

# Concealed Causation in English and Japanese

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This paper deals with linguistic expressions in English and Japanese in which 'concealed causation' is observed. Causation is concealed in an expression when the meaning of the expression involves a causal relation between events (*i.e.*, one event causes another event) and there is no morphosyntactic markings of the causation. In the periphrastic causative construction like *this song always makes me sad*, the verb *makes* qualifies semantically as a marker for causation. Thus the causation is not concealed but explicit in such a case. However, languages may have some syntactic and/or morphological devices for expressing causation without any causative morphemes. In such cases, the causation is concealed. As we will see, the causation can be concealed within an inherent semantic structure of simple words, or it can be derived by morphological compounding or by a compositional process at a certain level of semantic representation.

In section 1, we survey concealed causation constructions in English and Japanese. In section 2, we try to characterize the semantic properties of the concealed causation in terms of the notion of direct causation, which is the most salient semantic character of concealed causation. We argue that the direct causation can be formalized as two constraints on semantic representations. Section 3 is dedicated to proposing a dual semantic structure approach. We propose that semantic representation should be separated into two distinctive but closely related representations. One is Event Structure, which represents the temporal organization of meaning. The other is Conceptual Structure, which represents the situational information of meaning such as thematic relations. We also argue that the two constraints discussed in section 2 are constraints on Event Structure and Conceptual Structure respectively. In section 4, we examine empirical evidence for the present approach based on a comparative study of English and Japanese.

## 1. Concealed Causation

### 1.1. English

English has two kinds of expressions in which causation is concealed. The first type of expression of concealed causation is so-called lexical causative verbs like *break* or *open*. These verbs involve a causal relation between two events in their lexical meaning. Thus the meaning of the sentence (1a), for example, is represented as in (1b). The first subevent, EVENT-1, is a causing event, and the second subevent, EVENT-2, a caused (or result) event. CAUSE is a semantic function that takes two events as arguments.

- (1) a. The explosion broke the house.  
 b. [<sub>EVENT</sub> CAUSE ([<sub>EVENT-1</sub> the explosion], [<sub>EVENT-2</sub> BECOME (the house, broken)])]

The other case where causation is concealed is resultatives, some canonical examples of which are listed in (2).

- (2) a. He hammered the metal flat. <transitive resultative>  
 b. She sang herself hoarse. <unergative resultative>  
 c. The river<sub>i</sub> froze <sub>t</sub> solid. <unaccusative resultative>

The resultative is a subtype of secondary predication in which a predicative result phrase (AP or PP) occurs in addition to the primary predicate, *i.e.*, the matrix verb. However, it differs from other types of secondary predicate constructions like (3) in that only in the former can we observe a causal relation between two events in its meaning.

- (3) a. He ate the meat raw.  
 b. John left the hotel angry.

Thus (2a) can be paraphrased as (4), but (3a) cannot be paraphrased as (5):<sup>1</sup>

- (4) He made the metal flat by hammering it.  
 (5) He made the meat raw by eating it.

In resultatives, neither the matrix verb nor the result phrase involves causation in its lexical meaning. For example, in (2a), the matrix verb *hammered* denotes only an activity and the result phrase *flat* denotes a state. Thus the source of the causation intuitively obtained in (2a) is not clear and must be explained.

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<sup>1</sup>In fact, as we see in section 2, the paraphrase here is not always correct. (2a) always entails (4), but (4) does not always entail (2a).

Lexical causatives and resultatives are quite similar with respect to their event semantics, while they are different with respect to their morphosyntax. It is obvious that lexical causatives are morphologically simple verbs, but as for resultatives, their morphosyntactic status needs to be considered in more detail. The matrix verb in (2a) is transitive and the postverbal NP is a direct internal argument of the verb. In (2b), the matrix verb is unergative and the postverbal NP is a 'fake' object, which is not an argument of the verb. In (2c), the verb is unaccusative and at S-structure, the postverbal position is occupied by an NP-trace left behind by the movement of the surface subject, *the river*. Whether the postverbal NP is a verbal argument or a fake object, and whether it is phonetically null or not, resultatives all fall under a unique syntactic scheme (6).

(6) [<sub>V</sub> V NP AP/PP]

Although the internal structure of the V' in (6) is still controversial,<sup>2</sup> it is widely accepted that both NP and AP/PP are in the complement domain of the matrix verb. Thus V' in (6) is the lowermost V'; AP/PP is not an adjunct of the V'.

Because of the tight semantic relation between V and AP/PP, one may propose that V and AP/PP are reanalyzed into a single complex predicate at some level of syntactic representation as in (7):

(7) [[<sub>X<sup>0</sup></sub> V-AP/PP] NP]

This, however, violates principles of X-bar Theory since a maximal projection AP/PP is adjoined to an X<sup>0</sup> category, V, and the reanalyzed predicate is also an X<sup>0</sup>. It is clear that the result predicate is a maximal projection, because the result predicate can be a phrasal expression:

- (8) a. Why don't you paint it red and white like a barber pole?  
 b. You should wipe the table as clean as possible.

