



# English causative alternation: A sign-based constructional approach<sup>\*</sup>

Incheol Choi

(Kyungpook National University)

**Choi, Incheol. 2024. English causative alternation: A sign-based constructional approach.** *Linguistic Research* 41(3): 475-491. English causative alternation is largely considered to be controlled by the semantic content of a lexical entry. However, clarifying the extent of this belief has been challenging. This paper proposes an SBCG analysis utilizing the feature structures and inheritance hierarchies of HPSG to address these challenges, bypassing the need for inferential conceptual structure or arity operations. Unlike traditional theories where lexical entries directly function as lexemes in syntax, this approach suggests that terminal lexemes inherit constraints from both supertype lexemes and lexical entries. This method avoids issues arising from treating one alternant as the base of derivation and pursues grammatical rigor by model-theoretically defining alternation elements. The possibility of alternation is determined by the unification potential of feature types within a type hierarchy, thereby reconciling the productive aspects of causative alternation with lexical idiosyncrasies. (Kyungpook National University)

**Keywords** English causative alternation, HPSG, Sign-Based Construction Grammar, linking

## 1. Introduction

English verbs that describe change of state events can be used in both transitive and intransitive constructions without any morphological variation:

(1) a. John broke the window.

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\* I am grateful to the anonymous reviewers for their valuable insights. All remaining errors are solely the responsibility of the author.

b. The window broke.

- (2) a. Jane opened the door.  
b. The door opened.

The causative alternation shows that internal theme arguments are realized as subjects in their intransitive counterparts, where agent arguments disappear. The verbs in (1b) and (2b) have been termed unaccusative because their sole arguments lose their object-like properties, and these verbs display a distinctly different nature compared to the passive verbs in (3).

- (3) a. The window was broken on purpose.  
b. \*The window broke on purpose.

The reason why the unaccusative verbs cannot combine with adverbial phrases like *on purpose* is that they lack a concept of an agent, unlike passive verbs, which still retains an implicit agent.

Challenges that this verb alternation phenomenon reveals include the fact that this alternation is not fully predictable from the semantic classification of verbs:

- (4) a. \*The toys ruined in the rain.  
b. \*All the chickens killed.

As observed in Rappaport Hovav (2014), verbs of killing, such as *destroy*, *demolish*, *ruin*, and *kill*, do not occur in intransitive sentences, even though they involve change-of-state eventualities.<sup>1</sup> Conversely, there are verbs that do not appear in transitive sentences despite being semantically classified as typical change-of-state verbs, as illustrated in (5).

- (5) a. \*He fell the glass.  
b. \*The criminal died an innocent person.

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<sup>1</sup> An event refers to a specific occurrence, whereas an eventuality encompasses a broader definition that includes possible situations or states. In this paper, the terms event and eventuality are used interchangeably without distinguishing their definitions.

c. \*The farmer blossomed the fruit trees.

Furthermore, as discussed in Levin and Rappaport Hovav (1995) and Rappaport Hovav (2014), there are verbs that, in principle, can participate in alternation but do not for certain choices of arguments.

- (6) a. I cleared the screen.  
 b. The screen cleared.
- (7) a. The waiters cleared the counter.  
 b. \*The counter cleared.

Rappaport Hovav (2014) notes that a study that relies solely on the semantic classification of verbs or their lexical properties would struggle to adequately address the issues discussed here.

The challenge presented by English causative alternation arises because a single verb can have both a transitive use and an intransitive use, and the lexical identification of the verb is not determined solely by its semantic classification, such as change-of-state verbs or causative verbs. Treating the alternants as polysemy (i.e., different lexical entries) is not desirable because it ignores the connection between the two alternants. Additionally, the fact that the alternation is largely governed by universal lexical information, yet still sometimes relies on lexical idiosyncrasy (e.g., *kill* vs. *die*), presents an additional challenge for researchers constructing adequate grammatical frameworks for this issue.

