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Event Structure and Argument Realization[1]

Abstract

The paper develops Levin and Rappaport Hovav's event structure representation and proposes a fuller inventory of event structure templates. It shows that the Argument-Per-Subevent Condition suggested by Levin and Rappaport Hovav (2004 and Rappaport Hovav & Levin 2001) is empirically incorrect. It demonstrates that, although event complexity and argument realization are closely related, it is not always the case that argument realization patterns reflect event complexity. In addition, the paper discusses cases of obligatory realization of structure and constant participants as well as three cases in which a constant participant of a transitive activity verb can be left unexpressed. This discussion points to the fact that a full account of argument realization needs to take all different factors into consideration, including structural, semantic, and pragmatic/discourse factors.

1. Introduction

Ever since the introduction of an event variable to the logical semantics of "action" sentences by Davidson (1967), "event" has become such an important notion in linguistic research that the representation of the linguistically-relevant component of verb meaning is now often called "event structure" (instead of "lexical semantic representation" or "lexical conceptual representation"). This paper is directly inspired by Levin and Rappaport Hovav's work on event structure, particularly Levin (1999) and

[1] I am grateful to Editor Markus Hamunen for encouragements and to the two anonymous reviewers of the paper for their valuable comments and suggestions, which have led to important clarifications and significant improvements. I am also grateful to five friends and colleagues (all native speakers of English) who shared with me their intuitions about almost all the English examples used in this paper.

Abbreviations: CL=classifier; INCH=inchoative; MM=modifier marker; PASS=passive; PERF=perfective; PROG=progressive; SFP=sentence-final particle.

Rappaport Hovav and Levin (1998). It aims to address two issues related to event structure and argument realization, namely the inventory of event structure templates and the obligatory or optional realization of certain arguments. Theoretically, this study contributes to the development of a comprehensive theory of event structure and argument realization.

The paper is organized as follows. Section 2 discusses Levin and Rappaport Hovav's event-structure templates (e.g. Levin 1999; Rappaport Hovav & Levin 1998). It points out that there is evidence from English and Mandarin that more event structure templates are needed than what is presented by Levin and Rappaport Hovav and that not all the participants in their templates are structure participants that must be overtly realized in the syntax. Section 3 discusses conditions on argument realization proposed by Levin (1999) and Levin and Rappaport Hovav (2004), and argues that the "Argument-Per-Subevent Condition" proposed by Levin and Rappaport Hovav (2004) is crosslinguistically invalid and the "Structure Participant Condition" by Levin (1999) is something unnecessary if the definition of the structure participant includes its obligatory overt realization in a complete sentence. Section 4 discusses cases where arguments have to be overtly realized and cases in which an argument can be left unexpressed. The final section summarizes the main points made in this paper.

2. Inventory of event structure templates

2.1 Event structure templates presented by Levin and Rappaport Hovav

Levin (1999: 229) and Rappaport Hovav and Levin (1998: 107) use what they call "event structure templates" to represent the grammatically-relevant component of verb meaning. Initially, Rappaport Hovav and Levin (1998) propose the following templates:[2]

[2] One reviewer mentioned that I should have just presented Levin and Rappaport Hovav's latest theory of event structure templates. I fully agree with the reviewer's general point that, in discussing works by other researchers, it may be sufficient to just present the most recent version of their theory. In the case of Levin and Rappaport Hovav's work, however, the situation is somewhat different. With respect to the inventory of event structure templates, the most representative and most-cited work by Levin and Rappaport Hovav is Rappaport Hovav and Levin (1998). The more recent works, including Levin and Rappaport Hovav (2005), only touch upon the issue of event structure templates in passing. As a result, I think that, in discussing Levin and Rappaport Hovav's proposal as to the inventory of event structure templates, it is

(1) Event Structure Templates (Rappaport Hovav & Levin 1998: 108; cf. Van Valin 1990: 224, Van Valin & LaPolla 1997: 102, 109)

a. [x ACT$_{<MANNER>}$] (activity)
b. [x <*STATE*>] (state)
c. [BECOME [x <*STATE*>]] (achievement)
d. [[x ACT$_{<MANNER>}$] CAUSE [BECOME [y <*STATE*>]]] (accomplishment)
e. [x CAUSE [BECOME [y <*STATE*>]]] (accomplishment)

The above event structure templates or predicate decompositions consist of two major types of components, semantic primitives (which are in plain uppercase) and constants (which are in italics and in angle brackets). With respect to the latter, they are of two types, "argument constants" and "modifier constants". Argument constants (e.g. "<*STATE*>" in (1b)) "appear in the appropriate argument position in the templates", and modifier constants (e.g. "$_{<MANNER>}$" in (1a)) "appear as subscripts to the appropriate predicate in the event structure templates" (Rappaport Hovav & Levin 1998: 109). Specific combinations of primitives constitute the structural component of verb meaning, and the constants represent the "core" meaning or the idiosyncratic aspect of verb meaning.

In addition to the two types of constants, Rappaport Hovav and Levin also make a distinction between "structure participants" and "constant participants". Structure participants "are licensed by virtue of both the event structure template and the constant" (Rappaport Hovav & Levin 1998: 111), and they are indicated with variables in the templates. In contrast, "constant participants" are licensed by the constant alone.

One crucial difference between structure participants and constant participants is that structure participants must be overtly realized in the syntax while constant participants do not need to. This can be seen from one of the argument realization conditions proposed by Rappaport Hovav and Levin (1998) that is later named by Levin (1999) "Structure Participant Condition" (see (2)). The difference in question between structure and constant participants can also be seen from Rappaport Hovav and Levin's discussion of verbs like *sweep*. Although activity verbs like *sweep* in *He swept the floor* involve two participants, in Rappaport Hovav and Levin's view only the first participant is a structure participant and the second participant is just a "constant participant" that is required by the constant

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necessary to start with their most representative work published in (1998) and then mention recent changes and corrections. This way of summarizing Levin and Rappaport Hovav's work also has the advantage of adding a historical perspective that readers may find useful.

alone. The evidence for their view comes from the fact that a string like *He swept* is grammatical, but a string like **The floor swept* is not.