Thus, as a syntactic representation, (7) is not correct. However, the fact that the meaning of resultatives is parallel with that of lexical causatives, *i.e.*, both conceal causation, suggests that the V-AP/PP pair should be represented as a single unit at a certain level of semantic representation. We will argue on this matter in section 3.

Note in passing that the reanalysis approach seems to be plausible in the following case, where the result predicate precedes the NP complement of the verb even without the environment of heavy NP shift:

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<sup>2</sup> See Carrier and Randall (1992), Hoekstra (1988), and Williams (1997) among others.

(9) John wiped clean the table.

Williams (1997) proposes that (9) is a candidate for a lexical rule of complex predicate formation (10).

(10) V → V A

He points out that the adjective *clean* in (9) cannot be phrasal, while in the case of resultatives, it can be:

- (11) a. \*John wiped very clean the table.  
b. John wiped the table very clean.

A parallel contrast is found in verb-particle constructions:

- (12) a. They looked up the information.  
b. \*They looked right up the information.  
c. They looked the information up.  
d. They looked the information right up.

Den Dikken (1995) generalizes this fact as follows:

- (13) Particle modification is impossible if V-Prt reanalysis has occurred.

(Den Dikken (1995: 107))

Although Williams claims that (9) is the output of a lexical complex predicate formation rule, we can assume it to be a result of reanalysis as Den Dikken does for verb-particle construction. If so, Den Dikken's generalization is extended to V-A reanalysis. We leave the explanation of the generalization open for further research and only claim that, nonetheless, the reanalysis approach cannot be extended further to the resultatives for the reason we have seen above.

In sum, in English, concealed causation is observed in lexical causative verbs and in resultatives. Since these two are quite different from each other from the view point of morphosyntax (the former is lexical, while the latter is phrasal), it is plausible to suppose that concealed causation is accounted for in the domain of semantics.

## 1.2. Japanese

Let us now turn to the consideration of Japanese concealed causation constructions. Japanese also has both lexical causative verbs and resultatives as in (14) and (15) respectively:

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- (14) a. Kare-ga ie-o kowashi-ta  
 He-Nom the house-Acc break-Past  
 'He broke the house.'
- b. Kare-ga mado-o ake-ta  
 He-Nom the window-Acc open-Past  
 'He opened the window.'
- (15) a. Kare-ga kabe-o akaku nut-ta.  
 He-Nom the wall-Acc red paint-Past  
 'He painted the wall red.'
- b. Kare-ga bin-o konagona-ni wat-ta.  
 He-Nom the bottle-Acc bits-NI break-Past  
 'He broke the bottle to bits.'

We assume that the structure of Japanese resultatives is as in (16) below. It is identical with the English case (6) except for differences in word order.

- (16) [<sub>v</sub> NP AP/NP-ni V]

Note that the following examples show that even when the result predicate is an adjective as in (15a), A-V reanalysis does not occur:

- (17) a. Kare-ga bin-o totemo komakaku kudai-ta.  
 He-Nom the bottle-Acc very fine crush-Past  
 'He crushed the bottle into very fine pieces.'
- b. Kare-ga kabe-o yane-to onaji aka-ni nut-ta.  
 He-Nom the wall-Acc the roof-TO same red-NI paint-Past  
 'He painted the wall as red as the roof was.'

Being phrasal, the result predicate cannot be an X<sup>0</sup> category.

From the argument so far, it appears that English and Japanese both use the same class of expressions to imply concealed causation. However, as Kageyama (1996) argues in detail, the range of environments where resultatives can occur is still narrower in Japanese than in English. There are some classes of verbs which do not admit resultatives in Japanese but whose English counterparts do:

- (18) a. He ate himself sick.  
 b. \*Kare-ga jibun-o byoki-ni tabe-ta.  
 He-Nom himself-Acc sick-NI eat-Past

- (19) a. They drank the teapot dry.  
 b. \*Karerera-ga teapot-o karakara-ni non-da.  
 They-Nom the teapot-Acc dry-NI drink-Past
- (20) a. He hammered the metal flat.  
 b. \*Kare-ga sono kinzoku-o taira-ni tatai-ta.  
 He-Nom the metal-Acc flat-NI hammer-Past

According to Kageyama (1996), the ungrammatical cases can be divided into three major subcases. First, unergative resultatives with fake objects are completely disallowed in Japanese as in (18). Second, if an argument of a transitive verb is unexpressed and the verb is used as if it was unergative as in (19a), its literal translation into Japanese (19b) is unacceptable. Finally, as the contrast in (20) shows, not all transitive verbs are allowed in Japanese resultatives. Kageyama claims that only change-of-state verbs are allowed in Japanese resultatives. Note that change of state verbs are lexically causative. Thus the causation is inherently concealed in their lexical meaning as we saw in the previous subsection. He proposes that the function of the result predicate is to specify or modify an LCS (Lexical Conceptual Structure) constant in the result subevent. Thus, for example, the Conceptual Structure of (15a) is as follows:<sup>3</sup>

- (21) [kare] CONTROL [[kabe] BECOME [[kabe] BE AT-[COLORED]]]  
 |  
 aka

The first line of (21) is the LCS of *nu-ru* (paint). *COLORED* is an LCS constant and a part of the lexical meaning the verb.<sup>4</sup> The result predicate *aka* (red) specifies the meaning expressed by the constant: It only specifies the color that he used to paint the wall. Even if the result phrase is omitted, the sentence still implies a causative relation of events. Therefore, the causation in Japanese resultatives originates from the inherent lexical semantic property of the matrix verb. The result phrase is not essential to express causation in this case. Result predicates do not alter the organization of event relations inherently encoded in the semantic structure of lexical causative verbs.