In this paper, building on Sign-Based Construction Grammar (Sag et al. 2012, SBGC) and HPSG linking approaches (Pollard and Sag 1994; Koenig and Davis 2006; Davis and Koenig 2000, 2021), I propose solutions to address the challenges. Traditional views of thematic roles cannot capture the full range of causative alternation. Instead, in this paper, I adopt a partial ordering of semantic roles, such as ACT, UND, and SOA, based on entailments as a tool of the linking system to capture the connection between verb meaning and argument structure (Dowty 1991). Those roles are established as features of relations that decompose the semantic properties of verbs in a parallel manner, serving to link semantic elements with syntactic arguments (Section 3.1). Utilizing SBCG feature structures and a multiple inheritance type hierarchy, I suggest that a feature structure representing a lexical

entry exists separately from lexeme features equipped with constructional information in the type hierarchy. The terminal lexeme features, containing the full-fledged lexical and syntactic information of the verb, inherit all constraints and information collectively from their relevant supertype features (Section 3.2). The remaining section addresses how the proposed analysis deals with otherwise problematic cases and how the KEY feature, as the locus of linking, plays a crucial role.

## 2. Literature review

A common approach to handling causative alternation is that the two variants of the alternation are derived from a single lexical entry. That is, one of the two alternants is taken as the base, and a lexical or syntactic operation involving arity changes adds or removes an argument. In this section, I will examine these analyses and reveal the limitations of explaining causative alternation through syntactic or lexical derivation using arity operations.

### 2.1 The decausativization analysis

Various researchers consider that the verbs participating in causative alternation are basically dyadic, selecting both a causer and a theme argument (Grimshaw 1982; Reinhart 2002; Chierchia 2004 and many others). In the approaches that consider the transitive causative alternant as the base of derivation, it is necessary to explain why causative verbs like *murder* and *kill* do not have intransitive counterparts. In relation to this issue, Reinhart (2002), suggests that only when a transitive verb denoting a change-of-state eventuality describes an unspecified external causation does it feed the alternation rule, resulting in a monadic unaccusative verb. For instance, the verb *break* describes external causation but does not specify a specific intention or the involvement of an agent, in contrast to the verb *murder*, whose subject carries out a certain intentional or volitional action. Specifically, the intransitive alternant of *break* is derived by the lexical operation given in (8).

(8) Decausativization: Reduction of [+cause] role

$$V_{ACC} (\Theta_{[+C]}, \Theta_j) \rightarrow V(\Theta_j)$$

This rule explains not only the alternation but also the wide semantic range of the external agent for the verb *break*. As shown in (9a), the verb *break* allows for a variety of semantic causers, not just an agent causer. Reinhart (2002) concludes that this is because, unlike verbs like *murder*, the verb *break* does not impose specific restrictions on its subject.

- (9) a. Antonia/the wind/the ball broke the window.  
 b. The window broke.

However, as noted in Rappaport Hovav (2014), this type of analysis does not precisely capture the English causative alternation. For example, even the verb *break*, which is the most typical causative alternation verb, may not have an intransitive counterpart depending on the overall meaning of the sentence:

- (10) a. He broke his promise.  
 b. \*His promise broke.

To explain the ungrammaticality of (10b), it is necessary to explicitly state the volitional causer's involvement in the lexical properties of *break*, which contradicts the logic used to explain (10). Furthermore, numerous typical alternating change-of-state verbs lack corresponding intransitive sentences depending on the context in which the verbal meaning is combined.

## 2.2 The causativization analysis

Many studies on causative alternation have regarded the alternation as a lexical or syntactic arity operation, considering that the transitive causative alternant is derived from the intransitive inchoative alternant (Lakoff 1966; Dowty 1989; Hale and Keyser 1993; Härtl 2003). For example, Hale and Keyser (1993) suggest that alternating verbs have an intransitive entry involving only the change of state in its lexical conceptual structure (LCS), which is modified by causativization, embedding the CAUSE predicate and introducing the external argument variable as shown in (11).

- (11) Basic LCS of *break*: [BECOME BROKEN (x)] →  
 Derived LCS of *break*: [(y) CAUSE [BECOME BROKEN (x)]]

Contrary to decausativization analyses, these approaches must explain why verbs with a change-of-state LCS do not participate in alternation:

- (12) a. The letter arrived.  
 b. The vase fell.  
 c. The person died.

The sentences in (12) do not have transitive causative counterparts although the theme arguments in them undergo the change of state. In addition, the so-called internally caused change-of-state verbs, such as *blossom*, *shudder*, and *tremble*, do not occur in transitive causative sentences either (Levin and Rappaport Hovav 1994):

- (13) a. \*The farmers blossomed the fruit.  
 b. \*The monster shuddered Mary.  
 c. \*The scene trembled her.

