (59) a. Working site A: [_{Pred'} [_{Pred⁰} ∅ [_{AP} rare]]] (≈ (57a))
 b. Working site B: [_{NP} AP granny] (≈ (57b))
 c. Working site B: [_{DP} an AP granny] (≈ (57c))
 d. Working site B: [_{vP} [_{DP} an AP granny] OCCURS IN C]
 e. Working site A: [_{PredP} [_{vP} [_{DP} an AP granny] OCCURS IN C] [_{Pred'} [_{Pred⁰} ∅ [rare]]]]
 f. Working site C: [6 feet tall]
 g. Working site C: [_{vP} [_{DP} the AP granny] [6 feet tall]]
 h. Working site C: [_{IP} [_{DP} the AP granny] is [_{vP} <the AP granny> [6 feet tall]]]

In this analysis of various types of DEKEs, a DP contains an element that is not base-generated there. Barbiers (1995a; 1995b: 130ff) discusses a Dutch expression such as *de krant gisteren* ‘the paper yesterday’, as in (60a), showing that the word *gisteren* ‘yesterday’ semantically modifies the verbal projection of the clause, and thus it is not semantically related to the nominal *de krant* ‘the paper’. The nominal is thus called “pseudo-DP”.

- (60) a. [De krant gisteren] meldde het voorval niet.
 the paper yesterday reported the incident not
 b. [De krant van gisteren] meldde het voorval niet.
 the paper of yesterday reported the incident not
 ‘Yesterday's newspaper did not report the incident.’

Unlike a DEKE nominal, a pseudo-DP occurs in a topic or scrambled position only. Nevertheless, the existence of such a pseudo-DP in Dutch shows a general possibility that in an apparent DP, one of the components is in its derived position, instead of its base-position (I thank an anonymous reviewer for bringing my attention to Barbiers’s works).

In this section, we have claimed that a DEKE has the same base-position as an event-kind predicate that appears as an adverbial, discussed in §3, and that its categorial features move, leaving its semantic features in situ.

5.3. The displacement of a DEKE to a nominal

In 5.1, we claimed that a DEKE is base-generated in an event kind predication. In 5.2, we further claimed that the categorial features of a DEKE cannot remain in situ because they do not satisfy the c-selection of Pred. The c-selection problem is the condition on the launching of a DEKE movement from an event kind predication. In this subsection, we address the condition on the landing of the DEKE movement into a DP.

In 4.3, we reported four cases in which a nominal does not have a legal position available for a relevant type of DEKE, and a DEKE cannot occur in the nominal. In our analysis, a DEKE can surface in a nominal, because its categorial features fit an available position in the nominal.

In this analysis, the movement of an event kind predicate, seen in a DEKE, is constrained not only in the launching site, but also in the landing site, like the movement of any other types.⁶

In an imagined non-movement approach, one might assume that numeral, ordinal, and frequency adjective each have two semantic types: one is used as a DEKE and the other is not. Although this is theoretically possible, we choose a more economical approach, which does not need to stipulate a new semantic type for each of the three categories. Their two uses correlate with their two base-positions.

5.4. The restrictions on D of a DEKE-hosting nominal

We have introduced three facts relevant to D: a DEKE is always local to the D position (4.2.6); if a definite determiner occurs with a DEKE, it does not have the semantics of a definite determiner (4.2.7); and no strong quantifier, such as *every* or *most*, occurs with a DEKE (4.2.7). We try to explain these facts now.

We have just shown that the surface position of a DEKE is identical to the position of a non-DEKE element of the same category, i.e., a numeral, an ordinal, and an adjective. They are all below D. Thus, a DEKE cannot be remerged after a determiner is combined with an NP. From the perspective of a DEKE, as a bundle of meaningless category features, it has no semantic interaction with any element in an NP (not only it does not add any meaning to the NP but also it does not help in organizing the components of the NP). From the perspective of the NP, it has its own formal structure, which cannot be intervened by any irrelevant element. A DEKE is thus remerged after the building of an NP is complete. Building of an NP is complete when all the lexical items in the numeration (or lexical Array) for the NP are used up. Thus, a DEKE can only surface at the edge of a nominal that has no determiner yet. This explains why a DEKE must be local to the D position.