Kageyama claims further that given the fact that only a subclass of English resultatives can be literally translated into Japanese, English resultatives also should be

<sup>3</sup>Kageyama (1996) uses the LCS function CONTROL in this case in place of CAUSE. The CONTROL/CAUSE distinction he proposes is very interesting, but we put aside the discussion about it and assume CONTROL as equivalent to CAUSE.

<sup>4</sup>See Jackendoff (1990), Pinker (1989), and Levin and Rappaport Hovav (1995) for the explanation of LCS constants.

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divided into two subtypes according to the inherent semantics of matrix verbs as in Japanese: in one subtype, the verb is lexically causative; and in the other, it is not. The former type, exemplified in (22), is analyzed similarly to Japanese resultatives. The result phrase is an LCS modifier. In the latter type, exemplified in (23), on the other hand, the matrix verb is not lexically causative, and the causation cannot be attributed to the lexical semantics of the verb. Their lexical semantic representations do not involve causation.

- (22) a. John broke the bottle open.  
b. John baked a cake black.  
c. The river froze solid.
- (23) a. John kicked the door open.  
b. John watered the tulips flat.  
c. I laughed myself hoarse.

The result phrase cannot be an LCS modifier in this case, because there are no LCS constants to be modified in the LCS of the matrix verb. Following Jackendoff (1990), I assume that the LCS of *kick* is (24):

- (24) [<sub>EVENT</sub> INCH [<sub>STATE</sub> BE ([     ], [<sub>PLACE</sub> AT [     ]])] / WITH-FOOT]

The portion after the slash represents the manner of activity, which differentiates *kick* from other verbs of impact like *hit*, *strike*, or *punch*. The only LCS constant found in (24) is *WITH-FOOT*. But it is impossible to interpret the result predicate *open* as a modifier of *WITH-FOOT*. The resultant meaning would be wrong. Thus result predicates in (22) and in (24) have different semantic characterization from each other. Those in (22) are LCS modifiers, while those in (23) are not.

If Kageyama's proposal is on the right track, Japanese resultatives and English ones of the type (22) are simply variants of lexical causative verb constructions. Japanese only allows this type of resultatives, whereas English also allows the second type exemplified in (23). Given that the causation observed in the second type cannot be reduced to any lexical items, it must be derived in some other ways. Namely, the concealed causation in the first type is lexical in some sense, while in the second type, it is not lexical. Henceforth, we refer to the first type as lexical resultatives, and to the second type as non-lexical resultatives. We will discuss the source of the concealed causation of non-lexical resultatives in section 3.

In addition to lexical causative verbs and lexical resultatives, Japanese has yet another type of expression of concealed causation. It has the form of a V-V compound. Japanese abounds in V-V compounds. Kageyama (1993) divides them into two major

types in terms of the level of representation at which the compounding is applied: syntactic V-V compounds and lexical V-V compounds. Syntactic V-V compounds are derived by the application of compounding at a level of syntactic representation and thus involve some complement structure. These include aspectual compounds, which are formed by compounding an aspectual verb like *hajime-ru* (begin), *oe-ru* (finish), and *tsuzuke-ru* (continue) as second verb of the compound with a first verb:

- (25) a. *warai-hajime-ru*  
 laugh-begin-Pres  
 'begin laughing'  
 b. *yomi-oe-ru*  
 read-finish-Pres  
 'finish reading'  
 c. *hashiri-tsuzuke-ru*  
 run-continue-Pres  
 'continue running'

-(*S*)*ase-* causatives, which count as periphrastic causatives, show similar morphosyntactic behaviors to syntactic V-V compounds, though -(*s*)*ase-* is not an independent V, but a bound morpheme:

- (26) a. *waraw-ase-ru*  
 laugh-Cause-Pres  
 'cause to laugh'  
 b. *ukab-ase-ru*  
 float-Cause-Pres  
 'cause to float'

-(*S*)*ase-* causatives are the only causative construction in Japanese which derived syntactically. On the other hand, Kageyama argues that lexical V-V compounds are derived by the application of compounding at a level of lexical representation and do not involve any complement structure. They include the following compounds.

- (27) a. *oshi-taos-u*  
 push-topple-Pres  
 b. *tataki-tsubus-u*  
 hit-smash-Pres  
 c. *keri-ake-ru*  
 kick-open-Pres



This class of lexical compounds corresponds semantically with English non-lexical resultatives. The most natural translation of (28a) is (28b):

- (28) a. Taro-ga    doa-o            keru-ake-ta  
           Taro-Nom the door-Acc kick-open-Past  
       b. Taro kicked the door open.

Since *kick* is not a lexical causative verb as we have seen above, (28b) is a non-lexical resultative. Japanese uses V-V compounds to express the same meanings that English uses non-lexical resultatives to express.