(2) Structure Participant Condition (Levin 1999: 238)
There must be an argument XP in the syntax for each structure participant in the event structure.

Rappaport Hovav and Levin (1998: 106) point out that the different templates in (1) correspond "roughly" to the aspectual classes of verbs originally proposed by Vendler (1957) and then developed by Dowty (1979), namely activities, states, achievements, and accomplishments. However, Levin (1999: 229, 2000: 421) and Rappaport Hovav and Levin (2002: 278) state that their event structure templates are nonaspectually defined. For example, Levin (2000: 424) and Levin and Rappaport Hovav (2004: 478) (cf. also Levin 1999: 231; Levin & Rappaport Hovav 1999: 219, note 2) explicitly say that causativity, which is involved in (1d) and (1e), is distinct from accomplishments, which are telic. To illustrate, there are both non-causative accomplishments like *She ran to the store* and atelic causatives like *She cooled the soup for ten minutes*.

Levin (1999: 229, 2000: 424) and Levin and Rappaport Hovav (2004: 480) propose that event structure templates are of two types, simple and complex. Simple event structure templates consist of a single subevent, and complex event structure templates are composed of two subevents, each of which is a well-formed simple event structure template. Based on this distinction, Levin (1999) proposes the following event structure templates:

(3) Event Structure Templates (Levin: 1999: 229–230)
Simple event structure templates:
a. [x ACT$_{<MANNER>}$] (activity)
b. [x <*STATE*>] (state)
c. [BECOME [x <*STATE*>]] (achievement)

Complex event structure template:
d. [[x ACT$_{<MANNER>}$] CAUSE [BECOME [y <*STATE*>]]] (causative)

Three changes can be noted when we compare (1) and (3). First, the templates are now grouped into two types, simple and complex. Second, the event structure template in (1e) is not repeated in (3), though it is not clear whether it is simply withdrawn or whether it is not immediately relevant to

the discussion and thus not mentioned.[3] Finally, "causative" instead of "accomplishment" is used to name the event structure template that has a "CAUSE" component, which further affirms the distinction between causativity and accomplishment and corrects Rappaport Hovav and Levin's earlier assumption that all accomplishments are causatives. To stress the close connection between causativity and complex events, Rappaport Hovav and Levin (2001: 775; see also Levin 2000: 424) explicitly state that "complex event structures are causative event structures". According to them (see Levin 2000; Levin & Rappaport Hovav 1999, 2004; Rappaport Hovav & Levin 2001), the criterial property of a complex causative event is the lack of necessary temporal dependence between its two subevents.

2.2 Problems with Levin and Rappaport Hovav's event structure templates

This subsection is intended to show that there is crosslinguistic evidence that more event structure templates are needed than those in (3) and that not all the participants in (3) are structure participants, as assumed by Levin (1999). Regardless of whether or not Levin and Rappaport Hovav have explicitly said that their templates are exhaustive, the paper intends to develop the theory of event structure representation presented by them. The research question is thus: Given that Levin and Rappaport Hovav never explicitly present a full list of event structure templates, what should a full (or fuller) list of event structure templates be like if what is presented by Levin and Rappaport Hovav is not a complete list?

The inventory of event structure templates is certainly very important for a full theory of event structure. In fact, Rappaport Hovav and Levin (1998: 107) assume that Universal Grammar provides an inventory of event structure templates. As I see it, the inventory of event structure templates is an empirical question. Although it might be possible that not all languages will utilize all the templates in the inventory, it is important to try to provide a full inventory of event structure templates based on crosslinguistic data. This paper is in fact mainly motivated by this endeavor.

Crucially, when the templates in (3) are applied to English and Mandarin, it becomes clear that more templates are needed than what is

[3] Levin (1999: 229) does mention that the templates in (3) are "several major event structure templates". From this, it can be inferred that the templates in (3) are not intended to be an exhaustive list.

presented by Levin and Rappaport Hovav and it also becomes clear that not all the participants in (3) are truly structure participants. First, the acting participant of a transitive activity verb is not necessarily a structure participant because crosslinguistically it is not the case that this participant is obligatory in an active sentence. For example, although *sweep* in English only allows its internal argument to be unexpressed as shown by the ungrammaticality of (4c) when no use of an adverb like *easily* is involved to form a middle construction, Mandarin, at least in some cases, allows the external argument of a transitive activity verb to be unexpressed as well, as shown in (5b). In this regard, it should be pointed out that (5b) is a grammatical standalone sentence. That is, it can be a complete sentence without further context. At least for such uses, it is actually odd to give the sentence a pro-drop analysis. Moreover, on the basis of Ackema and Schoorlemmer's (2006: 132) characterization of the middle construction in (6), (5b) is not a middle because, for example, it is not a generic statement and is not about the property of the clothes. Furthermore, (5b) in fact has similar English counterparts as well (see the part in bold in (7)), which, to my knowledge, are normally not analyzed as middles.

(4) a. *Phil swept the floor*. (Rappaport Hovav & Levin 1998: 115)

b. *Phil swept.* (ibid.)

c. **The floor swept.*

(5) a. *Zhangsan zai xi xifu.*
Zhangsan PROG wash clothes
'Zhangsan is washing clothes.'

b. *Yifu zai xi.*
clothes PROG wash
'The clothes are being washed.'

(6) Characteristics of the Middle Construction (Ackema & Schoorlemmer 2006: 132)
a. The external argument of the non-middle counterpart of the middle verb cannot be expressed as a regular DP-argument in the middle.
b. If the non-middle counterpart of the middle verb has a direct internal argument role, the subject of the middle sentence carries this role.
c. The middle verb is stative, non-episodic. The middle sentence is a generic statement. It expresses that the argument mentioned in (b) has a particular individual-level property, or that events denoted by the verb or the verb-argument combination have a particular property in general.