Levin and Rappaport Hovav (1994) consider the verbs in (13) to describe internally caused eventualities since the eventualities arise from inherent properties of their arguments and lack external causation. Given this consideration, the arguments of these verbs become the theme and the causer of the change of state simultaneously. In this case, rules like the one in (11) that take the intransitive alternant as input cannot prevent overgeneralization as in (13).

### 3. A SBCG approach to causative alternation

#### 3.1 A semantic analysis and linking

Both the transitive and intransitive alternants of the causative alternation involve a change-of-state interpretation. Traditionally, this semantic property has been considered to be encoded in a lexical item whose sole argument bears the undergoer

thematic role. However, in Head-Driven Phrase Structure Grammar (HPSG) linking approaches, lexical decomposition and proto-role approaches have been utilized to describe this semantic relation (Davis and Koenig 2000; Koenig and Davis 2006). As is well known, traditional thematic roles do not encompass every argument. A significant drawback of the thematic role approaches is that the same role might be assigned to both the subject and the object of a verb simultaneously, and multiple roles can be assigned to a single argument.

Avoiding the problems posed by thematic roles, three proto-roles, ACT, UND, and SOA, suffice to explain linking system in HPSG (Dowty 1989; Davis 1996; Davis and Koenig 2000; Choi 2003). The ACT and UND attributes in HPSG represent disjunctions of entailed properties of situational participants, similar to the proto-agent and proto-patient roles advocated by Dowty (1991). For example, while ACT covers a wide range of entailments, in (14) it stands for a causer who is responsible for and initiates the event.

(14) Transitive lexeme *break* (preliminary)

$$\left[ \begin{array}{l} \text{CONTENT} \left[ \begin{array}{l} \text{ACT } \boxed{1} \\ \text{UND } \boxed{2} \end{array} \right] \\ \text{ARG-ST} \left\langle \text{NP}_{\boxed{1}}, \text{NP}_{\boxed{2}} \right\rangle \end{array} \right]$$

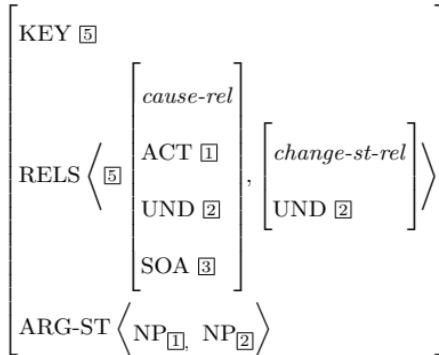
On the other hand, the UND attribute designates the semantic argument that undergoes the event. The linking constraints in HPSG maps the ACT role to the initial item in the ARG-ST list whereas the UND role to the second item in the list.

Building on the Minimal Recursion Semantics (MRS; Copestake et al. 2001), Davis et al. (2021) suggest that CONTENT values consist of elementary predications characterized by RELS values and the relationships among them are not specified. For instance, the transitive lexeme *break* will be represented by the AVM in (15). The RELS feature provides a partial description of the semantic content of the transitive alternant of the causative alternation verb *break*.<sup>2</sup> Each member of the list represents

<sup>2</sup> This presentation is an abbreviated version following the HPSG feature structure conventions. The KEY

a significant semantic relation. In (15), the cause relation (*cause-rel*) and the change of state relation (*change-st-rel*) are distinct members that characterize the causing event and the resultant change of state, respectively.<sup>3</sup>

(15) Transitive lexeme *break*



This analysis aligns with traditional approaches to English causative verbs, in that the first member of the RELS list represents the causing event involving an external agent, whereas the second member describes the theme argument in the change of state subevent. The feature structure inherits the more general constraints for the entire causative construction from its super-type. These type constraints include the linking rule, which states that the value of ACT in *cause-rel* is linked to the thematic role of the initial argument in ARG-ST, and that of UND is linked to the second argument. The advantage of using proto-role features like ACT and UND is that the issues raised by Reinhart (2002) do not pose any problems within this treatment. As shown in (9a), the ACT feature inherently allows for the possibility of categorizing the subject of the verb *break* in various ways. This means that, in addition to a traditional agent, a causal affector or influencer can also be considered a valid entailment of the ACT feature.

A question that arises from this treatment is why the *cause-rel*, rather than the *change-st-rel*, determines the linking and how it is licensed. Using the MRS feature inventory, Koenig and Davis (2006) propose that the feature KEY plays a crucial role.

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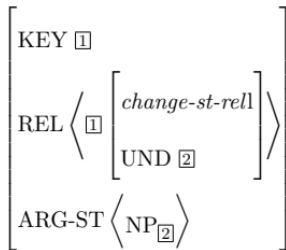
feature and RELS feature are represented as values of the CONTENT feature.