To sum up, the correspondences between English and Japanese concealed and explicit causation constructions are schematized as follows:

(29) English	Japanese	Causation type
Lexical causative	— Lexical causative	) concealed causation
(Lexical resultative	— Lexical resultative)	
Non-lexical resultative	— Lexical V-V compound	
Periphrastic causative	— <i>-(s)ase-</i> causative	— explicit causation

Note that the lexical resultative is enclosed in parentheses since we concluded that it is a variant of the lexical causative.

## 2. Direct Causation

In this section, we consider the semantic characterization of concealed causation. Shibatani (1976a, b) makes interesting observations about the semantic differences between lexical causatives and syntactic (*i.e.*, periphrastic) causatives with respect to the distinction between direct causation and indirect causation. In direct causation, the causer directly causes the result event; while in indirect causation, the causer brings about the result event through some mediating factor. Thus direct causation is restricted to the causation in which no mediating factors intervene between a causer and a result event. Let us refer to this constraint as the No Mediating Factor Constraint (NMFC):

(30) *No Mediating Factor Constraint*

The causer causes the result event without any mediating factors.

While lexical causatives can represent direct causation but they cannot express indirect causation; syntactic causatives, on the other hand, can represent both direct and indirect causation:<sup>5</sup>

- (31) a. Taro-ga fune-o ukabe-ta.  
Taro-Nom a boat-Acc float-Past  
'Taro floated a boat.'
- b. Taro-ga fune-o ukab-ase-ta  
Taro-Nom a boat-Acc float-Cause-Past  
'Taro caused a boat to float.'
- (32) a. Kare-ga paipu-o mageta.  
He-Nom a pipe-Acc bend-Past.  
'He bent a pipe.'
- b. Kare-ga paipu-o magar-ase-ta.  
He-Nom a pipe-Acc bend-Cause-Past  
'He made a pipe bend.'

The periphrastic causatives, (b) examples in (31) - (32), can express both direct and indirect causation, but the lexical causatives, (a) examples, only express direct causation. (31b), for example, can be used to describe a situation in which Taro put a boat onto the surface of the water by using his own hands. In addition, it can also describe the situation like this: Hanako made a model boat and tried to float it. But it sank. Taro found a pinhole in the bottom of the boat and told Hanako to stop it up. She did so and then she managed to float it. (31a), on the other hand, can be used only to describe the former situation. The same generalization holds in English for the translations of (31) - (32). This generalization about direct causation can be stated as follows:

- (33) Only the following associations are allowed:
- |   |       |                    |
|---|-------|--------------------|
| lexical causative (lexical resultative) | ————— | direct causation   |
| periphrastic/-(s)ase- causative         | ————— | indirect causation |

Now let us examine how the generalization (33) is extended to English non-lexical resultatives and Japanese lexical V-V compounds. English non-lexical resultatives are similar to lexical causatives in that they express only direct causation. In transitive resultatives, it is difficult to imagine a situation of indirect causation because most

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<sup>5</sup> Shibatani's analysis is more elaborated than the one presented here. However, it is sufficient for the present purpose to make clear that lexical causatives cannot express indirect causation.

transitive verbs imply that the subject directly acts on the object without intervening factors. Thus we consider unergative resultatives:

- (34) The clock ticked the baby awake.

This sentence does not express indirect causation. For instance, it cannot mean that the clock ticked, the mother woke up by hearing that, and she woke the baby up. Therefore, resultatives resemble lexical causatives in that both always imply direct causation and cannot express indirect causation.

Japanese lexical V-V compounds are also restricted to expressing only direct causation.

- (35) Watashi-wa doa-o keru-ake-ta.  
I-Top the door-Acc kick-open-Past

It is impossible to suppose a mediating factor between the kicking and the opening. The kick must be the direct cause of the door's opening.

At this point, if the concealed/explicit distinction for causation in (30) is taken into consideration, we see that concealed causation is always direct causation. Consequently, we have reached the following generalization:

- (36) Only the following associations are allowed:
- |  |   |                    |
|--|---|--------------------|
| lexical causative (lexical resultative)        | } | — direct causation |
| non-lexical resultative / lexical V-V compound |   |                    |
| periphrastic/-(s)ase- causative                | — | indirect causation |

Direct causation has been characterized from another perspective: temporal displacement between two causally related events. The direct versus indirect causation distinction in this respect was first noted by Fodor (1970). He pointed out the contrast in (37), denying the possibility of deriving *kill* from *cause to die* transformationally.

- (37) a. John caused Bill to die on Sunday by stabbing him on Saturday.  
b. \*John killed Bill on Sunday by stabbing him on Saturday.

The periphrastic causative (37a) allows two distinct time adverbs: *on Sunday* modifying the event of dying and *on Saturday* modifying the whole event *cause to die*. The lexical causative (37b) does not allow two time adverbs. The sentence (38a) is ambiguous but (38b) is not:

- (38) a. John caused Bill to die on Sunday.  
b. John killed Bill on Sunday.

*On Sunday* in (38a) can refer either to the moment of John's action, say stabbing Bill, which caused Bill's death; or to the moment of Bill's death. *On Sunday* in (38b) must refer to the moment of both John's action and Bill's death. Thus John's action and Bill's death must occur on Sunday. This fact shows that in periphrastic causatives, the causing event and the caused event can be temporally distant, while in the lexical causative construction, the caused event must occur simultaneously with the endpoint of the causing event. No intermediary time intervals are possible.