(7) *While **the clothes are washing**, we have lunch and then he helps me hang the things on the line.* (<http://ajoyfulchaos.blogspot.com/2013/11/young-men-and-washing-machine.html>, accessed on August 11, 2015)

The fact that the external argument of a washing action can be unexpressed in an active non-middle sentence in English and Mandarin shows that this argument is not a structure argument/participant, but a constant argument/participant. Given that crosslinguistically neither of the two participants of a transitive activity verb is a structure participant, there is no good reason for including only the acting participant in the event structure template. With activity verbs involving a single participant being taken into consideration as well, the representation of activity verbs can be improved as (8), in which the structure participant is italicized and in bold. The single argument of an intransitive activity verb in (8) is obviously a structure participant or a structure argument that needs to be overtly expressed in a complete sentence.

(8) [***x*** ACT$_{<MANNER>}$] or [x ACT$_{<MANNER>}$ on y]

Second, the constant component of an activity verb does not necessarily express the manner of an action. In fact, there are transitive activity verbs such as *brush* and *shovel* whose constants indicate the instrument with which an action is performed, as shown in (9).[4]

(9) a. *Mary has already brushed her teeth.*

b. *Bill has already shoveled the snow in front of his house.*

Third, with respect to (3b), it fails to cover transitive stative predicates like *love* and *know* or their Mandarin counterparts *ai* and *zhidao*. In such cases, both participants of the transitive stative predicates need to be overtly expressed to have a complete standalone sentence, as shown in (10) and (11).

(10) a. *Bill loves Mary.*

b. **Bill loves.*

c. **Mary loves.* (Intended: *Mary is loved* (*by others*).)

[4] Given this fact, (8) in fact should be refined as (i). "Instrument" is added only to the second part of (8) because it seems that there are no intransitive activity verbs that are named by an instrument with which an action is performed.

(i) [***x*** ACT$_{<MANNER>}$] or [x ACT$_{<MANNER/INSTRUMENT>}$ on y]

(11) a. *Zhangsan hen ai Lisi.*
Zhangsan very.much love Lisi
'Zhangsan loves Lisi a lot.'

b. **Zhangsan hen ai.*
Zhangsan very.much love
Intended: 'Zhangsan loves (someone specific) very much.'

c. **Lisi hen ai.*
Lisi very.much love
Intended: 'Lisi is very much loved (by someone specific).'

Fourth, concerning (3c), it fails to consider transitive achievement verbs like *find* and their Mandarin counterpart like *zhaodao* 'to find'. As shown in (12) and (13), although English *find* needs both of its arguments to be overtly expressed, Mandarin allows for the possibility of expressing the findee alone. As a result, crosslinguistically only the findee can be said to be a structure participant.[5] Moreover, as the representation in (3c) suggests that it is not only for instantaneous achievement verbs but also for potentially durative intransitive change of state of verbs like *to cool*, a term like "inchoative" would be more accurate. With this change, it is more desirable to use the term "inchoative" to cover verbs denoting the

[5] Note that on the basis of Ackema and Schoorlemmer's (2006) characterization of the middle construction in (6), (13c) is not truly a middle as the sentence is not about the property of the key. Also, *zhaodao* in (13) is not truly a case of "automatic passive" as characterized by Zhang (1953). This is due to the fact that the subject of *zhaodao*, unlike the subject of a true "automatic passive" like *ai* 'to suffer', is not necessarily a patient or recipient. As can be seen from (13a), the subject of *zhaodao* can be an agent. Moreover, it is not the case that the verb in automatic passives can take aspect markers and *bei*-passives cannot. As shown in (i–ii), the verb in *bei*-passives can be marked with *-le*, one of the aspect makers in Mandarin. Finally, regardless of how *zhaodao* in (13c) is characterized, (13c) is obviously not a case of syntactic passive, as there is no overt passive morpheme or marker to show that it is a passive sentence. In other words, (13c) is formally an active sentence, and thus it is within the scope of the current study, which is concerned with formally non-passive sentences alone.

(i) *Na-ben shu jingran bei ta zhaodao-le.*
than-CL book unexpectedly PASS him/her find-PERF
'Surprisingly, that book was found by him/her.'

(ii) *Zhangsan bei tong-da-le yi-dun.*
Zhangsan PASS soundly-beat-PERF one-CL
'Zhangsan was given a sound beating.'

beginning of a certain new activity as well, given the fact that there are languages (e.g. Georgian and Russian) which do have verbs of this kind (e.g. *zagovorit'* 'start to speak' and *zaplakat'* 'burst out crying' in Russian) (Van Valin & LaPolla 1997: 104). In fact, Mandarin *qilai (*or *qi…lai* when the verb is transitive and when its object is overtly expressed), can also be added to an activity verb to indicate the start of the activity denoted by the verb, as shown in (14).

(12) a. *Tim has found his key.*

b. **Tim has found.*

c. **His key has found.*

(13) a. *Zhangsan yijing zhaodao-le yaoshi.*
Zhangsan already find-PERF key
'Zhangsan has already found his key.'

b. *Zhangsan yijing zhaodao-le.* (Incomplete)
Zhangsan already find-PERF
Intended: 'Zhangsan has already found (it).'

c. *Yaoshi yijing zhaodao-le.* (Complete)
key already find-PERF
'The key has already been found.'

(14) *Zhangsan pao-qilai le.*
Zhangsan run-INCH SFP
'Zhangsan has started to run.'