<sup>3</sup> In this framework, semantic information is bundled into atomically decomposed relation types and only the relations are relevant to the linking.



For linking, one of the RELS values is designated as the value of the KEY feature. The relation designated by the KEY feature becomes the focal point for the linking process, while other relations do not intervene. The intransitive alternant of the causative alternation involves only the change of state. For example, the intransitive lexeme *break* can be described by the feature structure in (16).

(16) Intransitive lexeme *break*



Here, the sole relation *change-st-rel* assumes the key role for linking, and hence the value of UND maps onto the single argument of the ARG-ST.

### 3.2 A SBCG approach

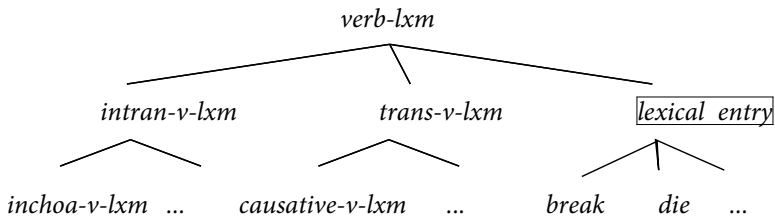
In Sign-Based Construction Grammar (SBCG), grammatical objects such as lexemes, words, and syntactic patterns are formulated as feature structures (Sag et al. 2012).<sup>4</sup> Each feature structure conveys partial information about linguistic entities, and multiple feature structures collectively form grammatical generalizations to ensure certain constructions are well-typed. To be grammatically valid, constructions must adhere to the well-formed multiple inheritance system of constraints, where various constraints are hierarchically inherited by subtypes of feature structures.

In SBCG, lexemes are not single entities but collections of feature structures organized within a type hierarchy. Building on the SBCG feature structure regime, I suggest that the grammatical characteristics of a lexeme result from the multiple inheritance of constraints from various feature structures. Particularly, following the lexicalist doctrine, this analysis treats the two alternants of the causative alternation

<sup>4</sup> Goldberg (2006) suggests that any linguistic pattern is recognized as a construction, meaning that lexemes, words, and syntactic constructions are all considered constructions. In this paper, however, I use traditional terms such as lexemes, words, and lexical entries.

as separate but related lexemes. However, the maximal type of a lexeme, for example intransitive *break*, is not brought about by a specific lexical entry. Instead, various constraints from separate feature structures instantiate the maximal lexeme type, as illustrated in the multiple inheritance hierarchy shown in (17).

(17) Simplified hierarchy of verb lexeme<sup>5</sup>



The *inchoa-v-lxm* and *causative-v-lxm* each implement the constraints of the intransitive alternant and transitive alternant of causative alternation constructions, with their feature structures being virtually identical to those in (16) and (15), respectively. The *inchoa-v-lxm* and *causative-v-lxm* each implement the constraints of the intransitive and transitive alternants in causative alternation constructions, with their feature structures being virtually identical to those in (3) and (2).

Rappaport Hovav (2014) posits the intransitive alternant as the basis of the alternation rule. In contrast with lexical rule approaches, this analysis does not choose one of the alternants as the input of the rule. However, to a certain extent, the approach proposed here is similar to Rappaport Hovav (2014) in that the lexical entry in this approach includes only the description of the internal theme argument as given in (18).

5 Some abbreviations:

*lxm*=lexeme, *intran-v-lxm*=intransitive verb lexeme, *inchoa*=inchoative verb lexeme,  
*tran-v-lxm*=transitive verb lexeme

(18) Lexical entry *break*

$$\left[ \begin{array}{l} \text{FORM} \langle \textit{break} \rangle \\ \text{REL} \langle \begin{array}{l} \boxed{1} \left[ \begin{array}{l} \textit{change-st-rel} \\ \text{UND} \boxed{2} \end{array} \right] \end{array} \rangle \end{array} \right]$$

Because this lexical entry contains only minimal information, it omits linking details such as KEY and ARG-ST.<sup>6</sup> Minimizing the information in the lexical entry ultimately allows it to unify with other types of feature structures in the verb lexeme hierarchy. As a result, the lexical entry licenses two distinct lexeme types being unified with *inchoa-v-lxm* and *causative-v-lxm*. The formulations in (19) and (20) illustrate how the terminal intransitive and transitive lexemes of *break* are derived.