Goldberg (1995) points out that the same restriction holds in resultatives. She refers to it as the Aspectual Constraint. Consider the sentences in (39).

- (39) a. He (already) ate.  
b. He ate himself sick.

In a neutral context, *eat* with an unexpressed argument normally implies that the agent finished eating something as in (39a). However, when *eat* occurs in a resultative as in (39b), the eating is necessarily interpreted as extending over the period of time leading up to the change of state associated with the resultative, here the change into a state of being sick. It cannot imply that a meal he ate last night made him sick this morning. The Aspectual Constraint on Resultatives is stated as follows:

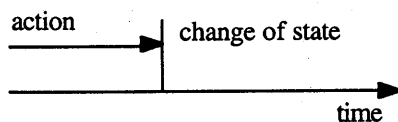
(40) *Aspectual Constraint*

The change of state must occur simultaneously with the endpoint of the action denoted by the verb. (Goldberg (1995: 194))

If we consider a period of time as a mediating factor, the Aspectual Constraint seems to fall under the NMFC. However, as Goldberg's naming suggests, the Aspectual Constraint differs from the NMFC. The former, being aspectual, refers to the temporal organization of denoted events, whereas the latter refers to the situational or contextual information about denoted events.

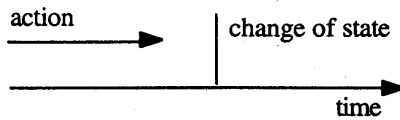
The temporal nature of the Aspectual Constraint is straightforwardly schematized by Goldberg:

(41) Allowed



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Disallowed



(Goldberg (1995: 194))

(41) expresses that the causing action must extend over the period of time leading up to the change of state. The formalization of the Aspectual Constraint unavoidably refers to the time axis as in (41).

Now let us go back to the NMFC to see some phenomena which suggest that the NMFC is situational or context-dependent in nature. Goldberg (1995) proposes several constraints that fall under the notion of direct causation to reveal its characteristics. She claims that some constraints require access to contextual information and general real-world knowledge combined with certain specifications of particular lexical items. For example, lexical causatives can be used to imply *conventionalized* causation that may in actuality involve a mediating factor. Consider one of her examples:

(42) Chris cut her hair at the salon on University Avenue. (Goldberg (1995: 169))

It is a conventional way to have one's hair cut to go to a salon. It is not Chris herself who cuts her own hair. There exists a hairdresser as a mediating factor. Goldberg suggests that conventional scenarios can be cognitively 'packaged' in such a way that their internal structure is ignored and the causation counts as direct. The unacceptability of the following sentence results from the fact that planting and watering is not a conventional way to grow plants 'onto the roof':

(43) ??Farmer Joe grew those vines onto his roof.

The same process of 'cognitive packaging' exists in Japanese:

(44) Taro-wa atarashii ie-o tate-ta.

Taro-Top a new house-Acc build-Past

'Taro build a new house./Taro had a new house built.'

The sentence (44) can be used even when Taro did not build a new house with his own hands. It is a conventional way to have a house built to ask a carpenter to build it. Thus the lexical causative verb *tate-ru* can be used to express this 'packaged' indirect causal relation.

The conventionality in question is determined depending crucially on contextual information and real-world knowledge. Such information and knowledge determine what

is a conventional way to do something. Therefore, the notion of direct causation, which we have formalized as the NMFC, is situational in nature.

On the other hand, the Aspectual Constraint is not situational. It is not affected by any contextual information or real-world knowledge. We cannot imagine any situation where (39b) is acceptable when the eating does not extend over the period of time leading up to the change into a state of being sick. Thus it is reasonable to consider that the Aspectual Constraint is not situational, but temporal (or aspectual) in that it must refer to the temporal organization of events. Accordingly, the NMFC bans a mediating factor between two events and the determination of mediating factors is dependent on situational information; while the Aspectual Constraint bans a temporal displacement of two events along the time axis and situational information is irrelevant.

In the next section, I propose a dual semantic representation approach and claim that that approach is fairly suitable to represent situational and temporal properties of meaning in a straightforward way, and that each of the two constraints discussed so far is regarded as a constraint on one of the two semantic representations. The NMFC is a constraint on semantic representations of situational properties. The Aspectual Constraint is a constraint on semantic representations of temporal properties.