Fifth, there is evidence for a distinction between the following two causative events, a causative event which involves a causing subevent that causes a change to take place and a causative event in which the change is ultimately attributed to an entity, particularly its properties, rather than to an event involving that entity. For example, while both (15a) and (15b) express a causative event, only (15a) involves an unspecified causing subevent and it is this subevent that causes the window to become broken. In contrast, (15b) means that the scar is responsible for John's becoming scared. Crucially, it does not and cannot mean that the scar's doing something is ultimately responsible for John's entering a new state. In fact, John's becoming scared is most likely to be caused by some property of the scar. Based on the contrast between (15a) and (15b), I propose that *break* in

(15a) and the *scare* in (15b) are associated with two different event structure templates, with the former being associated with the event structure template in (16a) and the latter with the one in (16b).[6] As in (8), the structure participants in (16) are italicized and in bold (see below for discussion of why only the Causee is proposed to be a structure participant in the case of an event structure template like (16a)). As shown in (15c) and (15d), both the Causer and the Causee arguments are structure participants in the case of the event structure template in (16b). The data in (15e–g) apparently invalidates this conclusion, but a closer examination shows that they do not count as true counterexamples. This is because, although (15g) is grammatical, it has lost the causative meaning associated with the template in (16b). As a result, the *worry* in (15g) is actually associated with a different event structure template than the one in (15e).

(15) a. *Tony broke the window yesterday.*

b. *The scar somehow scared John.*

c. **The scar somehow scared.* (Intended: *The scar somehow scared someone specific.*)

d. **John somehow scared.*

e. *The scar always worried John.*

f. **The scar always worried.*

g. *John always worried.*

(16) a. [[x ACT$_{<MANNER>}$ on y] CAUSE [BECOME [***y*** <*STATE*>]]]

b. [***x*** CAUSE [BECOME [***y*** <*STATE*>]]]

With respect to (15), recall that Rappaport Hovav and Levin (1998) propose two causative event structure templates and Levin (1999) only lists one. Rappaport Hovav and Levin (1998) do not address the question of why two causative templates are proposed, but Levin (p.c.) informed me that they were not sure whether or not an individual as CAUSE as well as an event as CAUSE was found and that it was still an empirical issue that needed more research. However, as seen above, there is evidence for a distinction between event as CAUSE and individual as CAUSE. Based on this, I conclude that there is evidence for Rappaport Hovav and Levin's

[6] It is worth noting that Pylkkänen's (2002, 2008) CAUSE always involves a causing subevent, which is absent in (16b).

(1998) proposing two distinct templates for causative events. In fact, in addition to causing a change of state, the entity in the CAUSE component can also be paired with a state (17) or an activity (18).

(17) *The bad news caused John to be very sad.*

(18) *The bad news caused John to cry uncontrollably.*

However, even if (16a) and (16b) are regarded as two separate event structure templates, the inventory of event structure templates is still incomplete in seven respects. First, as shown in (19) from Mandarin, the "ACT" primitive in (16a) may involve just one constant participant, which is consistent with or further supports the proposal that activity verbs are associated with two different event structure templates shown in (8) above.

(19) *Zhangsan ku-hong-le yanjing.*
Zhangsan cry-red-PERF eye
'Zhangsan cried his eyes red.'

Second, as far as causative events involving a subevent as the cause of a change in an entity are concerned, the second subevent does not necessarily involve a change of state. As shown in (20), it may also be an event denoting a change of location.[7]

(20) *He has shelved all the books.*

Third, with respect to this same type of causative events that involve a causing subevent as the cause of change, crosslinguistically only the Causee is a structure participant, as shown by the grammaticality of (21b) in (21–22). In this case, it is important to note that although (21c) can be used in a context like answering a question of who wiped the table clean, it

[7] Levin and Rappaport Hovav (2005: 72) discuss the use of *bottle* as a verb and provide the representation in (i), though they do not discuss the inventory of event structure templates in the book. Also, to be fair, Rappaport Hovav and Levin (1998) do mention the templates in (ii) and (iii) in their article; however, they fail to include them in the inventory of event structure templates.

(i) [[x ACT] CAUSE [y BECOME IN <*BOTTLE*>]]

(ii) [[x ACT] CAUSE [BECOME [y <*PLACE*>]]] (Rappaport Hovav & Levin 1998: 107)

(iii) [[x CAUSE [BECOME [y <*PLACE*>]]] (Rappaport Hovav & Levin 1998: 109)

is an incomplete sentence with the object NP elided. On the other hand, (21b) is construed by native speakers of Mandarin as a complete sentence.

(21) a. *Zhangsan yijing ca-ganjing-le zhuozi.*
Zhangsan already wipe-clean-PERF table
'Zhangsan has already wiped the table clean.

b. *Zhuozi yijing ca-ganjing-le.* (a complete sentence)
table already wipe-clean-PERF
'The table has already been wiped clean.'

c. *Zhangsan yijing ca-ganjing-le.* (an incomplete sentence)
Zhangsan already wipe-clean-PERF
'Zhangsan has already wiped (it) clean.'

(22) a. *John has wiped the table clean.*

b. **John has wiped clean.*

c. **The table has wiped clean.*

With respect to (21b), I would like to point out that, although both Cheng and Huang (1994) and Ting (2006) call sentences like (21b) middles, such examples are not truly middles on the basis of Ackema and Schoorlemmer's (2006) reasonable characterization of the middle construction in (6) because they are not generic statements and are not about the property of the overt arguments. In addition, it should be pointed out that there is good evidence that the single overt argument of (21b) is the subject of the whole sentence at least for those cases in which it is used as a complete sentence. First, in terms of linear order, it appears in the canonical subject position of Chinese. Second, unlike the topicalized NP in (23), which is typically accompanied with a pause, normally no pause is involved with respect to the single NP in (21b), as also pointed out by Ting (2006). This suggests that it is at least not necessary to analyze the sentence in (21b) as involving a topicalized Causee and a dropped Causer that occupies the subject position. Third, the example in (21b) is similar to the inchoative use of English change of state predicates such as *break* and *open* in (24) in both form and meaning, except that the sentences in (24), unlike the one in (21b), do not entail a Causer. Given this, the fact that the NPs of the sentences in (24) are subjects strongly suggests that the single NP in (21b) is also a subject. Fourth, if (21b) truly involved a dropped Causer like *Zhangsan*, the sentence should be compatible with adverbs like *teyi*

'intentionally' or *youyi* 'intentionally', an insight drawn from Sybesma (1991: 277). As shown in (25), this is not borne out, which strongly suggests that (21b) does not really involve an elided Causer. Finally, unlike (26), which is strongly felt to be an incomplete sentence without a proper context, the sentence in (21b) sounds natural without any further context. Based on the above evidence, I conclude that the NP in (21b) is a subject.