Assume that syntactic composition is derivational. After an NP is built, it is ready for the merger of a determiner, if the NP must have a determiner in the language. During the syntactic derivations, if any morphosyntactically necessary but semantically vacuous element takes part in, the element is supposed to have an identity function in semantics ($\lambda g.g$). However, a DEKE is not morphosyntactically necessary in a nominal: its absence does not affect the grammaticality of the nominal itself. There is no probe to attract a DEKE, technically speaking. A DEKE in a nominal has no semantic feature and plays no semantic role in any semantic

⁶ One anonymous reviewer asked why a *rare*-DEKE cannot be in a comparative or superlative form. One reason is the following. A quantificational comparative morpheme, such as *-er*, takes two predicative CP arguments; and in each CP, an adjective occurs and a degree operator moves, deriving a clause-level predicate (e.g., Beck 2011). In our analysis, the DEKE use of *rare* is merged with a Pred_{RP}, not a CP. A PredP is not rich enough to host an operator movement, and thus it cannot be selected by a comparative form. I assume that a superlative construction also needs a richer structure than a simple PredP.

composition. Accordingly, I claim that a DEKE does not have an identity function, and thus it cannot bridge the post-DEKE NP with a determiner semantically. If semantic composition is also derivational, the combination of an NP with a determiner can be interrupted by a DEKE. This interruption causes a determiner fail to take the post-DEKE NP as its semantic argument. It is thus semantically bleached. Accordingly, the contrasts among *the*, *a*, and a possessive are levelled (see 4.2.7). The DEKE-hosting DP behaves like a bare plural in English. It can be nonspecific (see 4.2.5). It does not have to be kind-denoting, since a part of an event kind does not have to be kind-denoting (e.g., *Susi* in (6b) is not kind-denoting). This explains the second fact, the definiteness mismatch in the DEKE constructions.

The same explanation applies to the third fact: a strong quantificational determiner, such as *every* or *most*, is unable to take the post-DEKE NP as its restrictor (and also to take the kind-denoting vP as its nuclear scope).

We now consider the issue why a bleached determiner may occur with a DEKE at all. A possible reason is that a language such as English does not allow bare singular nominal argument, and thus the occurrence of a determiner ensures the well-formedness of a singular argument in the language. Since bare plural arguments are allowed in English, if a DEKE occurs with a plural NP, no determiner occurs, as seen in (61). In Chinese, which has no definite article, no D element occurs with a DEKE, as seen in the ordinal DEKE in (39a) and the numeral DEKE in (40a). Thus, the bleached determiners with DEKEs behave like place-holders in English.

- (61) a. Occasional sailors strolled by. (Morzycki, to appear: (4b))
 b. Four thousand ships passed through the lock last year.

In this subsection, we have given an account for the special relation between D and DEKEs from a syntactic perspective. See Gehrke and McNally's, Zimmermann's, and Morzycki's works for extensive discussion of the issue from semantic perspectives.

5.5. Summary of the analyses of the properties of DEKEs

We have proposed that a DEKE is base-generated as the complement of Pred_R , a position for a kind predicate. It is the same position for the event kind predicates discussed in §3. It is dislocated into a DP, so that the Pred_R can go on to have a vP as its Specifier. The overt movement is a categorial feature movement, leaving the semantic features of a DEKE in situ. This proposal explains the facts reported in 4.2 and 4.3, as summarized in (62).

(62) Facts of DEKEs and proposed analyses

§	facts	proposed analyses	§
4.2.1	DEKEs do not scope over negation.	A DEKE is an event kind predicate. It is base-generated as the complement of Pred _R , and a vP is the Spec of the Pred _R .	5.1
4.2.2	DEKEs do not scope over non-iterative events.		
4.2.3	DEKEs may not be conjoined with non-DEKE expressions.	An event kind predicate moves when it fails to meet the c-selection of Pred. Thus, the category features of a DEKE move away but its semantic features remain in situ. Thus, a DEKE has no semantics in the hosting DP.	5.2
4.2.4	DEKEs are invisible in DP pronominalization.		
4.2.5	DEKEs are invisible to the specificity of indefinite DPs.		
4.3	A DEKE occurs in a categorially legal position in a DP.	A DEKE can land in a nominal because of the availability of a legal position there.	5.3
4.2.6	A DEKE is local to the D position.	A DEKE is remerged to an NP that has been built completely.	5.4
4.2.7	The determiner of a DEKE-hosting DP is semantically bleached.	A DEKE never has an identity function. Its occurrence blocks the semantic composition of a determiner with an NP.	5.4

6. A comparison with the previous analyses of various DEKE constructions

In this section, we briefly connect our analysis with certain major previous analyses of DEKE constructions. Since each of these analyses deals with only one of the three DEKE constructions, we discuss the analyses of the different DEKE constructions separately.