### 3. Event Structure

Recent studies concerning the relation between lexical (or conceptual) semantics and syntax (Jackendoff (1990) and Grimshaw (1990) among others) has revealed that the determinant of argument linking is the aspectual property of verbs. Grimshaw (1990) distinguishes thematic and aspectual dimensions of semantic analysis and claims that it is the aspectual dimension that determines argument linking. Tenny (1994) states this conception in a more explicit way as the Aspectual Interface Hypothesis:

(45) *Aspectual Interface Hypothesis*

The universal principles of mapping between thematic structure and syntactic argument structure are governed by aspectual properties. Constraints on the aspectual properties associated with direct internal arguments, indirect internal arguments, and external arguments in syntactic structure constrains the kind of event participants that can occupy these positions. Only the aspectual part of thematic structure is visible to the universal linking principles. (Tenny (1994: 2))

These findings strongly suggest that aspectual properties of meaning should be represented in an explicit way. Following Pustejovsky (1991), we assume that aspectual

properties are explicitly represented at a unique level of representation. We refer to the level of aspectual representation as Event Structure. Event Structure is associated in a principled way with (Lexical) Conceptual Structure and represents the temporal organization of meaning. In addition, following Tenny (1994), we assume Event Structure to be a representation of *syntactically relevant* aspects of meaning. Event Structure must include the information that is necessary to determine the legitimacy of syntactic representation, but it must not include any information that is not relevant in syntactic components. This means that situational or contextual notions like thematic relations should be excluded from the characterization of Event Structure. Consider the following sentence.

(46) The car hit the tree.

What thematic role does *the car* bear? Agent? Can a non-human be an agent? What about *the tree*? Is it a patient? It may be so. However, if the car is much smaller than the tree and the car broke when it hit the tree, then the patient will be *the car* not *the tree*. The identification of thematic roles is far from well-established and, more importantly, it requires contextual information. Nevertheless the syntactic expression of the sentence (46) does not change regardless of the thematic roles the two NPs bear. Argument realization in syntax is not affected by thematic relations. Syntactic structures are determined by virtue of aspectual properties, not of situational properties such as thematic relations. Then the most restrictive hypothesis is that syntax can access only to Event Structure, but cannot refer directly to Conceptual Structure, which encodes situational properties. In other words, semantic representation consists of two distinct but properly related structures: Event Structure and Conceptual Structure. Event Structure is the sole interface for the correspondences between syntactic structure and Conceptual Structure.

Pustejovsky extends the conventional view of an event as a single, existentially quantified event variable, and proposes a subeventual analysis for predicates and an arboreal notation for Event Structure, both of which we adopt here. He distinguishes three basic types of Event Structures: states, processes and transitions, as in (47) - (49). (The left column is a general template for each event type and the right is an example.)<sup>6</sup>

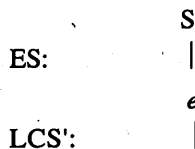
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<sup>6</sup> In fact, the LCSs must be more refined so that they involve enough information to express situational and contextual properties correctly.

(47) *State*



The door is closed.

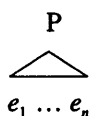


[closed (the-door)]

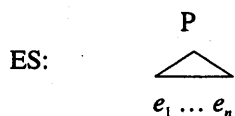
LCS:

[closed (the-door)]

(48) *Process*



John ran.



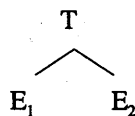
LCS':



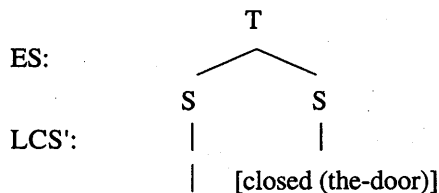
LCS:

[run (j)]

(49) *Transition*



The door closed.



[¬ closed (the-door)]

LCS:

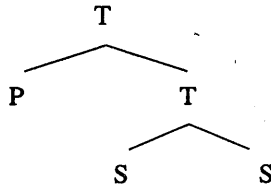
become ([closed (the-door)])

A state, labeled S, is a single event, which is evaluated relative to no other event. A process, labeled P, is a sequence of events ( $e_1 \dots e_n$ ) identifying the same semantic expressions. A transition, labeled T, is composed of two subevents  $E_1$  and  $E_2$ . In the example in (49), the two subevents are both states, but we assume that they need not necessarily be states.

Our concern in this section is how concealed causation is derived and represented in this framework. Recall that we defined causation as a relation between events. So it is plausible to assume that it is represented at the level of Event Structure. First, consider the Event Structure of lexical causatives. It can be regarded as a variant of the transition structure as in (50):



(50) Mary broke the bottle.



The first subevent P represents a process that causes the result event, which is represented as the second subevent, the downstairs T. Then suppose (51) below, where causation is defined in structural terms:

(51) Interpretation of Transition Structure

Two subevents in a transition structure are causally linked.

The idea underlying (51) is not novel. For example, Wunderlich (1997), following the proposal of Kaufmann (1995a, b), poses a general coherence constraint on verbs (52).

(52) *Coherence*

A lexical SF conjunction is contemporaneously or causally interpreted.<sup>7</sup>

Since Wunderlich assumes that the primary–secondary predicate pair in resultatives is an extended lexical verb, (52) is applicable to the resultatives in question. Nevertheless (51) is theoretically more restrictive than (52) in that the latter includes a disjunctive statement.<sup>8</sup>

Consider next the Event Structure of English non-lexical resultatives. Each non-lexical resultative sentence includes two predicative items: the activity verb, which denotes the action that brings about the resultant state, and the stative predicate, which denotes that resultant state. Assume that every predicate has its own event structure whether it is stative or nonstative.<sup>9</sup> Then in the case of (53a), for instance, the verb *drink* and the adjective *empty* are assigned Event Structures (53b) and (53c) respectively.