(23) *Zhuozi, Zhangsan yijing ca-ganjing-le.*
table Zhangsan already wipe-clean-PERF
'Speaking of the table, Zhangsan has already wiped it clean.'

(24) a. *The vase broke right away.*

b. *The door opened right away.*

(25) **Zhuozi yijing youyi ca-ganjing-le.*
table already intentionally wipe-clean-PERF
Intended: 'The table has been intentionally wiped clean.'

(26) *Zhangsan yijing ji-chuqu-le.*
Zhangsan already send-out-PERF
'Zhangsan has already sent (it) out.'

Fourth, another piece of evidence for the fact that the inventory of event structure templates is still incomplete even if (16a) and (16b) are regarded as two separate event structure templates comes from the fact that in Mandarin the causing component can also be a state, as shown in (27).[8] In

[8] According to Vendler (1957: 146–147), states like *be tall* and achievements like *find* cannot be used in "continuous tenses" as shown in (i), and the two differ in that the former last for a period of time, while the latter occur instantaneously.

(i) a. **John is being tall.*
b. **John is finding the book.*

Based on this, the stative status of *e* in *e-bing* 'hungry-sick' and *bing* in *bing-huang* 'sick-nervous' in (27) can be established by the fact that, as shown in (ii), they cannot be used in the continuous tense (or, more exactly, in the progressive aspect) and that they have to be interpreted as lasting for a period of time when used in (27).

(ii) a. **Zhangsan zai e.*
Zhangsan PROG hungry
Intended: 'Zhangsan is in the continuous state of being hungry.'

fact, English also allows the causing component to be a state if this component is expressed with a gerund, as shown in (28).

(27) a. *Zhangsan e-bing-le.*
Zhangsan hungry-sick-PERF
'As a result of Zhangsan's being hungry, he became sick.'

b. *Zhangsan bing-huang-le Lisi.*
Zhangsan sick-nervous-PERF Lisi
'Lisi became nervous as a result of Zhangsan's being sick.'

(28) *Bill's owning a gun frightened Martha.* (Van Valin & LaPolla 1997: 107)

Fifth, as shown in (29), the result component of a Mandarin resultative verb compound (RVC) can also be an activity verb when the causing component is a state.

(29) a. *Zhangsan e-ku-le.*
Zhangsan hungry-cry-PERF
'Zhangsan was so hungry that he started to cry.'

b. *Zhangsan bing-ku-le ta-de mama.*
Zhangsan sick-cry-PERF he-MM mother
'Zhangsan's being sick caused his mother to cry.'

Sixth, there are cases in which both the causing and the result eventuality are activities, although the causing eventuality may be left unexpressed. This is illustrated by (30) below.

(30) *The general is marching the soldiers in the field.*

Finally, if we also take causative verbs like *cause* and *make* into consideration, α and β in "α CAUSE β" can really be any of the simple event structure templates in (3), as suggested by Van Valin and LaPolla (1997). As there are three simple event structure templates in (3), there will be nine combinations if α and β can be any of them, as shown in (31). With

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b. **Zhangsan zai bing.*
Zhangsan PROG sick
Intended: 'Zhangsan is in the continuous state of being sick.'

respect to the first three combinations, (30) is an example of (31a), (15a) and (21a) illustrate (31c), and (32) below illustrates (31b).

(31) α CAUSE β
a. α = activity, β = activity
b. α = activity, β = state
c. α = activity, β = achievement
d. α = inchoative, β = activity
e. α = inchoative, β = state
f. α = inchoative, β = achievement
g. α = state, β = activity
h. α = state, β = state
i. α = state, β = achievement

(32) *The dog's barking caused the baby to be very scared.*

Concerning the next three combinations (31d–31f), they can be illustrated with (33–35), respectively. As for the last three combinations, (31g) has been illustrated with (29), and (31h) and (31i) are exemplified by (36) and (37), respectively.

(33) *The balloon's popping caused the cat to run even faster.*

(34) *The balloon's popping caused the cat to be very scared.*

(35) *The balloon's popping startled the baby.* (Van Valin & LaPolla 1997: 107)

(36) *Bill's owning a gun caused the child to be very scared.*

(37) *Bill's owning a gun undoubtedly startled the child.*

2.3 A solution

To resolve all the issues mentioned in the last subsection, I propose that the inventory of event structure templates should include at least the ones in (38).

(38) Event Structure Templates (cf. Li 2008: 59)
Simple event structure templates:
a. [***x*** ACT$_{<MANNER>}$] or [x ACT$_{<MANNER/INSTRUMENT>}$ on y] (activity)
b. [***x*** <*STATE*>] or [***x*** <*STATE*> ***y***] (state)
c. [BECOME [***x*** <*STATE*>]] or [BECOME [***x*** <*STATE*> ***y***]] or
[BECOME [***x*** ACT$_{<MANNER>}$]] or
[BECOME [x ACT$_{<MANNER/INSTRUMENT>}$ on y]] (inchoative)

Complex causative event structure templates:

d. α CAUSE β, where α is an entity or a simple event and β is generally a simple event and where both the Causer and the Causee participants are structure participants except in the following scenarios, in which a causing activity component is involved and the causing predicate and the result predicate are realized as a single predicate of the word level:
[[x ACT$_{<MANNER>}$] CAUSE [BECOME [***x***, ***y*** or ***z*** <*STATE*/*at LOCATION*>]]]
[[x ACT$_{<MANNER/INSTRUMENT>}$ on y] CAUSE [BECOME [***x***, ***y*** or ***z*** <*STATE*/*at LOCATION*>]]]

As in (16), the variables which are italicized and in bold in (38) refer to structure participants. (38a) incorporates data like (5b), (7), and (9), and (38b) takes examples like (10) and (11) into consideration. Template (38c) incorporates data like (12–14) and template (38d) has taken into account the rest of the discussion in subsection 2.2.