6.1. Numeral DEKE constructions

Krifka (1990) initiates the research of the numeral DEKE construction. He proposes two analyses. He recognizes that the first one is semantically simpler than the second one (p. 489). In this first analysis, a numeral DEKE is separated from the rest of the nominal, an analysis compatible with our analysis here. However, he rejects this analysis, because he considers its constituency not to be syntactically right. Krifka (1990: 502) states that in the example *Four thousand ships pass through the lock, ships* should be combined with the verbal predicate *passed through the lock*, and then *four thousand* is added; however, syntactically, “*four thousand* clearly forms a constituent with *ships*”. He gives the evidence from pronominalization and coordination of such a string (see our (29) and (31a)). In our syntactic derivation, the numeral is indeed base-generated out of the nominal in which the noun *ship* occurs. Also, if we realize that the numeral has no semantics in the hosting DP, the event counting reading of the numeral is not included in the pronominalization of the string. Also, the apparent conjunction of such strings can always be analysed as clausal conjunction plus ellipsis (see 4.2.3). Thus, his first semantic analysis, which is abandoned by him, is not challenged.

As for his second analysis, the contrast between a DEKE and a non-DEKE reading is assumed to come from a polysemous null D: the null D of the DP that hosts a DEKE is assumed to be semantically different from the null D of the DP that does not host a DEKE. This null D analysis of numeral DEKEs integrates the event-counting meaning into the meaning of the whole DP. In this analysis, the semantics of a DEKE must be part of the hosting DP, an assumption that is different from ours (see 4.2). Then, as pointed out by Barker (1999: 685), it is hard to explain the pronominalization fact. For example, (63a) can be followed by (63b),

even in its DEKE reading.

- (63) a. Four thousand ships passed through the lock last year.
b. They each tooted their horn when they cleared the last gate.

If the DP *four thousand ships* in (63a) means 4000 events which had less than 4000 distinct ships involved, a DEKE reading, (63b) still means 4000 tooting events. In that case, what does *they* mean? It does not mean events, since events do not toot. Note that in English, in contrast to a full nominal, an overt pronoun must have an overt antecedent. Krifka (1990: 516) states that in this case, although the ships themselves are not directly introduced in (63a), “the concept of ships is introduced, and that pronouns can pick up concepts.” One can see that this has the same effect as our claim that the pronoun in (63b) picks up just the NP *ships* in (63a), without the numeral DEKE. Since the semantics of a DEKE is consistently out of the hosting DP in our analysis, we are able to capture the expected effect of Krifka’s second analysis.

Barker (1999) gives a critical review of Krifka’s null D analysis of numeral DEKE constructions, and proposes that the contrast between a DEKE reading and a non-DEKE reading of a numeral expression depends on how we individuate things such as ships; and a DEKE reading counts the stages of individuals but a non-DEKE reading counts individuals. But in order to see what we are counting, we have to consider the meaning of the verb phrase, and “the verb phrase denotation in effect supplies the set of relevant nominal stages” (p. 689). The assumed stage is defined with respect to the concrete event tokens, with specific time and location. Thus, every stage of an individual is the individual in an event token. Counting such stages is then the same as counting event tokens. However, like the null D analysis discussed above, this analysis does not link numeral DEKE constructions to their correlated simple and non-simple event kind predication constructions discussed in our §2 and §3. In contrast, we pursue a possible general analysis.

In Doetjes & Honcoop’s (1997) analysis of numeral DEKES, a global event is divided into subevents, and each subevent is paired with an individual (p. 271). Empirically, this contrast is covered by our contrast between event kind and event tokens. Since every event token must have its participants, the special mechanism of pairing of a subevent with an individual is not necessary in our approach.

Moreover, the pairing analysis gives the following semantics for the DEKE reading of the sentence (63a) (Doetjes & Honcoop 1997: 264, 276).

- (64) a. $4000\langle e,x\rangle: \text{ship}'(x) \wedge \text{passed-through-the-lock}'(e,x) \wedge \text{last-year}'(e)$
b. $\exists e,x[\text{ships}'(x) \wedge \text{passed-through-the-lock}'(e,x) \wedge \text{COUNT}'(e,x) = 4000]$

In addition to such a semantic structure, we still need syntax to represent the structural relation between the DEKE *four thousand* and the verbal expression in (63a) and to explain how the DEKE shows up in the subject position there. Our syntactic analysis has taken this task.