<sup>7</sup> SF is Semantic Form, which is considered to be a computational level of Wunderlich's two-level semantics. The other is Conceptual Structure, which is the level of reasoning that may draw on any kind of mental operations. See Wunderlich (1997) for details.

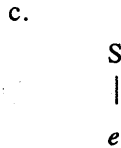
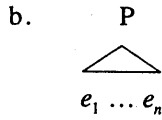
<sup>8</sup> The contemporaneous conjunction corresponds to depictives as in (i), where there is no causal relation:

(i) John ate the meat raw.

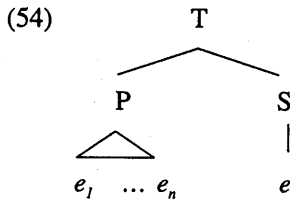
In terms of Event Structure, the depictive predicate *raw* in (i) counts as modifier of the eating event. So assume that depictives do not have a transition structure in their Event Structure.

<sup>9</sup> See Higginbotham (1985) for a similar proposal.

(53) a. John drank the bottle empty.



In order for (53a) to be properly interpreted, the two events should be related as a causal relation. Suppose that two events can be combined under a certain condition, yielding a transition structure as in (54).



Then the interpretation rule (51) can be the source of concealed causation in English non-lexical resultatives., derived by the composition of two events at Event Structure. Given the assumption that Event Structure is the sole interface level of semantic representation for syntax–semantics correspondence, it is plausible to consider that an operation at Event Structure directly affects syntactic structures. So it is accounted for why result predicates can occur within the complement domain of the matrix verb as in (6) for English and (16) for Japanese repeated here.

(55) [<sub>V</sub> V NP AP/PP] (English) (= (6))

(56) [<sub>V</sub> NP AP/NP-ni V] (Japanese) (= (16))

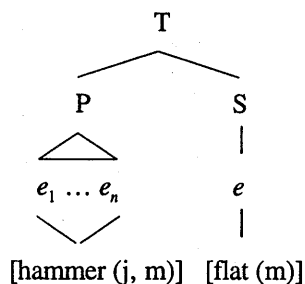
Two predicates, *i.e.*, the matrix verb and the result phrase, occur within a single predicative phrase, V'. As mentioned in section 1, this fact suggests that the two predicates are closely related, and they form a single unit at some level of semantic representation, though they are distinct at syntactic representation. Now we have a representation where they form a single unit: Event Structure. Though the matrix verb and the result predicate are separate categories in syntactic structure, their Event Structures are combined, forming a single event. Thus they are not complex predicates at syntactic structures, but they *are* at Event Structure. The syntactic structures (55) and (56) reflect this characteristic of resultatives.

The dual semantic structure approach proposed here provides appropriate representations for the two semantic constraints on concealed causation constructions discussed in section 2. Recall that the formalization of the No Mediating Factor Constraint (NMFC) is dependent on situational information, while the Aspectual Constraint crucially refers to temporal organization of events. This situational-temporal distinction corresponds quite straightforwardly to the Conceptual Structure-Event Structure distinction argued for above. Therefore we conclude that the NMFC is a constraint on Conceptual Structure and the Aspectual Constraint is a constraint on Event Structure. This shows that the dual semantic structure approach has a conceptual advantage over the theories that assume a single level of semantic representation. We will try to seek empirical evidence for our present approach in the next section.

#### 4. Japanese Lexical Compounds versus English Non-lexical Resultatives

We assumed in the previous section that lexical causatives and non-lexical resultatives have an identical Event Structure, thus they denote the same causal relation. However, the source of the causal meaning is different. As for non-lexical resultatives, the causation is derived by the composition of Event Structures. Thus Conceptual Structure (CS) should not be affected, and the causation is not encoded at the level of CS. The two subevents have their own LCSs assigned as in (57).

(57) John hammered the metal flat



CS: [hammer (j, m)] [flat (m)]

However, they are not combined at the level of Conceptual Structure. There is no causative CS functions such as CAUSE. The source of causation can only be Event Structure, namely (51). As for lexical causatives, on the other hand, the causation is encoded as an inherent property of the verbs, so it is plausible to assume that the causal relation is also encoded at the level of LCS as in (1b) repeated below as (58) as well as at the level of Event Structure.

- (58) [<sub>EVENT</sub> CAUSE ([<sub>EVENT</sub> the explosion], [<sub>EVENT</sub> BECOME (the house, broken)])]

Event Structures of lexical causative verbs inherit the causation encoded in LCS, and they have a transition structure as we saw in (50). Thus we can attribute the source of concealed causation to either the transition structure of Event Structure (via interpretation rule (51)) or the CAUSE function in LCS. Then we must determine which level of semantic representation is the genuine source of the causation. In this section, we argue that there are some pieces of evidence that suggest it is the level of LCS. Because we assume that Event Structure and Conceptual Structure are closely related in a principled way and they interact with each other, the argument in this section sometimes depends on quite subtle differences in meaning. However, it will be shown that such differences are explained under the present theory, which, then, leads us to the conclusion that the theory proposed here is supported empirically as well as conceptually.

In section 1, we summarized the causative constructions in English and Japanese as in (29), repeated here.