(19) Intransitive *break*

$$\left[ \begin{array}{l} \text{MTR} \left[ \begin{array}{l} \textit{break}_{int} - \textit{lxm} \\ \text{FORM} \langle \textit{break} \rangle \\ \text{KEY} \boxed{1} \\ \text{REL} \langle \boxed{1} \rangle \\ \text{ARG-ST} \langle \text{NP} \boxed{2} \rangle \end{array} \right] \\ \text{DTRS} \left[ \begin{array}{l} \textit{break} \\ \text{FORM} \langle \textit{break} \rangle \\ \text{REL} \langle \begin{array}{l} \boxed{1} \left[ \begin{array}{l} \textit{change-st-rel} \\ \text{UND} \boxed{2} \end{array} \right] \end{array} \rangle \end{array} \right] \end{array} \right]$$

<sup>6</sup> In this paper, lexical entries are treated as distinct from the concept of lexemes. While a lexical entry contains only the most fundamental information of a word, a lexeme includes structural information that integrates across multiple levels.

(20) Transitive lexeme *break*

MTR	$break_{tr} - lxm$ FORM $\langle break \rangle$ KEY [2] REL $\langle [2], [1] \rangle$ ARG-ST $\langle NP_{[3]}, NP_{[4]} \rangle$							
DTRS	$break$ FORM $\langle break \rangle$ REL $\langle [2]$ <table style="border-left: 1px solid black; border-right: 1px solid black; padding: 5px; display: inline-table; vertical-align: middle;"> <tr><td style="padding: 2px 5px;"><math>cause-rel</math></td></tr> <tr><td style="padding: 2px 5px;">ACT [3]</td></tr> <tr><td style="padding: 2px 5px;">UND [4]</td></tr> <tr><td style="padding: 2px 5px;">SOA [5]</td></tr> </table> , [1] <table style="border-left: 1px solid black; border-right: 1px solid black; padding: 5px; display: inline-table; vertical-align: middle;"> <tr><td style="padding: 2px 5px;"><math>change-st-rel</math></td></tr> <tr><td style="padding: 2px 5px;">UND [4]</td></tr> </table> $\rangle$	$cause-rel$	ACT [3]	UND [4]	SOA [5]	$change-st-rel$	UND [4]	
$cause-rel$								
ACT [3]								
UND [4]								
SOA [5]								
$change-st-rel$								
UND [4]								

The SBCG formulations (Sag et al. 2012) in (19) and (20) demonstrate how the lexical entry *break* results in specific terminal lexemes unifying with the *inchoa-v-lxm* and *causative-v-lxm*. Unlike the lexical rule, this approach does not take one alternant of the causative alternation construction as the input for the rule. Additionally, it does not treat the two lexeme alternants as idiosyncrasies of the lexicon. Instead, this proposal clearly captures how two alternants are connected: they manifest as different types of lexemes in the process of a single lexical entry combining with different types of feature structures.

In contrast with derivational approaches or lexical rule-based approaches, this analysis effectively accommodates otherwise problematic cases:

- (21) a. The waiter cleared the counter.  
b. \*The counter cleared.  
c. The screen cleared.

The lexeme constraints identical to those in (19) prevent the verb *clear* from appearing in the intransitive sentence as in (21b). This is because the event of clearing a counter does not occur without the intervention of an external agent. In contrast, the screen can clear without external intervention, as observed in Rappaport Hovav and Levin (2012), and hence the verb *clear* can appear in the intransitive alternant in (21c). The analysis proposed here accommodates this explanation because the constraints in (19) and (20) provide comprehensive terminal information about the two alternants of the causative alternation. Specifically, the constraints in 19 are compatible with the meaning conveyed by the verb *clear*.

### 3.3 Lexical idiosyncrasies and KEY feature

As discussed in the previous section, not all change of state verbs undergo causative alternation. One of the most challenging issues among these examples is explaining how, despite the semantic connection between *kill* and *die*, they occur as different lexical items without undergoing causative alternation.

- (22) a. An innocent person died.  
 b. \*The criminal died an innocent person.  
 c. The criminal killed an innocent person.  
 d. \*An innocent person killed.

In (22a), the change of state is conveyed with the same meaning as in (22c), with the only addition being the presence of a causer. Approaches that use the change of state as the sole input for the alternation rule cannot prevent (22b) from being generated, since the reconciliation between the rule and idiosyncrasy might not be achievable. In a sense, *kill* can be defined as the suppletive causative form of *die*, as (22d) is also not possible, as suggested in Rappaport Hovav (2014).