With respect to (38), the following should be pointed out. First, (12–14) do not illustrate all the templates in (38c). To mend this, four more examples are provided below in (39) to fully illustrate all the four templates in (38c) in order.

(39) a. *The soup has cooled on the table for about ten minutes.*

b. *Zhangsan ai-shang-le na-ge nühair.*
Zhangsan love-INCH-PERF that-CL girl
'Zhangsan has fallen in love with that girl.'

c. Zhangsan tiao-qilai le.
Zhangsan jump-INCH SFP
'Zhangsan has started to jump.'

d. *Zhangsan jingran mai-qi yifu lai le.*
Zhangsan unexpectedly sell-INCH clothes INCH SFP
'Surprisingly, Zhangsan has started to sell clothes.'

Second, "***x***" and "***z***" are included in (38d) to accommodate the fact that the entity which undergoes a change of state is not necessarily the same entity as the Patient/Theme argument of the causing subevent expressed by a transitive verb. In fact, the entity undergoing the change can also be a participant that is the Agent argument of the causing subevent as in (40a) or an entity that is distinct from any argument(s) of the causing subevent as in (40b).

(40) a. *Zhangsan zou-lei-le.*
Zhangsan walk-tired-PERF
'Zhangsan walked himself ragged.'

b. *Zhangsan qie-dun-le dao.*
Zhangsan cut-blunt-PERF knife
'Zhangsan cut (something), and as a result the knife became blunt.'

Third, on our proposal the causing component of a complex causative event does not necessarily involve a causing "subevent" as Levin (1999, 2000) and Levin and Rappaport Hovav (2004) claim. Further, what distinguishes between simple events and complex events is whether a causing component is involved and linguistically relevant.

Finally, it should also be pointed out that the inventory of event structure templates in (38) is not arbitrary and in fact has a firm ontological basis in the types of eventualities we experience and observe on a daily basis. Our encyclopedic knowledge tells us that there are not only states and activities but also the onset of a new activity or state and the possible causative relations between (change of) states and (start of) activities. Recall that an event structure template is a representation of the grammatically-relevant aspects of verb meaning. However, verbs are important ways of expressing what we experience and observe. Given the fact that one of the metafunctions of language is "experiential" or "ideational", i.e. to represent patterns of experience (Halliday 1994, 2014), it should be of little surprise that the inventory of event structure templates is so closely related to the ontology of the patterns of experience seen in the real world.

3. Levin and Rappaport Hovav's conditions on argument realization

It has been noted in the last section that one of the differences between (1) and (3) is that the templates in (3) are grouped into templates for simple events and those for complex events. With respect to the distinction between simple and complex event structure templates, Levin and Rappaport Hovav (2004) point out that it is crucial to argument realization via the "Argument-Per-Subevent Condition" (APSC) in (41).

(41) Argument-Per-Subevent Condition (Levin & Rappaport Hovav 2004: 481; see also Levin 2000: 425; Levin & Rappaport Hovav 1999: 202; Rappaport Hovav & Levin 2001: 779; cf. van Hout 2000: 414; Kaufmann & Wunderlich 1998: 29)
There must be at least one argument XP in the syntax per subevent in the event structure.

However, there is evidence that the APSC is empirically incorrect. Specifically, as far as verbs of change of state are concerned, most of them have both a transitive and an intransitive use. According to Levin and Rappaport Hovav (1995) and Rappaport Hovav and Levin (1998), both the transitive and the intransitive uses of verbs like *break* have the event structure representation for a complex event as in (42). If this view is correct, the APSC predicts that *break* should not occur in an intransitive frame. However, this prediction is not borne out, as seen from (43b).

(42) [[x ACT$_{<MANNER>}$] CAUSE [BECOME [y <*BROKEN*>]]]
(Rappaport Hovav & Levin 1998: 116)

(43) a. *John broke the vase yesterday.*

b. *The vase broke yesterday.*

The intransitive use of *break* in (43b) apparently violates the APSC. To account for this, Rappaport Hovav and Levin (1998: 118) assume that the intransitive use involves a zero morpheme (analogous to a reflexive morpheme in the Romance and Slavic languages) which serves to satisfy the Argument-Per-Subevent Condition. However, in their other works (e.g. Rappaport Hovav & Levin 2001: 790–791; see also Levin & Rappaport Hovav 1995: 108), they hold that the causing event of *break*, on its intransitive use, is "lexically bound" and thus "receives no syntactic expression". However, I think that Rappaport Hovav and Levin's explanations above are kind of *ad hoc*. Given that most of the externally caused change of state verbs like *break* have an intransitive use, this poses a serious problem for the APSC.

More importantly, there is evidence against the APSC from Mandarin RVCs like *xi-ganjing* 'wash-clean' which also have a transitive and an intransitive use, as shown in (44) (see (21) for a similar example). Crucially, both uses involve one and the same complex event structure template, as they both entail a causing subevent and a result subevent. Again, the APSC incorrectly predicts that Mandarin RVCs like *xi-ganjing* should not have an intransitive use.

(44) a. *Zhangsan yijing xi-ganjing-le yifu.*
Zhangsan already wash-clean-PERF clothes
'Zhangsan has already washed the clothes clean.'

b. *Yifu yijing xi-ganjing-le.*
clothes already wash-clean-PERF
'The clothes have already been washed clean.'