(59) English	Japanese	Causation type
Lexical causative	— Lexical causative	) concealed causation
(Lexical resultative	— Lexical resultative)	
Non-lexical resultative	— Lexical V-V compound	
Periphrastic causative	— -(s)ase- causative	— explicit causation

An interesting mismatch occurs in the correspondence between English non-lexical resultatives like (60a) and Japanese lexical V-V compounds like (60b):

- (60) a. I pushed the door open.  
 b. Watashi-ga doa-o oshi-ake-ta.  
 I-Nom the door-Acc push-open-Past

To describe the same eventuality, English uses a composition process at Event Structure and Japanese uses a lexical process of compounding. This difference leads to contrasts in acceptability in some environments.<sup>10</sup>

The contrast we point out here concerns adverbial modification. Japanese adverbial *kenmeini* appears to co-occur with both telic and atelic verbs:

<sup>10</sup> The argument below is based on Kageyama (1996).

- (61) a. Kare-wa kenmeini hashit-ta.  
           He-Top hard run-Past  
       b. Kare-wa kenmeini doa-o ake-ta.  
           He-Top hard the door-Acc open-Past

However, when *kenmeini* co-occurs with a verb that is lexically telic as in (61b), the verb has an atelic reading. (61b) does not necessarily imply that the door finally opened as the following examples illustrate:

- (62) a. \*?Kare-wa doa-o ake-ta, demo doa-wa  
           He-Top the door-Acc open-Past but the door-Top  
           aka-nakat-ta.  
           open-not-Past  
       b. Kare-wa kenmeini doa-o ake-ta, demo doa-wa  
           He-Top hard the door-Acc open-Past but the door-Top  
           aka-nakat-ta.  
           open-not-Past

Without *kenmeini* as in (62a), the first conjunct strongly implies that the door opened and, thus, contradicts the second conjunct. On the other hand, if *kenmeini* appears as in (62b), the sentence is fully acceptable. Thus the first conjunct does not imply that the door finally opened. Moreover, the atelicity is made clear when a time adverbial is added:

- (63) a. ?Kare-wa ichi-jikan kenmeini doa-o ake-ta.  
           He-Top one-hour hard the door-Acc open-Past  
       b. \*?Kare-wa ichi-jikan-de kenmeini doa-o ake-ta.  
           He-Top one-hour-DE hard the door-Acc open-Past

The adverbial *ichi-jikan* normally co-occurs with atelic predicates, whereas the adverbial *ichi-jikan-de* co-occurs with telic predicates. The contrast in (63) shows that the verb phrase *kenmeini doa-o ake-ta* is atelic. Bearing these facts in mind, examine the example below, where a lexical V-V compound appears:

- (64) Watashi-wa kenmeini doa-o oshi-ake-ta.  
           I-Top hard the door-Acc push-open-Past

(64) has an atelic reading in the same way as (61b). The atelicity is obvious when we see that the following sentence is still acceptable.

- (65) Kare-wa kenmeini doa-o oshi-ake-ta, demo doa-wa  
 He-Top hard the door-Acc push-open-Past but the door-Top  
 aka-nakat-ta.  
 open-not-Past

This fact suggests that Japanese lexical V-V compounds retains the atelic property as part of their meaning.

The English counterpart of *kenmeini*, i.e., *hard*, has a more restricted distribution. It only cooccurs with atelic predicates:

- (66) a. I studied hard.  
 b. \*I opened the door hard.

And it does not cooccur in non-lexical resultatives:

- (67) \*I pushed the door open hard.

These examples show that English non-lexical resultatives are completely telic, never atelic.

Accordingly, Japanese lexical V-V compounds and English non-lexical resultatives differ with respect to telicity. Japanese lexical V-V compounds are not necessarily telic, while English non-lexical resultatives must be strictly telic. Recall that we assumed that aspectual properties like telicity are represented at the level of Event Structure. If we suppose that English non-lexical resultatives are derived by the combination process at Event Structure, the change of telicity in (67) is accounted for. The transition structure always denotes telic events. In Japanese, the V-V compounding in question is a lexical process. If we assume that lexical V-V compounding is a process that affects LCS, the telicity, which is not explicitly encoded at the level of LCS, is not directly affected. Note that this account holds only when we assume Event Structure as a distinctive level of semantic representation.

## 5. Summary

We have argued that the dual semantic representation approach is conceptually and empirically supported. It has been shown that the notion of direct causation can be reorganized as two separate constraints on semantic representations. The No Mediating Cause Constraint prohibits a mediating factor between a causer and a caused event. It is a constraint on Conceptual Structure because the determination of a mediating factor is dependent on situational and contextual information. The Aspectual Constraint prohibits

the temporal distance between a causing event and a caused event. It should be regarded as a constraint on Event Structure because it refers to the temporal organization of events. The dual semantic representation approach is conceptually preferable since it allows a clear-cut formalization of direct causation restrictions.

Furthermore, the present theory is empirically supported. As we have seen in section 4, a subtle difference in meaning between English non-lexical resultatives and Japanese lexical V-V compounds can be attributed to the difference in the representation of causation. In non-lexical resultatives, causation is represented only in Event Structure; whereas in lexical V-V compounds, causation is represented in Conceptual Structure.

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