Furthermore, as in the null D analysis discussed above, this event-individual pairing analysis mixes the container/standard measure constructions with numeral DEKE constructions (see our footnote 6). The former does not count events, whereas the latter does. Thus, this analysis rejects an event counting approach to DEKE constructions altogether (p. 269), and resorts to an event-individual pairing approach.

One major difference between these previous analyses of numeral DEKE constructions and the one proposed here is that none of them links the ban of a non-iterative and negative event denoted by the verbal expression of the constructions to event kind predication. Thus, these two restrictions are treated as two separated construction-specific restrictions.

6.2. Ordinal DEKE constructions

The only analysis of the ordinal DEKE construction that I can find is Tsai (2009, 2011) on the construction in Chinese. She proposes that the D of an ordinal DEKE-hosting nominal is her [-strong], which is indefinite, in contrast to the D of the correlated non-DEKE ordinal nominal, her [+strong], which is definite. Although Chinese does not have a definite article, the ordinal morpheme *di* is analysed to be either [-strong] or [+strong] (Tsai 2011: 112), and only the former, i.e., the indefinite version, occurs in an ordinal DEKE construction. Her conclusion that ordinal DEKE-hosting DPs are not definite matches with the conclusion reached from the studies of frequency DEKE-hosting DPs in the literature (see our 4.2.7 and 5.4). However, in Tsai’s analysis, the event ordering reading is assumed to be part of the semantics of the whole DP, an assumption that is challenged in our 4.2.

6.3. Frequency DEKE constructions

Bolinger (1967: 5) and Stump (1981: 227ff) are the early discussions of frequency DEKES. Some of the DEKE properties introduced in our 4.2 are first noted in Stump (1981: 248–249), e.g., they cannot be conjoined with another element, are not part of the antecedent of a pronominal, and cannot follow a modifier. He also points out that the fact that a DEKE is not interpreted in its surface position is “the norm whenever surface constituent structure and the principle of compositionality are at such odds.” (p. 248) Nevertheless, he did not propose a concrete syntactic derivation for DEKE constructions. Instead, he states (p. 246) that “frequency adjectives used adverbially could appear underlyingly as ‘higher predicates’, which would attain the status of superficial adjectives only as the result of a lowering transformation. Unfortunately, no one has ever formulated such a transformation successfully.” The effect of this lowering transformation is what we have tried to achieve in our §5.

A concrete syntactic derivation might be a moving-out-of-nominal analysis. Specifically, since a DEKE appears in a nominal, one might assume that it covertly moves out of the nominal to an adverbial position so that it scopes over the whole clause. This is similar to the proposal made by Kitagawa (1986: 182) for nominal-internal adjectives that have a manner adverbial reading. For example, in the Japanese example in (65), the adjective *ko* ‘little’ in an NP has a manner reading, and it is assumed to move out of the NP to adjoin to the VP.

- (65) [VP **ko** [VP [NP [N [A **t_i**] [N waki]]]-ni [V kakaeru]]
 little armpit -LOC hold
 ‘lightly hold something under one’s armpit’

One problem in this moving-out-of-nominal analysis has been pointed out by Larson (1998: 162, 164, footnote 13; 1999: 16; also Morzycki 2019: 63): such an LF movement cannot explain why a DEKE is base-generated in a nominal. The semantics of a DEKE is not part of that of the non-event nominal (our 4.2). The merger violates the basic principle of UTAH.

Developing Larson (1999), Zimmermann (2003: 250) proposes a complex quantifier analysis of Dir-frequency DEKES. His bleached D theory is adopted in our 5.4. However, in his analysis, a DEKE is base-generated with the head noun of the hosting nominal, then it adjoins to D, forming a complex Q-head, as in (66b), and finally the complex is raised to the IP domain at LF, scoping over the event-denoting clause, as in (66c), giving the adverbial reading of the DEKE (p. 271).

- (66) a. The occasional sailor strolled by. b. [QP [Q the+occasional]_i] [NP **t_i** sailor]]
 c. [IP [QP [Q The/an+occasional]₁] [NP **t₁** sailor]] [VP e strolled by]]

In this approach, since a DEKE is base-generated inside an NP, the analysis shares the problem with the moving-out-of-nominal analysis discussed above. The motivation of his movement of a DEKE out of the vP where it surfaces is that the DEKE reading of (66a) “is synonymous to that of its adverbial counterpart [...], its semantic structure should be structurally similar to that of the latter” (p. 253). This effect, in our approach, is achieved by the unification of the base-positions of a frequency adverb and a frequency DEKE: in both cases, their base-positions are out of the vP. In our analysis, Zimmermann’s DEKE-to-D analysis is not required. Such a movement, if it exists in some languages, has to be motivated for a reason other than the next step of the assumed LF movement of the DEKE.