While the *break* cases can be accounted for by proposing that the intransitive use in fact involves a simple inchoative event structure template and thus does not pose a problem for the APSC (Li 2008; Pylkkänen 2002, 2008), examples like (44b) do clearly demonstrate that the APSC is crosslinguistically invalid. Moreover, they show that although event complexity and argument realization are closely related, it is not always the case that argument realization patterns reflect event complexity.

Then the question is whether examples like (44b) can be accounted for by Levin's "Structure Participant Condition" (SPC) in (2), which requires each structure participant to be represented by an argument XP in the syntax. However, there is a problem with the use of the SPC to account for (44b) because (i) the SPC relies on unambiguous identification of structure participants on the one hand and (ii) the identification of structure participants relies on the diagnostic of obligatory presence in the overt syntax to form a complete sentence on the other.[9] In fact, if we maintain the distinction between constant participants and structure participants and define the latter as a participant without which the sentence would be either incomplete or ungrammatical, the SPC is something intrinsic to the definition of the structure participant and should be eliminated as something unnecessary to avoid any redundancy.

Now we turn to the question of whether the distinction between constant participants and structure participants itself can account for

[9] Rappaport Hovav and Levin (1998) define structure participants as those participants licensed by both the event structure template and the constant and they present the SPC as something distinct. However, the crucial question is how to determine which participant is licensed by both the event structure template and the constant. As seen earlier, Rappaport Hovav and Levin's discussion of the difference between structure participants and constant participants centers on the fact that it is the former, not the latter, that are obligatorily expressed in the overt syntax to form a complete sentence. The point I want to make is that, if this fact is so crucial, obligatory realization should be part of the definition of the structure participant. If the definition of the structure participant involves overt obligatory realization to form a complete sentence, then the SPC becomes something unnecessary.

examples like (44b). As noted in the last section, in the case of the event structure template in (38d) that involves an activity causing component and an inchoative result component, only the Causee argument, the argument undergoing the change of state, is a structure participant. However, it is important to note that while a sentence without the structure participant can certainly not be a complete or grammatical sentence, the distinction between constant participants and structure participants itself does not truly predict that, when only one of the two participants is a structural one and when only this structure participant is overtly realized, the sentence would be grammatical. An analogy here will make my point clearer. If a meal without vegetables cannot be a good meal, then this does not entail that a meal which has vegetables alone is necessarily a good meal. Given this, the two event structure templates given "overtly" under (38d) only predict the ungrammaticality of a complete sentence without having the Causee expressed in the overt syntax. It, however, does not predict the necessary grammaticality of a sentence in which only the Causee is overtly expressed. As a result, the grammaticality of (44b) does not fall out of the distinction between structure participants and constant participants.[10]

4. Obligatory and optional realization of arguments

This section explores in more detail how to realize the arguments in an event structure template. It should be pointed out that an event structure template does not predict all the argument realization patterns with respect to a specific verb represented with this template when, from a crosslinguistic perspective, no structure participant(s) can be established for all the verbs that have this event structure representation. However, when there is at least one structure participant involved, the templates do make predictions as to what participants or arguments need to be overtly expressed while maintaining the same event structure template. For

[10] Then the question is how to account for the grammaticality of (44b) in Mandarin. Li (2008) suggests that, for resultatives to appear in the frame illustrated by (44b), two conditions must be met. First, the two components of a resultative must form a predicate of the word level, which includes compounds. Second, the resultative formed does not violate the head feature percolation condition, namely that the way the arguments of the head of an RVC are realized in the overt syntax should be maintained on the compound level. As Mandarin meets both conditions, (44b) is predicted to be grammatical in the language. See Li (2008) for a comparison of Mandarin and several other languages in terms of their different behavior with respect to the sentence frame in (44b).

example, as noted earlier, the Causee argument is a structure participant in the case of the templates in (38d) that involve an activity causing component and an inchoative result component. This predicts the ungrammaticality of a complete sentence that only has the Causer overtly expressed. For another example, in the case of the template that involves an inchoative result component and an entity or its property as the causing component, both the Causer and the Causee need to be overtly expressed to maintain the same event structure representation. While there are examples that apparently only need the "Causee" argument to be overtly expressed (see (45b)), such examples in fact involve a different event structure template. Specifically, there is no evidence that the *grieve* in (45b), for example, is causative, and arguably it is associated with one of the event structure templates in (38c).

(45) a. *The court decision grieved Sue.*

b. *Sue grieved over/at the court decision.* (Pesetsky 1995: 18, 73)

Moreover, crosslinguistically there is a universal pattern of realizing the Causer and the Causee of a causative sentence when both arguments are overtly realized in the syntax by two distinct expressions. That is, the Causer is realized in the subject position and the Causee in the object position (Li 2008, 2009).[11] For example, in (45a) *the tiger* (the Causer) and *the deer* (the Causee) are realized in the subject and object position, respectively. With respect to the argument realization of a complex causative event, as noted by Levin and Rappaport Hovav (2005: 21), many researchers (e.g. Croft 1990; Hopper & Thompson 1980) have pointed out that verbs involving an animate agent acting on and causing a change in a patient will have the agent argument realized in the subject position and the patient argument expressed in the object position. However, as far as word-level predicates that at least name the resulting change from a causing component are concerned, what is most relevant to argument realization is the Causer and the Causee, not the agent and the patient (Li 2008). This can be illustrated by (46) and (47) below. In (46), for example, *na pen yifu* 'that basin of clothes' is construed as the ultimate Causer of Zhangsan's becoming tired although it is by no means an Agent. As for *Zhangsan*, it is

[11] This way of linking can be formulated in any theoretical framework that recognizes a level of representation for grammatical relations (e.g. Bresnan's 2001 and Bresnan, Asudeh, Toivonen & Wechsler's 2015 Lexical-Functional Grammar and Jackendoff's 2002 Parallel Architecture of Grammar).

interpreted as the Causee that undergoes the change of state. However, this same participant is also interpreted as the Agent of the causing component (i.e. *xi* in *xi-lei* 'wash-tired') and his washing the clothes is also certainly related to his becoming tired.