The SBCG approach proposed here effectively accommodates lexical idiosyncrasies without positing it as exceptions. In this approach, as illustrated by the verb lexeme hierarchy in (17), lexical entries that contain the basic properties of verbs exist on a separate level from *intran-v-lxm* or *tran-v-lxm*. Therefore, simply, such idiosyncrasies can be attributed to the lexical entries. The feature structure given in (23) demonstrates

the lexical properties of *die*.

(23) Lexical entry *die*

$$\left[ \begin{array}{l} \text{FORM} \langle die \rangle \\ \text{KEY} \text{ [1]} \\ \text{REL} \langle \text{ [1]} \left[ \begin{array}{l} \text{change-st-rel} \\ \text{UND [2]} \end{array} \right] \rangle \end{array} \right]$$

In contrast to the lexical entry *break*, the lexical entry for *die* has *change-st-rel* as a KEY feature specification. Consequently, the more detailed lexical entry for *die* is naturally more restricted in its usage compared to *break*. Specifically, since *die* explicitly specifies a change of state as its KEY value, it cannot participate in transitive alternation. That is, the information of the lexical entry *die* is not compatible with *tran-v-lxm*, whose KEY feature designates *cause-rel* as its value. This analysis also allows the lexical entry for *kill* to require its KEY feature to designate *cause-rel* as its value, thus permitting only a transitive verb lexeme as shown in (22c).

The same explanation can be applied to other change-of-state verbs such as *fall*, *vanish*, and *arrive* that do not participate in causative alternation. This approach is characterized by the fact that lexical entries participating in alternation are subject to less specific constraints compared to those that do not participate. This means that the lexical entries of causative alternation verbs are more flexible in their unification with constructions and the proposed analysis accurately reflects these tendencies.

There are also verbs that denote the change of the state but their eventualities are not externally controlled as observed in (13) (Smith 1970). For these verbs, the eventualities result from inherent properties of their arguments. A way to handle such verbs might be to consider that the arguments they take are licensed by both the ACT and UND features. In Davis (1996) and Choi (2003), it can be possible that not only volitional agent but also causal affector that is responsible for the eventuality can be suitable to be the value of ACT. Therefore, the verbs denoting internally caused eventualities can have ACT and UND features whose values are token identical as illustrated in (24).

(24) Lexeme *tremble*

FORM	⟨ <i>tremble</i> ⟩
KEY	[1]
REL	⟨ [1] [ <i>internal-cause-rel</i> ] [ ACT [3] ] , [2] [ <i>change-st-rel</i> ] [ UND [3] ] ⟩
ARG-ST	⟨ NP [3] ⟩

The two relation features in (24) each include an ACT feature and an UND feature. The fact that the values of these two features are identical implies that the semantic nature of the argument carries different entailments in each relation. In a semantic representation based on entailments, there is no restriction preventing an argument from being linked as an ACT value in one decomposed semantic relation and as an UND value in another. This provides a useful tool for explaining the linking of verbs that denote internally caused eventualities. As shown by the KEY feature in (24), for such verbs, the locus of linking is the *internal-cause-rel* rather than the *change-st-rel*, which explains why they do not participate in the causative alternation.

#### 4. Conclusion

This paper proposes an SBCG analysis capable of explaining the English causative alternation. Unlike traditional theories where lexical entries directly function as lexemes that feed into syntax, this proposal suggests that terminal lexemes inherit constraints from supertype lexemes containing constructional information, as well as from lexical entries encompassing lexical idiosyncrasies. This approach circumvents the issues arising from considering one alternant of the causative alternation as the base of derivation. Additionally, unlike explanations that rely on the nature of the eventuality, including conceptual structure or contextual information, this proposal pursues grammatical rigor by defining the elements involved in the alternation model-theoretically. In this proposal, the possibility of alternation is determined not by inferential mechanisms related to the nature of the eventuality, but by the potential

for unification of feature types within a type hierarchy. This method's advantage lies in its ability to reconcile the productive aspects of English causative alternation with the nature of lexical idiosyncrasies without conflict.

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**Incheol Choi**

Professor  
 Department of English Education  
 Kyungpook University  
 80 Daehak-ro, Buk-gu  
 Daegu 41566, Korea  
 E-mail: incheol@knu.ac.kr

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