Zimmermann also claims that frequency DEKE constructions are pluractionality constructions. One assumed property of the latter constructions is that the denoted multiple events do not overlap in time. He then finds that although the adverb *frequently* allows overlapping events, as seen in (67a), the adverb *occasionally* does not, as seen in (67b).

- (67) a. In those days, we frequently built houses.
 → No particular periods of non-house-building necessary.
- b. In those days, we occasionally built houses.
 → Periods of house building necessarily alternate with periods of non-house-building.

Since a frequency-DEKE can only be an infrequency adjective (see our 4.1.4), he claims that a DEKE construction shares the property of the non-overlapping events with pluractionality constructions and thus a DEKE marks pluractionality.

However, first, pluractionality constructions include constructions such as *The students came in {individually/one at a time}* (Zimmermann’s (47c)), which is not a frequency construction. Second, pluractionality constructions also include constructions such as *It rained here and there* (Zimmermann’s (47)), which seems to allow the multiple events to overlap in time. We are thus not sure how the pluractionality marker analysis helps to explain why a frequency DEKE must be an infrequency expression. Alternatively, one can treat *occasionally* as a temporal frequency expression, and *frequently* as either a temporal or a spatial frequency expression. Only the adjective version of the former can be a DEKE. We leave an account of this gap in both the adverb and its adjectival version for future research.

One influential analysis of frequency DEKES is Gehrke & McNally’s (2015) predicate-modifier analysis. Among their many contributions to the research of frequency adjectives, they distinguish frequency DEKES from other uses of frequency adjectives (e.g., those occurring with an event noun such as *trip*). Also, they distinguish the DEKES that can be paraphrased as an adverbial and those that cannot (i.e., our Dir- and Indir-frequency DEKES, respectively). Moreover, in addition to Stump’s observations, they note that there is no intersective relation between a DEKE and the non-event noun in the hosting DP (p. 849), and that such a DEKE is compatible with any kinds of non-event nouns (p. 860). Importantly, on the same page, they claim that a DEKE “serves only as a modifier of predicates of kinds, as opposed to predicates of pluralities of tokens”, and it provides information about the distribution of the realizations of the kind it modifies. Thus, they start the event kind analysis of frequency DEKES, from a semantic perspective (also see Gehrke 2017a, b). In this paper, we have developed the event kind predication theory, from a syntactic perspective.

They treat frequency DEKES as a special semantic type of adjectives, to capture the differences of adjectival DEKES from other adjectives. In order to argue for the adjective status of frequency DEKES, Gehrke (2017a: §2.3) claims that some other types of adjectives may also

have to appear external to other adjectival expressions, e.g., the adjective *other*, as seen in (68a). Moreover, some other types of adjectives can also be excluded in pronominalization, e.g., *different*, as seen in (68b). These types of adjectives are not event kind predicates, however.

- (68) a. *Two well-dressed other sailors strolled by.
b. Mary saw a sailor. John saw a different sailor, and Bill saw one (\neq a different sailor), too.

In 5.3, we also emphasized that frequency DEKEs are indeed adjectives, from a different perspective. We expect our syntactic analysis to be complementary to their semantic analysis.

7. Conclusions

We have argued for a unified syntactic analysis of three types of kind level predicates of events: numeral expressions, ordinal expressions, and frequency expressions. They are all base-generated as the complement of Pred_R , which heads an event kind predication and takes an event kind-denoting expression as its subject. Second, we have observed their shared constraints: their subject cannot denote any non-iterative event and they cannot scope over negation. Third, we have explained why the reduced forms of such predicates can appear in nominals: they are displaced there in order to avoid a c-selection problem for the second merger of the Pred_R . Theoretically, we have thus identified categorial features as a possible source of the apparent syntax-semantic mismatches. Also, since such predicates in their reduced forms appear in a nominal, we have also identified nominal structures as a possible target for integrating a predicate from another predication. Finally, we have explored a logical possibility for an overt movement to displace just non-semantic features, to be symmetrical to the well-recognized LF movement, which dislocates semantic features only.

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