(46) *Na pen yifu xi-lei-le Zhangsan.*
that basin clothes wash-tired-PERF Zhangsan
'(Zhangsan washed that basin of clothes) and the clothes got Zhangsan tired.'

(47) *Na kuai paigu kan-dun-le san-ba dao.*
that piece/chunk sparerib cut-blunt-PERF three-CL knife
'That sparerib got three knives blunt as a result of the cutting (by some specific person).'

In addition to the obligatory realization of structure participants in complete sentences, there are also two environments where arguments, whether structure or constant ones, must be overtly realized. First, arguments in contrast need to be overtly realized when they do not employ the same linguistic expression (cf. Li 2009). In (48), for example, both pairs of contrastive participants are overtly expressed. I believe that this quite obvious fact has a functional basis. That is, when two entities are compared, our attention is necessarily drawn to them and their overt realization is thus due to communicative needs.

(48) *Zhangsan xihuan **tiaowu**, Lisi xihuan **changge**.*
Zhangsan like dance Lisi like sing
'Zhangsan likes dancing and Lisi likes singing.'

Second, focal arguments without overt contrast also need to be overtly expressed. While Goldberg (2001: 514, 2004: 434) attributes this to focal elements' unpredictability from context, a more straightforward explanation is that it is also due to communicative needs. That is, the focal argument carries the most important information and is what the speaker wants to express the most; as a result, it must be overtly expressed. As shown in (49), the focal argument, which bears heavy stress and is in bold, is overtly expressed. It should be pointed out that unlike (48), (49) does not involve any overt contrast, though it may convey some sort of implicit contrast.

(49) *Zhangsan xihuan **tiaowu**.*
Zhangsan like dance
'Zhangsan likes dancing.'

As mentioned above, when from a crosslinguistic perspective no structure participant(s) can be established for all the verbs sharing the same event structure template, the shared template itself does not predict the argument realization patterns with respect to a specific verb represented with that template. However, crosslinguistically there are universal contexts where a constant argument can be left unexpressed.

First, for an activity event that involves two participants, the constant participant that is acted upon can be omitted when it is indefinite and nonspecific and when a generic statement is involved (cf. Li 2009), as shown in (50).

(50) a. *Dogs can certainly bite when they are irritated.*

b. *Gou ji-le dangran hui yao.*
dog irritated-INCH certainly can bite
'Dogs can certainly bite when they are irritated.'

Second, as shown in (51), the constant participant being acted upon in an activity may also be left unexpressed when the action is repetitive (cf. Goldberg 2001, 2004; Li 2009). This is due to the fact that the repeated action creates an effect of emphasizing the action and defocusing the entity being acted upon.

(51) a. *The chef-in-training chopped and diced all afternoon.* (Goldberg 2001: 506, 2004: 435)

b. *Zhangsan zhengge xiawu dou zai kan.*
Zhangsan whole afternoon all PROG chop
'Zhangsan chopped all afternoon.'

Third, for an activity that involves two participants, the participant performing the action can be omitted if it is possible to talk about the event from the perspective of the participant being acted upon and to construe the patient/theme argument and the verb as forming an event on their own. For example, some transitive verbs in the progressive aspect can be used intransitively, as shown in (52). This can be explained by the fact that the progressive aspect in (52) makes the event appear as a state, i.e. a state of continuously performing the same action. This, in turn, helps make it possible to talk about the event from the perspective of the patient/theme

and to construe the patient/theme argument and the verb as forming an event on their own.

(52) a. *Seasonings such as garlic, onion, oregano, parsley or thyme can be added to the pot while* ***beans are cooking***. (<http://www.americanbean.org/cooking-with-beans/>, accessed on August 29, 2015)

b. *Douzi zai zhu.*
bean PROG cook
'The beans are cooking.'

For another example, many transitive verbs can be used in the middle construction (see, for example, Ackema & Schoorlemmer 2006; Fagan 1988, 1992; Fellbaum 1986; Keyser & Roeper 1984; Lekakou 2006), as shown in (53). One property of the English middle construction, for instance, is its use of adverbs like *easily*. I argue that the addition of *easily* makes the event more stativized and thus makes it more possible to talk from the perspective of the entity being acted upon and to present this entity and the action involved as an event in itself. In this respect, Ackema and Schoorlemmer (2006) are right in characterizing true middles as stative.

(53) a. *Books like this one sell easily.*

b. *This car drives easily.*

5. Summary and theoretical significance of the study

Questions related to event structure and argument realization are important questions in syntax–semantics interface studies. This study, I believe, is of theoretical significance due to its contribution to the development of a comprehensive theory of event structure and argument realization. Specifically, the paper develops the event structure templates presented by Levin and Rappaport Hovav. It not only presents a fuller list of event structure templates but also shows that the Structure Participant Condition should be eliminated if the definition of the structure participant involves the part of obligatory realization in a complete sentence. The paper also contributes to a better understanding of the relationship between event structure and argument realization. It argues that the Argument-Per-Subevent Condition suggested by Levin and Rappaport Hovav (2004 and

Rappaport Hovav & Levin 2001) is empirically incorrect. It demonstrates that, although event complexity and argument realization are closely related, it is not always the case that argument realization patterns reflect event complexity. Finally, the paper contributes to our understanding of obligatory and optional realization of arguments by discussing several cases of obligatory realization of structure and constant participants as well as three cases in which a constant participant of a transitive activity verb can be left unexpressed. This discussion points to the fact that a full account of argument realization needs to take different factors into consideration, including structural, semantic, and pragmatic/discourse factors.

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